A STUDY OF THE EFFECTS OF INFORMATION ON THE SIZE OF THE EVOKED SET

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Abstract

This study investigated the relationship between the size of the evoked set and (1) selected aspects of the information environment potentially available, and (2) the strategy used by individuals to acquire information. The results both support and extend existing research on the evoked set and provide additional insights into the strategies used by consumers to simplify the brand selection process.

Introduction

Howard (1977, p. 306) defines the evoked set as "the subset of brands that a consumer considers buying out of the set of brands he or she is aware of in a given produce class." A major conclusion of consumer behavior research is that the evoked set is small, usually in the range of three to five brands or less. Despite the importance of the evoked set concept, the number of studies which have investigated the size, and factors which affect the size, of the evoked set is quite small. Furthermore, most of this research has involved surveys requiring retrospective construction of the evoked set.[1] Such recall data is plagued by a number of well known problems (e.g., Neter 1970).

On the basis of the available research there is reason to believe that the size of the evoked set may be influenced by a number of individual difference variables. Jarvis and Wilcox (1973) found that the size of the evoked set is positively correlated across product classes. Campbell (1969) and Gronhaug (1973/74) both report that the size of the evoked set is positively correlated with education and negatively correlated with age in both Norway and the United States.

In two articles, which appear to be based on the same data base, Belonax (1979, Belonax and Mittelstaedt 1978) reports that the size of the evoked set is positively related to the mean level of information and negatively related to the variability of that information in a brand/attribute matrix for microwave ovens. He also found that subjects who used fewer choice criteria tended to have a larger evoked set. Both of these findings are consistent with an earlier study by Cunningham (1967) which found that subjects who perceived a higher level of risk in a brand choice situation tended to be more brand loyal. The Belonax study, however, is limited in two major ways. First, is the small number (six) of brands and attributes which were available to subjects. Second, is the fact that subjects were asked to read all of the information available. The researchers, therefore, were forced to rely on self-reports to determine how many attributes were considered by subjects. In another study, May and Homans (1977) found that the size of the evoked set was positively related to the use of abstract, as opposed to concrete, criteria to both identify and evaluate competitive brands of automobiles. No other studies relating any aspect of information structure and information processing by consumers on the size of the evoked set could be located.

The present study is primarily concerned with how the size of the evoked set varies as a function of (1) the information environment, defined in terms of the number of brands and attributes, which is potentially available, and (2) the strategy, defined in terms of the number of brands and attributes for which information is actually acquired, used by individuals in acquiring brand/attribute information. It is expected that the size of the evoked set is not related to the structure of the information environment but is related to the information acquisition strategy. Although it is believed that the absolute values of the size of the evoked set reported here have some external validity, the thrust of this study is the role of the evoked set in the information acquisition process.

Hypotheses

The following four specific hypotheses were tested:

H_1: The size of the evoked set is not affected by the number of brands for which information is available.

H_2: The size of the evoked set is not affected by the number of attributes per brand for which information is available.

H_3: The size of the evoked set is negatively related to the number of attributes for which individuals choose to acquire information.

H_4: The size of the evoked set is positively related to the number of brands for which individuals choose to acquire information.

H_1 is central to the logic upon which all four hypotheses are based. A central tenet of consumer behavior theory today is that the evoked set is small. By considering only a limited set of brands for purchase the consumer is able to quickly reduce what is often an extraordinarily complex task to one which is at least manageable. Therefore, it is expected that while making more brands available to subjects may result in some shifting of their attention among brands it should not increase the size of their evoked sets. The logic underlying H_2 is a simple extension of the present argument. If consumers maintain a small evoked set as a strategy for managing complex buying tasks, there should be no further need to reduce the size of the evoked set as more information per brand becomes available.

We have previously cited a number of studies which suggest individual differences in the size of the evoked set. Belonax (1979, Belonax and Mittelstaedt 1978), in particular, has presented limited evidence that the number of choice criteria or brand attributes actually considered by a consumer is negatively related to the size of the evoked set. Although the Belanox studies are limited, as previously noted, by the small number of attributes available (six) and the recall nature of the data collection process this seems a quite reasonable procedure for managing a complex task and we hypothesize (H_3) that subjects who choose to acquire information on a larger number of attributes

in a standard information processing task will tend to have a smaller evoked set. Although more speculative, it seems reasonable to expect subjects who examine more brands to have a larger evoked set at the completion of the information processing task (H_4). This is, perhaps, partly a matter of definition. But it would seem likely that subjects who examine more brands may have, among things, a higher level of interest in and involvement with the product class and, therefore, a larger evoked set.

Methodology

The data reported in this article was collected as part of a larger information processing study. A complete description of the methodology can be found in Horton (1980). Here we shall confine outselves to that portion of the methodology relevant to the evoked set.

Subjects

One hundred twelve male undergraduates at a private, eastern university participated in the experiment. All subjects were male juniors or seniors and were fulfilling a requirement for an introductory marketing course. Two separate sessions with subjects were required. The first session was conducted with groups of 20-40 subjects and was used to acquire a variety of individual difference variables. The second session was conducted on an individual basis with each subject in which they were presented with the information acquisition and decision-making task. It was at the completion of this second session that data on the size of the evoked set was acquired.

Product Class

The product class used in this study was automobiles. Automobiles were selected because it was believed that automobiles were a high interest product for the male subjects, the majority of whom were graduating seniors, who participated in the experiment. Automobiles have also been used in a number of studies of the size of the evoked set (e.g., Gronhaug 1973/74, May and Homans 1977, Maddox et. al. 1978). This allows comparison of results among studies using quite different methodologies, i.e., the present study is based on a laboratory experiment while all of the other evoked set studies involving automobiles are based on a survey methodology.

Treatment Conditions

The experimental design was a 2 by 2 factorial with subjects exposed to information on either 7 or 14 brands and 7 or 14 attributes. All information in the brand/attribute matrix was taken from the 1978 special April automobile issue of Consumer Reports. The primary reason for selecting seven brands as a break point was that the available data suggests that the evoked set rarely, if ever, exceeds seven (Howard and Sheth 1969, p. 98). In an assemblage of data from several sources, Howard (1977, p. 32) reports mean evoked sets for six different product classes which range from 3.1 to 5.6. Thus, it seems reasonable to argue that limiting the smaller number of brands to seven should not artificially restrict the size of the evoked set. Doubling the number of brands and using 7 or 14 attributes as additional parameters was essentially arbitrary.

The specific brands and attributes used in the brand/attribute matrix were selected in the following way. A list of 38 brands and 29 attributes was made up from Consumer Reports. Thirty-seven students, similar to those who participated in the experiment, rated the 38 brands on a four point interest scale and the 29 attributes on a four point importance scale. With a few minor deviations, the 14 brands of most interest and the 14 most important attributes were used to construct the brand/attribute matrix. In order to avoid a downward bias on the size of the evoked set the seven brands of greatest interest and the seven most important attributes were assigned to the basic 7 by 7 brand/attribute matrix.

Procedure

In contrast to the information display boards used in most information processing studies, an interactive computer terminal with a Cathode Ray Tube display was used by subjects to access information in the brand/attribute matrix to which they were assigned. Upon entering the computer terminal room, where the experiment was conducted, each subject was asked to read the instructions displayed in **Figure 1**. While the subject read the instructions an assistant prepared the terminal by typing in the subject's identification number and the treatment condition to which that subject had previously been randomly assigned. Although subjects were invited to ask questions after reading the instructions, virtually none were asked.

Once on the terminal there was no further contact with the experimenter until the experimental task was completed. All instructions for using the terminal were provided by the accessing program. In broad outline the program was structured as follows. First, subjects were exposed to a very simple two by two brand/attribute matrix for toothpaste and asked to acquire one piece of information to see how the program worked. Second, they were asked to select the five most important attributes for automobiles, from those to which they would be exposed, in order of importance. Third, they were invited to access as much or as little information from the computer as they thought useful. The objective of this search process was for subjects to find a set of brands they would consider for purchase. Information could be selected only one piece at a time and disappeared from the screen when the next piece of information was requested. Fourth, once they had acquired as much information as they wished, they were asked to list all of the brands they would be interested in considering for purchase, i.e., the evoked set.[2] And, fifth, they were asked to rate each brand selected for further consideration on a three point degree of interest scale. No time constraints were placed on subjects. The computer kept track, surreptiously, of all data collected regarding subjects' behavior in the experiment.

Results

Tests of Hypotheses

Table 1 present the results of the hypotheses tests. All hypotheses, except H_1, were supported. Contrary to expectation, the number of brands available to subjects did affect the size of the evoked set. Subjects indicated an evoked set size of 3.30 when 7 brands were available and 3.86 when 14 brands were available; an increase of almost 17 percent.

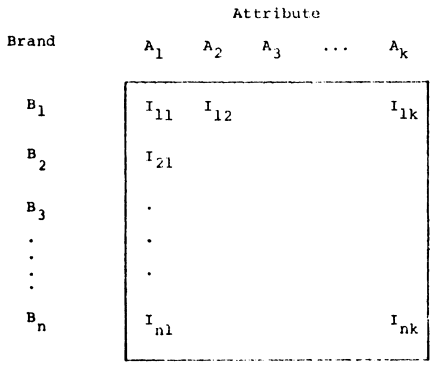
An important question is whether the difference in the sizes of the evoked sets in the two treatment conditions was due to any artificial restriction imposed by the number of brands available in the smaller treatment conditions. As can be seen in **Table 2** all but

FIGURE 1

INSTRUCTIONS TO SUBJECTS

This study is concerned with whether interactive computer terminals can be used effectively by consumers in acquiring information about brands and in helping make brand purchase decisions.

In this particular study the product class of interest is automobiles. Information on a number of makes of automobiles and specific attributes is stored in the computer in the form of a brand/attribute matrix. This matrix has the following form:



For example, I_{11} might be the weight (A_1) of a Triumph Spitfire (B_1). All of this information has been acquired from an independent testing agency. The computer will give you the exact instructions you need to access any specific piece of information in the brand/attribute matrix.

As a participant in this experiment you should imagine that you are interested in purchasing an automobile in the near future. You may acquire as much or as little information from the brand/attribute matrix as you find useful. You are not expected to be able to make a purchase decision based upon the information you acquire here. Rather, your goal in acquiring attribute information on various brands should be to find, for the available makes of cars, a set of cars you would be interested in considering further for possible purchase. The size of this set of cars could range from zero to the total number of brands in the matrix.

Specifically, we will ask you to do the following three things:

1. Pick from a list of alternatives the five attributes which you feel are most important to you in buying a car.
2. Acquire whatever amount of information you feel you need to acquire from the brand/attribute matrix in order to find that set of cars you would consider purchasing.
3. List those cars you would consider further for possible purchase.

Do you have any questions before we begin the experiment?

two of the subjects in the study indicated an evoked set of seven or fewer brands. Indeed, the data in Table 2 is quite consistent with the statement that the size of the evoked set rarely, if ever, exceeds seven and is usually in the range of three to five, or less.

Post hoc Analysis

A regression analysis was conducted both to investigate the strength of the hypothesized relationships and to extend the analysis. Seven independent variables, divided into two sets, were included in the analysis. The first set included: number of brands examined, number of attributes examined, total amount of information acquired, and average interest in the brands listed by each subject in his evoked set of automobiles. This last variable was measured on a three point scale with three being the greatest degree of interest. The second set of independent variables included three dummy variables to represent the treatment conditions. Although planned as a single analysis, the independent variables were allowed to enter the regression equation in a stepwise manner.

TABLE 1

TESTS OF HYPOTHESES

Hypothesis		Significance[a]
H_1:	Size of evoked set is not affected by number of brands	.022
H_2:	Size of evoked set is not affected by number of attributes	n.s.
H_3:	Size of evoked set is negatively related to number of attributes observed	.002
H_4:	Size of evoked set is positively related to number of brands observed	.037

a. Significance values listed for $p \leq .05$.

TABLE 2

SIZE OF EVOKED SET

Size of Set	Number of Subjects
1	3
2	19
3	44
4	21
5	15
6	3
7	5
8	2
Mean	3.58

Table 3 presents the intercorrelations among all variables and the results of the regression analysis for all independent variables which were significant at the .05 level at any step in the analysis.

Direct inspection of the matrix of intercorrelations reveals a number of interesting results. With a value of -.254 the correlation between number of attributes examined and the size of the evoked set is the strongest zero-order correlation. Both the number of brands potentially available and actually examined are positively related to the size of the evoked set. A most interesting result is that the number of brands available correlates (.193) more highly with the size of the evoked set than does the number of brands actually examined (.138). Note also that a larger number of brands available is relatively strongly correlated (.399) with examination of more brands. Finally, despite wide variations in subjects' tendency to acquire brand/attribute information, the amount of information acquired was unrelated to the size of the evoked set.

Examination of the regression analysis data shows that only the two dummy variables representing the number of attributes available and the brand by attribute interaction failed to be included in the final regression equation. The final equation is not only highly significant but the R^2 is, at .209, relatively large in comparison to other studies of the size of the

evoked set.

A detailed examination of the beta weights and the partial correlation coefficients at each step in the regression analysis provides a number of interesting insights into the relationships among the variables. First, with one exception where the beta weight is not significantly different from zero, the beta weights and the corresponding zero order correlations have the same signs. This will facilitate the substantive discussion of the data presented in the next section.

Second, two of the beta weights are larger in absolute value than their corresponding zero order correlations. This indicates the existence of suppressor variables. In particular, there is reciprocal suppression between the number of brands examined and the number of attributes examined (or the total amount of information acquired as the two variables largely overlap in their ability to explain the size of the evoked set[3]). This means that each variable is suppressing variance in the other which is unrelated to the size of the evoked set thereby improving the overall explained variance[4].

TABLE 3

REGRESSION ANALYSIS OF SIZE OF EVOKED SET

I. Intercorrelation Matrix

	Variables[a]				
	1	2	3	4	5	6
1		.138	-.254	.045	-.220	.193
2			.344	.708	.021	.399
3				.664	.211	-.031
4					.182	.093
5						.050

II. Regression Analysis

Independent Variables[a]	Regression Weights	Beta Weights	Zero Order Correlations
2	.027	-.067	.138
3	-.290	-.460	-.254
4	.033	.419	.045
5	-.613	-.206	-.220
6	.254	.176	.193

$p < .001$, $R^2 = .209$

a. Variables are
(1) Size of Evoked Set
(2) Number of Brands Examined at Least Once
(3) Number of Attributes Examined at Least Once
(4) Total Amount of Information Acquired
(5) Average Level of Interest in Brands in Evoked Set
(6) Dummy variable indicating number of brands available.

Third, and very interesting, is the fact that the number of attributes examined does not overlap with the total amount of information acquired (or the number of brands examined) in terms of explaining the size of the evoked set. This is true despite the fact that the correlation between the number of attributes examined and the total amount of information acquired is very high. In fact, once the number of attributes examined is included in the model the partial correlations for both number of brands examined and the total amount of information acquired increased substantially. Thus, the number of attributes examined makes a substantial contribution to explaining the size of the evoked set both directly and indirectly through suppressor effects.

Fourth, and contrary to the logic used to partially justify H_4, the interest variable is negatively related to evoked set size. An examination of the partial correlations at each step shows that the interest variable is almost entirely free of influences arising from the other variables in the regression equation.

Discussion

Evaluating the results of the present study in comparison with the existing literature on evoked sets is difficult for a number of reasons. Basically, these difficulties resolve to the fact that the methodologies of existing studies are so disparate that there are virtually no exact comparison points. Different product classes have been used. The evoked set, and other conceptual variables, have been operationalized in ways which are not directly comparable. Despite these difficulties there is a relatively consistent general pattern to all of the available empirical research on the evoked set concept.

At 3.58 the mean evoked set size reported here tends to be in the middle of previously reported values. This is encouraging because it gives us some confidence in, although not formal proof of, the validity of the results from this experiment. In comparison to several studies summarized by Howard (1977, p. 32) for six nondurable goods the evoked set size reported here for automobiles was slightly above to considerably below the evoked set size reported for the nondurables; the range for the latter being 3.1 to 5.6. In a survey study of the evoked set size for automobiles May and Homans (1977) report a mean evoked set of 1.71. They do note, however, that their methodolody may have had a tendency to underestimate the true size of the evoked set. Gronhaug (1973/74), using a survey methodology, reports an evoked set distribution for automobiles which is somewhat similar to the distribution in Table 2 but is shifted down by one to one and one-half units. In an experimental study of the size of the evoked set for microwave ovens Belonax and Mittelstaedt (1978) report evoked set sizes which ranged from 1.79 to 3.09 over six experimental conditions and average 2.45 for the entire experiment.

Although the evidence is limited, the pattern is relatively clear. Evoked set size tends to be larger for nondurables than durables. Although initially somewhat perplexing this pattern does have a certain logical consistency with existing consumer research. Presumably, the purchasing task for durables places a much heavier information processing burden on the consumer than does purchasing nondurables. A small evoked set is one major way consumers can manage this heavier information load.

In the present study there is a negative correlation between the average interest expressed towards brands in the evoked set and the size of the evoked set. In fact, from the emerging perspective on the role of the evoked set in the decision process the entire pattern of correlations involving the interest variables is most interesting (see Table 3). There is virtually no relationship with either the number of brands examined or available. The other three correlations are significant at the .05 level. Specifically, greater average interest in the evoked set is associated with (1) a smaller evoked set, (2) a larger number of attributes examined, and (3) more information acquired in the information acquisition task.

Despite quite different methodologies, the finding in the present study that the size of the evoked set is negatively correlated with number of attributes examined is consistent with Belonax and Mittelstaedt's (1978) findings for microwave ovens. More importantly, all of the data presented here is consistent with the emerging view of the consumer as a problem solver who facing a complex environment with limited resources, including limited cognitive capabilities, attempts to solve buying problems in a satisfactory, rather than fully optimal, manner (e.g., Wright 1975, Howard 1977, Bettman 1979).

Although this study was not designed to address public policy questions the pattern of the data is quite interesting given the apparent predilection of public policy makers for provision of more information. First, the evidence suggests that making information available on more brands does lead to a larger evoked set. This effect may mean that the whole search process can be extended by making information on more brands readily available.[5] Second, the evidence suggests that making information available on more attributes does not change the size of the evoked set. This result is especially interesting when coupled with the fact that subjects who were exposed to 14 attributes acquired approximately 25 percent more information than those who were exposed to only seven attributes. Whether this extended search process leads to better decisions is, unfortunately, a questions which cannot be answered from the present data. The possibility, however, is clearly there.

Conclusions

All but one of the four hypotheses was supported. Contrary to expectation, there was a positive relationship between the number of brands available and the size of the evoked set. Although the size of the evoked set would be positively related to the number of brands examined was supported, the argument that this relationship should hold because of a higher level of interest in the product class was contradicted by the post hoc analysis. Whether this was due to the particular, and somewhat indirect way, in which interest level was assessed is a question which needs to be addressed by additional research. The data also suggest that the provision of more information extends the search process without affecting the size of the evoked set. Finally, the overall pattern of the results provides additional support for the idea that consumers adopt a number of strategies, including a small evoked set, to reduce the complexity of their purchasing decisions.

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Footnotes

[1]For two exceptions see Belonax 1979 and Belonax and Mittelstaedt 1978.

[2]At this point the objection might be raised that the evoked set concept is being used improperly. Specifically, it can be argued that the evoked set concept refers to those brands which spontaneously come to mind when a need to purchase arises. Such an interpretation, which is consistent with Howard and Sheth's (1969) original description of the evoked set, would seem to limit the concept to frequently purchased goods. One could argue that what is being measured here is a consideration set which is developed during a preliminary information search from symbolic, as opposed to significative, sources of information. The

brands in this set, whatever it is called, would presumably then be explored in physical comparison shopping. Although substantive issues are raised by the use of the term evoked set in conjunction with a product such as automobiles, we have applied this term to the size of the set of brands measured in this study because several previously cited studies have established some precedence for this usage.

[3]This is clearly evidenced by the fact that the partial correlation for number of brands examined falls by approximately 73 percent when total amount of information acquired is entered into the equation.

[4]For a thorough discussion of suppressor variables in regression analysis see Horton (1978, pp. 218-222).

[5]The key words here are "readily available". In three studies which have now been conducted using the computer assisted information acquisition procedures described in this article it has been found that far more information was acquired than acquired in the typical information processing experiment using information display boards. Specifically, these studies have examined automobiles (Horton 1980), toothpaste (Shriber, et. al. 1980) and shampoo (Lantos 1980). The average amount of information acquired in each of these experiments was above 20 units; in marked contrast to the very small amount of information which is typically acquired in research using information display boards. This suggests that the procedures available for accessing information may be a crucial factor in determining the total amount of information accessed by consumers.