

RELATIONSHIP OF INFORMATION-PROCESSING ATTITUDE STRUCTURES TO PRIVATE BRAND PURCHASING BEHAVIOR¹

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Variables related to consumer information-processing models and consumer attitude structures were used to discriminate between private and nonprivate brand purchasers. Discriminant analysis was used to derive discriminant functions and to classify subjects. In general, variables reflecting lower risk and greater information were associated with private brand choices. Approximately 80% of the subjects in the three product classes studied were correctly classified. A scrambled sample validation procedure showed that these results were not spurious. Arguments for the general usefulness of an information-processing and decision-structure-oriented approach were advanced.

There have been several research studies that have attempted to characterize those consumers who purchase private brands and to distinguish them from those who buy nonprivate brands. To date, the results have not proven very successful. For example, Frank and Boyd (1965), defining private brands as those owned by either retailers or distributors and nonprivate brands as those owned by manufacturers, find virtually no predictive power for demographic and socioeconomic variables in attempting to predict the proportion of a household's private brand purchases. They conclude that private brand and nonprivate brand consumers are essentially indistinguishable with respect to such demographic measures. Similarly, Myers (1967), in attempting to predict private brand attitude, found very little predictive power for general personality variables and socioeconomic factors. Finally, Burger and Schott (1972) again found that demographic variables did not discriminate private brand from nonprivate brand buyers. However, they did find some degree of discrimination with attitudinal variables.

These results stem perhaps from the lack of a proper analytic framework. It is certainly easier to form market segments based

on demographic and socioeconomic variables, but such variables have not added much to the understanding of the psychology of consumer choice processes. There is no reason to expect demographic or general personality trait measures to correlate well with behavior, as has been shown in many consumer studies (Kassarjian, 1971). Fishbein (1967) has pointed out the same type of reasoning in studying attitude-behavior linkages. General measures of attitude may be compatible with many different behavioral responses; hence, such a general measure should not be expected to correlate highly with any given response.

In contrast, the more specific information-processing models have proven successful in modeling buyer choices in several areas (Bettman, 1970; Haines, 1969). Such models utilize complex decision networks composed of product perceptions and situational variables. Haines (1969) has noted the similarities between this approach and the notion of complex attitude structures developed by Schroder, Driver, and Streufert (1967). They see attitude as consisting of two types of properties:

An attitude is defined in terms of content properties (magnitude and direction; for example, x degree of conservatism) and structural properties (the complexity of conceptual rules involved in processing information about stimuli relevant to the attitude area) [p. 129].

These structural properties of attitude seem to be what is depicted in the consumer decision net information-processing models. As

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Schroder et al. (1967) state, "‘structural variables’ provide a metric for measuring the way a person combines information . . . for adaptive purposes [p. 4]." Thus, consumer attitude structure properties represent the internal model used by the consumer to process data about stimuli relevant to product choice.

This suggests that, in general, developing an information-processing model of a choice process can conceivably be considered as similar to the problem of assessing attitude-behavior relationships, when attitude is represented by both content and specific attitude structural properties. Fishbein (1972) has found that a fruitful approach to studying attitude-behavior relations involves using situation-specific attitudes and measures of attitude-belief components. This suggests an approach to the problem of discriminating between private and nonprivate brand purchasers. Useful variables for such differentiation are likely to be both related to the content properties of attitude and contained in the situation-specific attitude structures of purchasing. Bettman (1970) found that perceived risk of a product class was an important part of consumer information-processing structures for grocery products. Perceived product quality, informational variables, and the influence of children were also found to be relevant in these models. Note that such variables also should affect the content of the attitude toward grocery product brands, not merely be a part of the structural properties of the attitude that affects consumer information handling.

The objective of this study is to reexamine the phenomenon of private brand purchasing from a different perspective than that of explaining behavior by using general traits and descriptors. In particular, a situation-specific information-processing approach is taken. This study tests the usefulness of this information-processing viewpoint. Those variables previously found to be contained in the attitude structures active in processing information in the grocery brand purchase situation were used to attempt to discriminate between private and nonprivate brand choices. To the extent that this more micro and situation-

specific approach is successful, the information-processing approach is supported.

METHOD

Subjects

The subjects for the present study were 123 housewives selected from the Los Angeles area. The subjects were mostly wives of students living in the married student housing complex at the University of California, Los Angeles and members of a women's group. The subjects completed a paper-and-pencil instrument measuring the information-processing variables and some behavioral variables for each of nine types of grocery products. Specifically, the type of brand purchased and the attitude structure variables were obtained as outlined below.

Variables

The subjects were asked to check which of a list of brands in a product class they usually purchased. This allowed determination of the dependent variable of private brand or nonprivate brand choice. There were large enough groups of private brand purchasers to analyze for three of the nine product classes: paper towels, aspirin, and margarine.

The 10 independent variables measured fell into four main types of variables which had previously been found in consumer information-processing attitude structures for grocery products: demographic, perceived risk related, perceived product quality related, and information related (Bettman, 1970). Only 1 demographic variable was used, number of children living at home.

For the perceived risk variables, a measure of the inherent riskiness in a product class was developed by using paired comparisons with a 10-point intensity scale. For each comparison, each subject rated which of a pair of product classes would be more risky to purchase in an imaginary store where all brand levels and prices were disguised. The subject then rated how much more risky the chosen class would be on the intensity scale (with 0 meaning equally risky and 9 meaning much more risky). These data for each subject were then processed as follows to obtain a risk scale. Suppose product classes i and j were the two classes in the pair, and denote the numerical rating obtained by d_{ij} . The following sign convention was used: if i is more risky than j , $d_{ij} > 0$; if i and j are equally risky, $d_{ij} = 0$; and if i is less risky than j , $d_{ij} < 0$. Since this rating was obtained for all the distinct product class pairs only (i.e., $9 \cdot 8 / 2 = 36$ pairs), set $d_{ji} = -d_{ij}$. Then scale values for each product class s_i were obtained by setting $s_i = \sum_{j \neq i} d_{ij} / 9$.³ Thus, the s_i represent the relative degree of risk for that subject for each product class; that is, the s_i for each subject summed to zero over the nine classes. In addition, the measures of certainty and danger components of risk

³ This is akin to Thurstonian scale values. For an example of the use of this technique, see Bechtel, Tucker, and Chang (1971, pp. 374-375).

used by Cunningham (1967) were used, adapted to 10-point rating scale format.

To measure variables related to perceived product quality, the subjects were given a set of brand names for each product class (each subject had the same set, but the number of brands given differed across product classes). The subjects then placed these brands on a 20-point quality scale, ranging from very low to very high quality. The subjects also marked the lowest level of quality for each product class that would be acceptable to them. Given this data, the following measures were developed for each product class. Mean quality was measured as the mean for the quality levels marked for the sample of brands. Relative variance was obtained by measuring the sample variance in quality for each class and dividing by the maximum variance in quality for each subject over all nine product classes. The acceptance level was measured simply as the quality level marked as the minimal acceptable level. Finally, percent acceptable was defined as the percentage of the sample of brands for each class rated equal to or above the minimal acceptable level of quality by each subject.

Two informational variables were used. Mean familiarity was obtained by having subjects rate each brand in a product class on a 10-point familiarity scale. The average rating across brands was then taken. Confidence in information was measured on a 10-point rating scale for each product class.

Method of Analysis and Hypotheses

Because the dependent variable of private brand purchasing was a binary variable, a two-group multiple discriminant analysis was performed using the 10 independent variables defined above. This analysis yielded both discriminant functions and a classification table for each of the three product classes analyzed.

As discussed above, the information-processing variables measured should be related to consumer choice behavior, since these variables are contained in the attitude structures influencing consumer choice, and should also be related to the content properties of the attitudes invoked in the choice situation. In particular, private brand purchasing should be associated with a lower degree of risk and uncertainty attributed to a product class, higher and less variable perceived quality for brands in the class, and more information and familiarity with the product class. These hypotheses follow from the general notion that private brand purchasing is more likely when the consumer is confident she can obtain satisfactory performance as well as save money. Also, the greater the number of children at home, the greater the familiarity with the class and the motivation to economize on purchases are likely to be. Frank and Boyd (1965) found a slight association between family size and private brand purchases. These general arguments may be translated into specific terms by hypothesizing expected signs for the variables in the discriminant functions. Pri-

vate-brand-purchasing group membership should be associated with lower inherent riskiness (-); greater certainty (+); less perceived danger (-); higher mean quality and percent acceptable (+); lower acceptable level and relative variance (-); greater mean familiarity and confidence (+); and more children at home (+).

RESULTS

The discriminant functions are presented in Table 1 and the classification results in Table 2. The effective sample sizes for each product class were smaller than 123 because some subjects did not purchase in a product class or purchased brands not listed in the sample of brands used in the study.

Generalized Mahalanobis distance was used to test the significance of the discriminant functions.⁴ All three functions were significant at $p < .001$. Note that, in general, the variable coefficients are as hypothesized. One must be careful here, however, since many of the coefficients are not significantly different from zero. Finally, several of the coefficients have what appears to be the wrong sign because they are acting as suppressor variables (Darlington, 1968); that is, the variable actually correlates in one direction with the dependent variable but has the opposite sign in the equation because it is correcting for error in another variable. This is true for percent acceptable for paper towels, acceptable level for aspirin and margarine, mean quality for margarine, mean familiarity for margarine, and confidence for paper towels. The main counter-hypothesis finding seems to be for mean quality. By examining the magnitude of the standardized coefficients, it can be seen that, in general, certainty and percent acceptable are most important for discrimination, although the results vary over product class.

The fact that the discriminant functions are statistically significant does not mean that group members will be correctly classified. In the present study, however, the functions classify quite well, as can be seen from Table

⁴ Generalized Mahalanobis distance can be used to test the hypothesis that the mean vectors for the two groups are equal. Under this null hypothesis, the distribution of this quantity approaches that of chi-square. For more details, see Afifi and Azen (1972, especially pp. 235-250).

TABLE 1
PRIVATE VERSUS NONPRIVATE BRAND DISCRIMINANT FUNCTIONS

Variable	Coefficients for the product classes		
	Paper towels (<i>n</i> = 115)	Aspirin (<i>n</i> = 113)	Margarine (<i>n</i> = 118)
Constant	.957	.464	-.113
Children at home	.059 (.148)*	.013 (.030)	.004 (.010)
Inherent risk	-.002 (-.007)	-.008 (-.064)	-.024 (-.159)
Certainty	.056 (.355)***	.025 (.162)	.030 (.196)*
Danger	-.008 (-.043)	-.034 (-.221)*	-.033 (-.193)*
% acceptable	-.177 ^a (-.111)	.388 (.260)*	.475 (.377)**
Relative variance	-.178 (-.115)	-.273 (-.189)**	-.094 (-.073)
Acceptance level	-.032 (-.220)	.007 ^a (.061)	.035 ^a (.310)*
Mean quality	-.029 (-.099)	-.050 (-.247)**	-.034 ^a (-.174)
Mean familiarity	-.055 (-.229)**	.018 (.057)	-.008 ^a (-.034)
Confidence	.020 ^a (.116)	.018 (.114)	.021 (.147)
Mahalanobis <i>D</i> ²	39.991***	90.363***	45.682***

Note. Standardized coefficients are given in parentheses.

^a Variable acting as a suppressor variable.

* *p* < .10.

** *p* < .05.

*** *p* < .01.

2. The percentages correctly classified are 77.4% for paper towels, 82.3% for aspirin, and 80.5% for margarine. However, extreme care must be used in interpreting these results.

First, since the groups of private and non-private brand purchasers are of unequal size, the appropriate chance classification model must be determined as a standard of comparison. Morrison (1969) argues that the appropriate model is normally the proportional chance model. If *p* is the true proportion of private brand purchasers in the sample and *α* is the proportion actually classified as private

brand purchasers, then the probability of a correct classification by chance and, hence, the chance proportion correct is given by

$$P(\text{correct}) = p\alpha + (1-p)(1-\alpha).$$

For the three product classes of this study, the proportional chance figure is 56.0% for paper towels, 58.5% for aspirin, and 64.9% for margarine. Thus, the results were substantially better than this chance criterion.

The discriminant analysis of this study used all the data to estimate the discriminant coefficients because of interest in obtaining the most stable estimates of the coefficients possible, given the relatively small sample. As Frank, Massy, and Morrison (1965) point out, if the function based on all the data is then used to classify these same data, there is an upward bias in the percentage correctly classified. Since splitting the sample was undesirable for coefficient estimation purposes, the modified *V*₂ validation procedure suggested by Frank et al. (1965, p. 255) was applied. The raw data were "scrambled" by assigning individuals to the private brand and nonprivate brand groups at random, while keeping the sizes of the two groups equal to their actual values. Discriminant analysis was

TABLE 2
CLASSIFICATION OF SUBJECTS USING THE
DISCRIMINANT FUNCTIONS

Classification	Product class		
	Paper towels	Aspirin	Margarine
Actual private brand (classified private brand)	23	23	15
Actual private brand (classified nonprivate brand)	5	7	7
Actual nonprivate brand (classified nonprivate brand)	66	70	80
Actual nonprivate brand (classified private brand)	21	13	16
% correctly classified	77.4	82.3	80.5
% private brand correctly classified	82.1	76.7	68.2

then performed on this sample. This procedure was carried out 10 times for each product class. The average percentage correctly classified for each class was 63.5% for paper towels, 61.9% for aspirin, and 63.5% for margarine. Since the actual results are all substantially higher, the results do not seem spurious because of bias.

Finally, Morrison (1969, pp. 160-161) points out that the smaller group is usually difficult to classify well, although it is often the group of interest. In that light, the results for the private brand group are particularly impressive, since 82.1%, 76.7%, and 68.2% are classified correctly for paper towels, aspirin, and margarine, respectively.

DISCUSSION

The results bear out the contention that the perspective of information processing, with its emphasis on the attitude structural properties used to process information by the consumer and the variables contained in these structures, is more suited to analyzing consumer behavior than approaches based on ad hoc demographic or general personality trait approaches. That is, perceived risk, informational, and perceived-product-quality variables are seen as parts of the information-processing attitude structural properties that in conjunction with attitude content influence behavior. The ability of the discriminant analysis to differentiate among the private and nonprivate brand groups bears out this line of argument.

In general psychological terms, this type of viewpoint argues for closer attention to models of choice situation perceptions and choice processes. In this sense, the perspective is similar to that of Fishbein (1967, 1972) in arguing that relationships with behavior will be found only if the actual information-processing aspects of the choice situation are investigated and variables related to the active

attitude structures in the situation are considered.

REFERENCES

- AFIFI, A. A., & AZEN, S. P. *Statistical analysis: A computer oriented approach*. New York: Academic Press, 1972.
- BECHTEL, G. G., TUCKER, L. R., & CHANG, W. C. A scalar product model for the multidimensional scaling of choice. *Psychometrika*, 1971, 36, 369-388.
- BETTMAN, J. R. Information processing models of consumer behavior. *Journal of Marketing Research*, 1970, 7, 370-376.
- BURGER, P. C., & SCHOTT, B. Can private brand buyers be identified? *Journal of Marketing Research*, 1972, 9, 219-222.
- CUNNINGHAM, S. M. The major dimensions of perceived risk. In D. F. Cox (Ed.), *Risk taking and information handling in consumer behavior*. Boston: Harvard Business School, 1967.
- DARLINGTON, R. B. Multiple regression in psychological research and practice. *Psychological Bulletin*, 1968, 69, 161-182.
- FISHBEIN, M. Attitude and the prediction of behavior. In M. Fishbein, (Ed.), *Readings in attitude theory and measurement*. New York: Wiley, 1967.
- FISHBEIN, M. The search for attitudinal-behavioral consistency. In J. B. Cohen (Ed.), *Behavioral science foundations of consumer behavior*. New York: Free Press, 1972.
- FRANK, R. E., & BOYD, H. W. Are private-brand-prone grocery customers really different? *Journal of Advertising Research*, 1965, 5 (4) 27-35.
- FRANK, R. E., MASSY, W. F., & MORRISON, D. G. Bias in multiple discriminant analysis. *Journal of Marketing Research*, 1965, 2, 250-258.
- HAINES, G. H. Information and consumer behavior. (Working Paper 6908) Rochester, N.Y.: University of Rochester, College of Business Administration, July 1969.
- KASSARJIAN, H. H. Personality and consumer behavior: A review. *Journal of Marketing Research*, 1971, 8, 409-418.
- MORRISON, D. G. On the interpretation of discriminant analysis. *Journal of Marketing Research*, 1969, 6, 156-163.
- MYERS, J. G. Determinants of private brand attitude. *Journal of Marketing Research*, 1967, 4, 73-81.
- SCHRODER, H. M., DRIVER, M. J., & STREUFERT, S. *Human information processing*. New York: Holt, Rinehart & Winston, 1967.

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