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THE INFLUENCE OF SEARCH REQUIREMENTS AND THE ABILITY TO REFUSE PURCHASE ON JUDGMENTS AND CHOICES

BY

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To Lana, Mark, Nathanael and Timothy for their support, whether it was in the form of a reassuring hug or simply a smile, and to our wonderful Lord Jesus Christ.

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled THE INFLUENCE OF SEARCH REQUIREMENTS AND THE ABILITY TO REFUSE PURCHASE ON JUDGMENTS AND CHOICES submitted by G. DOUGLAS OLSEN in partial fulfillment of the requirements for the degree of DOCTOR OF PHILOSOPHY in MARKETING.

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ABSTRACT

Judgme[illegible] choices are commonly used in both basic and applied marketing researc[illegible] [illegible]search has demonstrated, however, that questions framed as choices will not always lead to the same conclusions as those framed as judgments. This paper presents a framework to study the differences between judgments and choices. As well, a new method is proposed and used, in conjunction with incidental learning and process tracing tasks, to test theoretical extensions relating to the presence of a nonpurchase alternative in judgment and choice tasks, each varied in terms of information search requirements. An external validity test, for a product with attributes that do not meet the criteria for a robust linear model (Dawes and Corrigan 1972), is also used to gauge the predictive ability of each of these tasks. Experimental manipulations were found to strongly influence both amount and type of search. Judgments (relative to choices) and the absence (relative to the presence) of a nonpurchase alternative each resulted in a greater amount of search and more alternative based search. Surprisingly, the utility values for attributes show little difference between experimental conditions.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION AND LITERATURE REVIEW

One of the primary objectives of applied marketing research is to predict how a particular product or service will perform in the market place. Research with survey techniques has demonstrated that the way information is presented may influence the results obtained. For example, outcomes may be influenced by the way information is framed (Levin and Gaeth 1988; Johnson 1987), or by the order in which information is presented (Anderson 1974; Johnson 1989). Task differences have also been observed; for example, outcomes obtained from choice tasks differ from those obtained from judgment tasks (Slovic and Lichtenstein 1971). Given that outcomes may be influenced by such variables, it would seem important that the questions asked of a respondent encourage mental processes similar to those that would normally be used in a purchase situation, to maximize accuracy of predictions based on the survey results.

For example, although on most shopping occasions we can refuse purchase, many studies of information search and decision making (e.g., Bettman and Kakkar 1977; Billings and Scherer 1988) have simply forced people to choose between a set of products. Consider the situation where a person who would buy a television only if it was color, is presented with three black and white televisions. If they are told that they can refuse all of them, their option is clear -- choose none. However, if they are told that they must select one of the televisions their task becomes more complex. What rule will they invoke to decide which of these alternatives is the least unacceptable? It would therefore seem plausible to suggest that the presence of a nonpurchase alternative may alter search behavior and/or decision policy. This, in turn, may lead to outcome differences (i.e., different choices).

Information display boards (IDBs) have also been used to study decision making (e.g., Bettman and Park 1980). These studies require that a person select information about a set of products one item at a time. However, making a person uncover information about a product by manually moving a cursor around a computer screen would seem to only be a very crude approximation of reality. While no one would suggest that someone could simultaneously process many pieces of information about a set of products upon encountering them, the methodical search required by the IDB might introduce search and processing bias.

Given that market surveys require subjects to make a judgment or choice of some nature, it is important that we understand how these tasks are influenced by different variables. The purpose of this paper is six-fold, to: (1) review research relating to the judgment-choice distinction, (2) propose a framework to study judgment and choice, (3) integrate previous findings and develop a more comprehensive theory of the cognitive processes underlying the two tasks, (4) develop a new method to study judgments and choices, (5) test theoretical propositions pertaining to the nature of the response task (judgment versus choice and presence or absence of a nonpurchase alternative) and the manner of information presentation (information presented simultaneously versus search required), and (6) test whether the predictive accuracy of survey results for purchase behavior is a function of the similarity of the experimental task to the actual purchase situation.

THE JUDGMENT-CHOICE DISTINCTION

Research has not always made a clear distinction between judgments and choices (e.g., Slovic and Lichtenstein 1971). In choice, it was assumed that alternatives are each judged, and the most favorably evaluated alternative is chosen. Some of the initial work that began to forge a distinction between the two procedures came from studies of preference reversal, involving gambles with two attributes (probability of winning and amount to be won). Additional studies have compared judgments and choices with more complex stimuli. After this research has been examined, implications for marketing research will be drawn, and finally boundary conditions for differences between judgments and choices will be considered. Judgments refer to situations where an individual must provide an evaluation about a product. This evaluation does not require the presence of any other alternatives. Choices, on the other hand, require a selection of one or more items from a set of alternatives, and an evaluation of every item in this set is not necessarily required for a choice to be made.

A. The Preference Reversal Phenomenon

Some of the initial work that began to forge a distinction between judgments and choices came from risky choice analysis. In this paradigm, a person is given a pair of betting opportunities (e.g., Scenario A: 70% chance of winning $100; Scenario B: 40% chance of winning $200). For each betting opportunity, the subject might be asked how much someone would have to pay them to give up the bet, if they owned it. Alternatively, they might be asked to state which gamble they would prefer. The first task is usually thought of as a form of judgment, whereas the second is considered a choice. An interesting and consistent finding (Lichtenstein and Slovic 1971; Lindman 1971; Grether and Plott 1979) is that people will often prefer an alternative in the choice task that they valued less in the pricing/judgment task. Termed the "preference reversal phenomenon", this outcome suggests that people tend to choose gambles that offer a higher probability of winning, but assign a higher reservation price to gambles that offer a larger payoff. Explanations for preference reversal have suggested that judgments and choices: (1) make subjects weight information differently (Lichtenstein and Slovic 1973; Tversky, Sattath and Slovic 1988), (2) apply different information integration procedures (Mellers, Ordonez and Birnbaum, in press), and (3) differentially affect the way people express their preferences (Goldstein and Einhorn 1987).

The ability to generalize the above findings regarding preference reversal to actual marketing situations may be tenuous. Most consumer decisions involve more than two attributes, yet the gambling paradigm is concerned only with the amount to be won and the probability of winning. Rosen and Rosenkoetter (1976) also note that gambles, as a "product", are unique in that they have a high level of stimulus interdependence, that is, the one attribute (price) has little meaning unless you specify the other (probability of winning). Studies of the judgment-choice distinction in more complex marketing applications are now reviewed.

B. Extensions To More Complex Stimuli

A number of alternative methods to investigate processes underlying judgments and choices have been used, including: (1) incidental learning, (Johnson and Russo 1984), (2) process tracing (Billings and Scherer 1988), and (3) comparisons of parameter estimates for conjoint and discrete choice models (Louviere and Gaeth 1988; Johnson, Louviere and Olsen 1992).

1. Incidental Learning. In incidental learning studies, subjects choose among or evaluate a set of products, and this is followed by a surprise recall test. Results suggest that people do not remember more information about more highly rated alternatives on a judgment task (Lichtenstein and Srull 1985), but they do remember attributes of chosen alternatives better than attributes of alternatives not chosen (Johnson and Russo 1984; McClelland et al. 1987). One interpretation of these results is that information is processed holistically for judgments, irrespective of whether a product is bad or good. Conversely, in a choice task there may be less need to look at every attribute of every alternative if one product clearly dominates on one or more criteria. The dominating alternative might then be examined further to confirm that it is a good choice.

2. Process Tracing. Process tracing methods also have been employed to study judgments and choices. Results from information display board (IDB) tasks indicate that

relative to choice tasks judgment tasks evoke more brand/holistic information search and more search in general (Billings and Scherer 1988).

Rosen and Rosenkoetter (1976) used eye fixation analysis to look at the effect of stimulus interdependence on information processing in judgments and choices. Dimensions are said to be highly interdependent when one piece of information can not be evaluated in the absence of other information. They found that the stimulus dimensions drove the processing strategy when they were either highly interdependent (gambling situations) or of very low interdependence (a gift package). However, the response task (judgment or choice) drove the processing strategy when stimulus dimensions were moderately interdependent (vacation profiles), with the judgment task evoking a greater amount of holistic processing than the choice task.

3. Marketing Models. Given the widespread use of conjoint tasks (Wittink and Cattin 1989) and the possibility of using discrete choice tasks for similar types of marketing research, comparisons of differences and similarities of parameters in judgment and choice tasks may have considerable applied value. As noted by Batsell and Louviere (1990), a major benefit of choice experiments compared with conjoint rating tasks is that choice tasks examine choices directly (they do not need to be predicted using ad hoc decision rules). Louviere and Gaeth (1988) also note that choice tasks: (1) are more natural for subjects, (2) allow one to examine more of the response surface than one usually can with full profile conjoint tasks, (3) accommodate a wide variety of choice models and utility specifications, and (4) permit one to include current product offerings, delay of purchase and nonpurchase alternatives.

In a study examining the effect of task characteristics on judgments and choices, Johnson, Louviere and Olsen (1992) manipulated the response task (judgment versus choice), attribute order, profile order and presence (versus absence) of a practice task. They report that although these conditions may produce different levels of variance around coefficient values, the underlying values remain constant. In a second experiment, they vary the response task (judgment versus choice), type of information presentation (paragraph versus list), and method of profile presentation for a choice task (simultaneous versus sequential). Again they conclude that the variance is affected; but, for the most part, the utility coefficients are not. These findings are interesting, given that we would expect these manipulations to alter the type of information processing strategies used, and consequently the weights of the attributes. Unfortunately, these studies do not permit us directly to examine whether these tasks differed in terms of the amount of information used, or the manner in which information was used. More research is needed to determine whether these findings will hold up when there is demonstrable evidence that information exposure is actually different. Elrod, Louviere and Davy (1992) compare choice and judgment based conjoint tasks, and also suggest that predictive ability of judgment and choice tasks does not differ.

Beyond the marketing research focus, differences in judgment and choice may have implications for advertising. For example, asking a person to evaluate a particular product might invoke a different mental process than if the person is shown two products and asked to choose, as they are in comparative advertisements. As discussed in the next section, theory would suggest that these different advertisements may elicit different mental processes and result in differences in consideration of, and memory for, attributes.

C. Boundary Conditions For Judgment-Choice Differences

Although it seems that there are significant differences in search and decision strategies between judgment and choice tasks, Einhorn and Hogarth (1981) caution that judgments and choices may not be independent in all circumstances. They suggest that, in many situations, judgments may precede and form the basis for choice and revealed preferences would therefore be consistent in these situations. Einhorn, Kleinmuntz and

Kleinmuntz (1979) suggested that judgments and choices employ similar cognitive processes when: (1) information load is low, (2) there is no time pressure, (3) there is a sequential display of alternatives, (4) there are multicategory choice options, (5) there is thorough knowledge of the decision task, and (6) the task is important to the subject. Three fundamental assumptions underlie the belief that these conditions should be equal. First, it is assumed that judgments implicitly demand the use of a holistic/compensatory process to a greater extent than choices. Second, it is assumed that people prefer to use a holistic process to make both judgments and choices unless capacity, time or effort thresholds are exceeded. Finally, it is assumed that, as capacity, time and effort requirements are increased, people when making choices will resort to heuristics more than when making judgments. The rationale behind this latter assumption is that judgments elicit a holistic decision rule to a greater extent than choices.

Bettman (1982) incorporates the ideas of Einhorn et al. (1979) into a more systematic examination of factors that influence whether judgment will precede choice. The categories he uses are: (1) mode of presentation and type of information, (2) characteristics of the decision situation, (3) importance and involvement, and (4) characteristics of set of alternatives. Mode of presentation and type of information factors that discourage the use of judgments in choice situations are: (a) the availability of all information considered at the point of choice, (b) the presentation of information about brands and attributes simultaneously, (c) presentation of information in a format that permits strategies other than those based on processing one brand at a time, (d) presentation of information in such a way that it can be easily compared within attributes and across brands, and (e) information that is cognitive rather than affective in nature. Judgments are also not encouraged when the following characteristics of the decision situation are present: (a) time pressure, (b) distraction, (c) only a choice, and not a quantitative judgment, is required, and (d) choices are made without social interaction.

Finally, he suggests that choices without holistic evaluations are more likely when the choice is unimportant/uninvolving, and when the set of alternatives is small.

While the research discussed in this chapter certainly sheds light on the judgment-choice distinction, a number of issues remain untouched, including: the nature of alternatives (e.g., the the similarity of profiles, number of acceptable alternatives, and the ability to refuse or delay purchase); specific types of decision maker knowledge (e.g., knowledge of the task vs. knowledge of the product); and, the form of product description (e.g., paragraph vs. list). A framework that integrates these issues with previous research, and other decision making variables is presented in the following chapter.

CHAPTER 2

A FRAMEWORK TO STUDY JUDGMENT AND CHOICE

The concept that any given decision situation involves a number of factors that influence a person's decision processes has led to the development of contingency decision models (e.g., Beach and Mitchell 1978; Payne 1982). For example, literature in decision making suggests that as the complexity of a choice task increases, decision makers tend to select choice strategies that will reduce cognitive effort (Newell and Simon 1972; Payne, Bettman and Johnson 1988; Shugan 1980); whereas other factors, such as task involvement, might have the opposite result (e.g., Chaiken 1980).

Beach and Mitchell (1978) suggest that there are three fundamental types of decision strategies. First, aided analytic strategies (requiring the person to use a particular procedure such as a decision tree) require the person to systematically evaluate the information provided. Second, unaided analytic strategies involve a systematic evaluation of the information; however, no external tool is used. Finally, nonanalytic strategies are simple rules applied to the task. The type of decision strategy used is proposed to be a function of both decision maker and task characteristics. For example, when the decisions are significant, or the person is highly knowledgeable, a more analytical evaluation process may be used. Decision maker characteristics include motivation, knowledge and ability. Task characteristics include: (1) decision environment characteristics (e.g., irreversibility, significance, accountability and time or monetary constraints), and (2) decision problem characteristics (e.g., unfamiliarity, ambiguity, complexity and instability).

Whereas decision maker characteristics and decision environment characteristics are relatively straightforward; classifications based on decision problem characteristics are more troublesome. Unfamiliarity (how foreign the decision maker is to the task), ambiguity (the extent to which the problem is unclear to the decision maker), complexity (the number of components to the decision problem and the impact of this task on future decisions) and instability (the amount of fluctuation in the criteria, goals and constraints of the problem during and after the decision) may each be produced in a variety of ways that may have markedly different effects on the behavior of an individual. For example, if instability is manipulated by frequently changing the criteria for a given choice situation, the decision maker might rely on a random choice rule or another procedure (e.g., majority of confirming dimensions) that does not require a great deal of knowledge about the characteristics. On the other hand, greater use of a conjunctive rule (see Appendix A for descriptions of commonly used decision heuristics) focusing on price might be expected if instability is manipulated by varying the budget constraint. We might also expect that different forms of "complexity" might lead to substantially different types of decision strategies. For example, complexity resulting from the number of alternatives might increase reliance on an EBA strategy, whereas complexity coming from the number of dimensions might lead to a greater use of the minimax strategy.

In his paper on contingent decision behavior, Payne (1982) discussed the differences between context and task effects. Context effects result from the values of stimuli in the decision set; whereas task effects refer to general structural characteristics of the decision situation. Examples of task effects include task complexity (a function of the number of product dimensions, number of alternatives, and time pressure), response mode, information display and agenda effects. Context effects include: similarity of alternatives, and quality of the option set.

The following framework integrates and extends these contingency frameworks, as well as the concepts Bettman (1982) and Einhorn et al. (1979), discussed in Chapter 1.

In order to further theoretical development in marketing, independent variables must be defined in a precise manner. To achieve this goal, the framework presented here follows the behaviorist tradition of specifying independent variables in concrete, directly observable terms. As well, the framework integrates and extends previous contingency frameworks, and is suggested for understanding the distinctions between judgment and choice. Its major components include: (1) decision maker knowledge, (2) situational constraints, (3) task significance, (4) information display, (5) response task, (6) between-alternative factors, and (7) within-alternative factors. An outline of the components of this framework is presented in Figure 2-1. Note that complexity per se is not dealt with in this framework, given that it could be argued that all of the variables in the framework impact on task complexity. Nonetheless, a number of issues raised by Wood (1986) regarding the construct of complexity will be discussed in different areas of the framework.

The experiment in this study compares judgments and choices and looks at one aspect of information display (whether or not search is required), and the influence of a nonpurchase alternative. However, in an effort to put these variables into context, each of the areas in the framework will be discussed briefly. Variables involved in the experiment are discussed in more depth in Chapter 3.

--- Insert Figure 2-1 About Here ---

FRAMEWORK VARIABLES

A. Decision Maker Knowledge

While this framework does not attempt to integrate all of the research on knowledge structure and expertise (see Alba and Hutchinson 1987 for an overview of the work in consumer expertise), two separate forms of knowledge are identified: product knowledge and knowledge of the decision task.

1. Product Knowledge. Product knowledge is defined as the amount of knowledge a person has about a product class, that is relevant to the task at hand. For example, knowledge about how to bake with an oven is not relevant to a task requiring knowledge about repairing an oven. In a protocol study involving housewives making choices about microwave ovens, Bettman and Park (1980) classified people who had never searched for information on, used, or owned a microwave oven in a low knowledge condition. Those who did not own a microwave oven but had either searched for information on or used one were in the moderate condition and those who owned one were placed in the high knowledge condition. They found that people with a moderate level of knowledge and experience processed more information than people with either high or low levels. One interpretation of this is that people in the low knowledge condition might be motivated to process more information but lack the ability; whereas subjects who are highly knowledgeable might have the ability to process information, but by virtue of their knowledge do not need to. This study, as well as others, (e g., Biehal and Chakravarti 1982), suggest that less knowledgeable subjects use more intradimensional processing (looking at the values across alternatives on an attribute by attribute basis).

2. Task Knowledge. Decision maker's knowledge about the task situation is defined in terms of the amount and type of experience (e.g., vicarious or hands on) with the task, as well as the clarity of instructions. Practice with a task may familiarize the individual with the intricacies of the task (e.g., particular reinforcement contingencies), alter the manner in which knowledge is used from conscious to automatic control (see Alba and Hutchinson 1987), and increase the number of pieces of information that can be used at a given time. Greater task knowledge should therefore facilitate analytic/holistic processing, as the person is more capable of processing most or all of the product information. This, in turn, should produce a greater similarity between judgment and choice.

B. Situational Constraints

Situational constraints refer to external limitations imposed on the subject. Two of the more commonly studied situational constraints are time pressure and budget constraints.

1. Time Constraints. Time constraints shall be defined here as an explicit indication to the subject that a fixed period of time will be permitted to complete the task. Note that this definition does not necessarily imply that a task would not normally be completed in this time if the constraint had not been imposed. What is generally referred to by the presence of a time constraint is the implicit or explicit communication to the subject that they must accelerate their activity in some fashion. Studies that wish to look at the effect of time pressure should ensure that the time to complete the task is recorded for members of a control condition, where no time limit is specified. In other words, the presence of a control condition would indicate how much faster the individual had to perform in order to complete the task. It is suggested that the ratio of time allowed to the amount of time taken in the control condition be used as the indication of time pressure. While there would undoubtedly be a great deal of individual variation with respect to the effect of the time pressure, this measure would be appropriate at an aggregate level.

Intuitively, it would seem that time pressure should lead to suboptimal results (e.g., people may not have time to compare all pieces of information and may therefore make a poor decision relative to what they would have if time pressure had not been imposed). However, time pressure need not necessarily lead to bad decisions. Rothstein (1986) demonstrated that under time pressure, individuals reduce cognitive control, although they may still be able to implement a policy correctly. He suggests, as Einhorn et al. 1979 did, that as time pressure increases so does the use of heuristics. This is supported by Payne, Bettman and Johnson (1988), who demonstrated that two strategies are commonly used by decision makers under time pressure: (1) they use the same decision process at an accelerated rate, or (2) they use a more efficient decision rule. The former tended to apply under moderate time pressure, and the latter under high time pressure. Interestingly, the adaptation to the task by invoking a less cognitively demanding heuristic allowed the subject to achieve about the same level of accuracy as a weighted additive (holistic) model.

2. Budget Constraints. Budget constraints shall be defined as the explicit statement of funds available to complete a transaction or set of transactions. As with time limits, a study looking at the effect of a budget constraint should also have a control condition where no budget constraint is imposed by the task. The amount of money spent in this condition could then be used to assess the severity of the budget constraint. For example, if the control condition suggests that an average person would spend $1000 to purchase computer equipment, imposing a $3000 budget constraint should have little, if any, effect. Once again, this measure would be subject to a great deal of variation at the individual level, but would be beneficial at the aggregate level.

As the amount available to be spent decreases, the use of conjunctive and EBA strategies should increase, with price being looked at first. Working on a budget might actually increase compensatory processing, by increasing the motivation to get maximum value for money. For example, this might be the case in those product classes where one has the option of buying one expensive, long lasting product or several that are less expensive but shorter lasting. In this case, people might use a compensatory strategy in an effort to use their money in the most efficient manner. This, in turn, should increase the similarity of judgments and choices.

C. Task Significance

Beach and Mitchell (1978) defined significance as, "the magnitude of the outcome and the breadth of the decision's ramifications for other parts of the decision maker's life." Among other things, significance may be influenced through performance incentives (e.g., money) or being held accountable for actions (McAllister, Mitchell and Beach 1979; Simonson 1989).

In an effort to assess the effect of the significance of a decision on the judgment-choice distinction, Billings and Scherer (1988) gave students living in residence halls a task pertaining to the selection of residence advisors. Although they referred to the independent variable as importance, in this framework it would be considered a manipulation of significance. Significance was varied by suggesting either that the results from the task would influence the extent to which students would be allowed to participate in future selection of advisors (high significance) or that the results would be used to test theories of decision making (low significance). For both judgment and choice, the low significance condition had a greater amount of intradimensional search than the high significance condition, although they did not differ in terms of the amount of information searched.

Although significance also reduced the difference between judgment and choice in terms of the amount searched, as predicted by Einhorn et al (1979), judgments still displayed a greater amount of alternative-based search. One possibility is that the level of significance invoked in the high significance condition was simply not enough to produce equivalent search patterns. Alternatively, it might be that the type of search pattern is not influenced by significance. Indirect support for the latter interpretation comes from the preference reversal phenomenon. Grether and Plott (1979) found that even financial incentives are not sufficient to eliminate this phenomenon. Another explanation for the lack of effect of significance on pattern of search is that the number of attributes and alternatives may moderate the extent to which significance elicits a holistic processing strategy. That is, although significance might normally cause a greater use of a weighted additive decision rule, if the information load is too great they may be forced to turn to a more simple rule, regardless of the decision's significance. This interaction between significance and both the number of attributes and number of alternatives still requires testing.

Accountability, in this framework, is viewed as a form of significance, with attention being given to the type(s) of reinforcers controlled by the supervisor, and the importance of these reinforcers to the subject. Accountability is said to be present when the respondent believes that their efforts will be evaluated, and they will be associated with those efforts (i.e., the performance is not anonymous). McAllister, Mitchell and Beach (1979) report that the use of analytical decision strategies increase as personal accountability, or the importance of the decision, increases. Hence, choices should more closely resemble judgments as accountability increases.

D. Information Display

The information in a given decision situation may be presented in a variety of formats, which may encourage different processes. Information display may be partitioned into three sections: (1) physical organization of information, (2) search requirements, and (3) form of description.

1. Physical Organization of Information. Physical organization of information refers to the way information is physically arranged in a decision making situation. Bettman and Kakkar (1977) provide evidence that the physical organization of information may affect the pattern of information acquisition more than the information itself. In their first experiment, they present information in: (1) a matrix format (brand by attribute), (2) by brand, and (3) by attribute. Interdimensional search, the method normally elicited by judgment tasks (Billings and Scherer 1988), is seen most often when the information is organized by brand, next most frequently when in matrix form, and least when presented by attribute.

Jarvenpaa (1989) looked at the effect of the display of data in a graphical format, in a study similar to Bettman and Kakkar's (1977). He presented subjects with bar charts that were organized by attribute, alternative or grouped. In the attribute condition, the bar chart shows the values of all of the brands on a single attribute. Values for other attributes are presented on other screens. Similarly, the alternative condition presents a given alternative on all dimensions, but the subject has to go to other screens to view other alternatives. The grouped bar chart presents the information about both the alternatives and the attributes at the same time, and is considered to be the graphical equivalent of the matrix format. Similar to Bettman and Kakkar (1977), he found that the presentation of information in the different graphical formats affected both the ability to use certain decision strategies and the order that information was acquired. Interestingly, although Bettman and Kakkar (1977) found the matrix condition to encourage processing by alternative, Javenpaa's grouped condition encouraged processing by attributes. Javenpaa (1989) suggests that this may be because attribute differences are more distinctive when presented graphically than when presented in a table.

While some tasks simultaneously provide all the information required to make an informed decision, others require the person to look at information in a particular order. Einhorn et al. (1979) reasoned that if alternatives are presented to people sequentially and a choice is required after all alternatives are displayed, then an implicit judgment of each alternative is necessary before the next alternative is presented. Hence, in these situations judgments should precede and form the basis for choice. Results from those studies above that have presented the information by brand would support this contention.

<u>2. Search Requirements</u>. Information display boards (IDBs) have become a popular method for assessing consumer decision strategies. These tasks usually

present information in matrix form (brand by attribute) but the information is hidden (e.g., concealed in an envelope). Subjects can gather as much information as they like from the board before making a judgment or choice. In contrast, many applied marketing research surveys, such as conjoint analysis tasks, present information simultaneously. Many purchase situations also present information in this manner; that is, the consumer can see many pieces of information about many brands very quickly. For example, when shopping for a television it is not uncommon to have a card by the television describing all of its features. Increasing the cost of information search will likely result in subjects resorting to strategies that reduce the amount of information search required. This strategy might alter the pattern of information search as well. The influence of search requirements is discussed further in the experiment section of this paper.

3. Form of Description. The form of description is the manner in which information is presented to the subject. Green and Srinivasan (1990) note that descriptions of products in conjoint tasks may be presented in a paragraph, list or pictorial format. It would seem plausible that embedding information in a paragraph would make it more difficult for people to quickly compare products across attributes. This would lead to the evaluation of alternatives in a sequential fashion, and consequently evaluations should precede choices to a greater extent. However, results from Johnson, Louviere and Olsen (1992) indicate that the paragraph and list descriptions do not result in markedly different coefficients for either judgment or choice tasks.

Painton and Gentry (1985) examined the effect that presenting information in a pictorial format has on amount and type of information search, relative to presenting printed information in an IDB. They conclude that pictures result in the early elimination of unacceptable alternatives but not a reduction in the number of attributes that subjects investigate. Furthermore, it would appear from the reported mean levels for type of search by condition that with traditional IDBs the presence of a line drawing increases the amount of alternative-based search. These findings suggest that if a choice situation does involve an unacceptable alternative the presence of a picture may reduce the similarity of judgments and choices; however if all alternatives meet minimum standards then the similarity may actually increase.

E. Response Task

One of the problems in the study of judgment and choice, to date, is a lack of precision in the description of judgment and choice tasks. Three factors that must be considered are the level of commitment required, the number of choice options, and the scale length.

1. Level of Commitment Required. It has been suggested choices require more commitment than judgments (Bither and Wright 1977; Einhorn and Hogarth 1981). While this may generally be true, in that one must select one product over another, both judgments and choices may vary widely in terms of the commitment required. For example, asking people to choose or rate a product in terms of overall attractiveness requires less commitment than asking them to choose or rate a product with respect to whether or not they would purchase it. That is, purchasing a product requires a greater commitment than merely evaluating its attractiveness. As commitment escalates we would expect the significance of the task to increase and therefore result in a greater amount of holistic processing in judgments and choices.

2. Number of Choice Options and Scale Length. Einhorn et al. (1979) predict that a holistic processing strategy is more likely when the task is a multicategory choice than a binary response. Multicategory choice refers to the ability to choose something to different degrees. For example, a graduate program need not simply accept one of two applicants even if they only have enough funding for one student. Options include: (1) rejecting both, (2) accepting only one, and (3) accepting both but funding only one. As more choice options become available, a finer distinction must be made among

alternatives, and more careful analysis of different attribute values may be required of subjects. Hence choices should more closely resemble judgments as the number of choice categories increases.

An analogous issue with rating tasks is scale length. As we increase the scale length the precision with which one may evaluate an alternative increases and the amount of information relevant for the task may increase. If a person is given only a two point rating scale anchored with attractive and unattractive and asked to evaluate an automobile, it may only be necessary for the person to look at one attribute to make that distinction. For example, a high price might automatically make an alternative unattractive, and eliminate the need to search more information to refine the response. Conversely, if they are provided with a 7 point scale with the same anchors, a high price might ensure a rating a below 4, but other features such as stereo quality or color of the interior might be needed to refine the response. Hence, we would expect that increasing scale length, to a point, should increase any differences observed between judgment and choice.

F. Between Alternative Factors

This category may be defined as those factors relating to the composition of the choice set; e.g., the number of available alternatives, or the nature of the alternatives present.

1. Number of Alternatives In Set. As the number of alternatives in a choice set increases, so does the amount of information to be processed. As the amount of information becomes too large to handle there will be a greater reliance on noncompensatory decision rules (Einhorn et al. 1979). Payne (1976) had subjects choose among apartments. Using a verbal protocol analysis and information display board, he found that subjects used a compensatory strategy when only two apartments were presented. However, when they were shown 6 or 12, they first eliminated

unacceptable alternatives using a noncompensatory strategy (EBA or conjunctive) and then evaluated the remaining alternatives using a holistic process. A verbal protocol study by Lussier and Olshavsky (1979) supports Payne's (1976) results. In this case they presented 3, 6 or 12 alternatives and found that a holistic strategy was used when three alternatives were present, but a two stage, noncompensatory then compensatory process was invoked for 6 or 12 alternatives. Unlike Payne (1976), they did not observe much use of an EBA strategy in the noncompensatory component. This two stage processing strategy has also been reported in a number of other studies (Biggs et al. 1985; Gensch and Svetska 1984; Payne and Braunstein 1978).

Paquette and Kida (1988) used a different form of procedure to study the effect of the number of alternatives. Similar to the above studies, they varied the number of alternatives (2, 5 and 9). Unlike the other studies, where subjects processed information as they wished, subjects in this study were told what strategy they should use to choose the company with the highest bond rating: compensatory, additive difference, EBA or Mixed (EBA and then compensatory). Surprisingly, while EBA and Mixed strategies required less time than compensatory in complex situations, the decision accuracy was not compromised. This is consistent with Payne, Bettman and Johnson's (1988) finding that, at least with certain stimuli, heuristics may produce results that are very similar to more optimal strategies but at a much lower mental cost.

<u>2. Nature of Alternatives Present</u>. In the studies by Johnson, Louviere and Olsen (1991) and Olsen, Louviere, Johnson (1991), alternatives were presented and judged individually, as they traditionally are in conjoint analysis tasks. However, in the study by Billings and Scherer (1988) alternatives were presented together and then judged. It is likely that judgments in the latter case are influenced by the other alternatives present, as they form a reference point. That is, the attractiveness of a product is dependent on what other options are available. Consider a situation where a consumer is asked to

make a purchase decision where a frozen dinner and another option are present. A decision regarding a frozen dinner will likely be influenced by whether the other option is: (1) another frozen dinner, (2) dinner at an expensive restaurant, (3) refuse purchase, and (4) starvation for 5 weeks. While the last alternative is rather extreme, it serves to demonstrate how important other alternatives are. Let us consider two different types of alternatives that may be present: (1) other product profiles, and (2) the ability to refuse or delay purchase. Within the former type of alternative we will also discuss the similarity of the profiles and the density of acceptable alternatives.

(a) Presence of Other Products. When two or more products are presented together, it is possible to make direct comparisons on specific attributes. Hence, a number of decision strategies, such as the majority of confirming dimensions rule, now become possible. While we normally think of these decision strategies as applicable to choices, it is argued that they are also relevant to judgments in this type of situation. Even if a subject tried to be objective in all of the evaluations provided (i.e., what is rated as a 7 in one context will be rated as a 7 in all other contexts as well), it is likely that the value assigned to a product will vary depending on whether that product is much better or much worse than the alternative it is paired with. The effect of the context would be expected to be greater for those subjects less knowledgeable about the product class, as experience would permit the subject to become aware of the range of product offerings and hence form stable reference points (e.g., using the best product overall as the reference point). Research, discussed below, has demonstrated that the influence of the presence of other products will depend on the similarity of the products, and the number of acceptable alternatives.

(i) Similarity Of Profiles. As pointed out by Payne (1982), the more similar the alternatives, the more likely it is that a compensatory rule will be used. Two factors contribute to this prediction. First, Shugan (1980) suggests that the cost of thinking is inversely related to perceptual similarity between alternatives, because perceptual similarity implies fewer dimensions need to be evaluated. Second, people need to search more cues and increase the weight of small differences in order to distinguish among similar alternatives (Biggs et al. 1985).

The presence of similar alternatives may also produce violations of rationality (Restle 1961; Tversky 1972). For example, Huber, Payne and Puto (1982) find that the introduction of a dominated alternative may increase the share of the dominating product, relative to a competitor. While this finding is certainly important, it has been limited to products described on two attributes and, therefore, further work is needed to examine how consumers deal with such a situation when a greater number of attributes are present.

Perceptual similarity in these studies has referred to the number of attributes on which competing products have exactly the same values. While this definition is easy to apply, it may be misleading. For example, imagine a situation involving three televisions, two of which are black and white and one of which is color. Suppose further that the color television and one black and white television share all of the same features (e.g., both have the same screen size and remote control). People may still perceive the two black and white televisions as being more similar by virtue of only one common attribute. Hence, the number of attributes that alternatives share in common may have less influence than the importance of the dimensions that differ. To the extent that similarity increases the use of a holistic process in judgment and choice tasks, we would expect judgments and choices to become more similar.

To this point we have considered products that are described by the same attributes; however, many situations exist where people must make a decision regarding two substantially different products (e.g., a new sofa or an oven). Johnson (1984, 1989) suggests that as the comparability of two products decreases, people are unable to make direct comparisons of the products on specific attributes and must therefore come up with some form of global evaluation for each alternative (increasing the use of more alternative-based processing). Hence, we would expect judgments and choices to be more similar as the comparability of alternatives decreases.

(ii) Number of Acceptable Alternatives. McClelland et al. (1987) demonstrate that as the number of attractive alternatives increases, more information processing is required and incidental learning increases. Similarly, Klein and Yadev (1989) report that accuracy increases and effort declines as the number of dominated alternatives increases. The accuracy of heuristic strategies for choices involving risk also improves when one product is dominant (Johnson and Payne 1985; Payne et al. 1988). In cases where no product is dominant, choice accuracy (choosing the product with the highest utility) improves with the variability in the attribute set (Malhotra 1982; Keller and Staelin 1987).

(b) Ability to refuse/delay purchase. In most purchasing situations, consumers are able to delay their purchase or withhold purchase altogether. However, most studies that have compared judgment and choice have involved a forced choice among offerings (e.g., Rosen and Rosenkoetter 1976; Billings and Scherer 1988). As a model is developed in Chapter 3 that examines how the inclusion of an option to refuse purchase will influence judgments and choices, it will not be considered further in this chapter.

G. Within Alternative Factors

Within-alternative factors are those variables that relate to the values that describe a particular product offering in a given decision task. These are what Payne (1976) referred to as context effects. Within alternative factors include the nature of attributes, dimensional dependence, and number of attributes.

1. Nature of Attributes. Each attribute may be described along a number of dimensions. For example, Myers and Shocker (1981) suggest that most attributes that

describe products and services fall into one of three classifications. Product referent attributes are physical characteristics (e.g., strength, and width) and pseudophysical characteristics (i.e., features like spiciness that are objective in nature but difficult to measure on a physical scale). Task or outcome referent attributes refer to the benefits of using a particular product (e.g., "makes me feel good"). They are primarily affective in nature, requiring subjective evaluations. Finally, user referent attributes are imagery characteristics that signal something about the person using the product (e.g., class, sophistication, or sexiness). According to Myers and Shocker (1981), different mathematical models may be required to represent each type of attribute appropriately.

Attributes may also be distinguished in terms of their metric nature. Garner (1978) noted the importance of recognizing the different effects of features (attributes that are either present at a single level or absent), and dimensions (attributes that exist at some continuous positive level, when they exist). Dimensions may be further differentiated with respect to whether they are described numerically or verbally. For example, the purity of a chemical compound may be described as excellent or as 90% pure. In order to use a compensatory process with a discrete variable, one must first translate the variable into a continuous variable, subjective utility. This may then be combined with utility values of other attributes. While the same holds true with continuous variables, such as price, it may be easier for subjects to form subjective utility values with continuous variables, as they are already on the same type of scale. Russo and Dosher (1983) demonstrated that, even within continuous dimensions, processing by alternative is greater when numerical dimensions (as opposed to verbal dimensions) are used. Hence the use of dimensions, and to a greater extent numerical dimensions, should increase the similarity between judgments and choices.

2. Dimensional Dependence. Rosen and Rosenkoetter (1976) state that dimensional dependence refers to the inability to evaluate a given piece of information

when another piece is missing. As an example, they suggest that knowing the probability of a gamble has little worth if one does not know the amount to be won. This is because these attributes implicitly demand the use of a multiplicative combination rule. They use judges' ratings of similarity of attributes to determine how interdependent the dimensions are (the more similar the more interdependent). Looking at the effect of high, moderate and low levels of dimensional interdependence on judgment and choice tasks, they report that interdependent stimuli elicit a holistic processing strategy, and dissimilar stimuli encourage a nonholistic strategy. When the stimuli were neither interdependent nor dissimilar, the processing heuristic was a function of the task.

A related factor that might encourage a holistic pattern of processing is the use, by subjects, of superordinate constructs. For example, when evaluating the attributes of a car one might look at cost/gallon, monthly payment, average cost of upkeep and cost for insurance. All of these attributes combine to form the superordinate "cost of owning" the car, and would likely be perceived as being similar. Additionally, the type of tires, color and quality of stereo might be collapsed into "prestige". The increased use of a holistic strategy would be associated with a corresponding increase in the similarity of judgment and choice tasks.

3. Number of Attributes. Payne (1982) reviews a number of studies and suggests that increasing the number of dimensions in alternatives makes people more selective about the information that they process, which increases the variability of responses, and decreases the quality of choices (i.e., people choose alternatives that they might not have if they had considered all of the information). He also refers to Slovic and Lichtenstein (1971), who show that increasing the number of dimensions boosts subjects' confidence in their judgments. Interestingly though, a number of studies indicate that increasing the number of attributes does not influence the underlying decision process used. Payne (1976) found that when the number of attributes used in a decision problem

was raised from 4 to 8 or 12, the proportion of information searched decreased, however, the underlying decision rule used remained constant. Similarly, Lussier and Olshavsky (1979) report that increasing the number of attributes from 5 to 10 or 15 decreases the proportion of information considered but does not affect the decision rule used. On the other hand, Ogilvie and Schmitt (1979) found that when subjects evaluated job candidates on likelihood of successful performance they used a compensatory process more often when they were faced with two attributes than when they had to consider 4 or 8.

These differing results of increasing the number of attributes might be due to the use of different attribute levels in each of the experiments and/or the interaction of other variables (e.g., task importance or product familiarity). This latter issue affirms the need for a comprehensive framework that considers variables that impact on judgments and choices. Such a framework not only makes us consider variables in relation to other factors, but also guides research by indicating gaps in existing knowledge. As an analogy, we are still completing a jigsaw puzzle, but with some understanding of what the pieces should look like and how they should fit together.

CHAPTER 3

HYPOTHESES REGARDING THE INFLUENCE OF A NONPURCHASE ALTERNATIVE AND SEARCH ON JUDGMENTS AND CHOICES

This experimental investigation compared judgments and choices and focused on two issues from the framework: (1) the influence of a nonpurchase alternative, and (2) the requirement that people search for information. First, some of the general effects of judgments and choices will be reviewed, then predictions regarding the framework issues will be discussed.

HYPOTHESES

A. General Hypotheses Regarding Judgment and Choice

In this experiment we are concerned with how judgments and choices differ in terms of both processes and outcomes. As emphasized throughout the framework developed in the previous chapter, there are certain conditions under which judgments should resemble choices. Previous research (Payne 1976; Lussier and Olshavsky 1979) suggests that when only two or three alternatives are present, subjects tend to use more holistic processing. Nonetheless, it is believed that even in situations where only two alternatives are present, results will be consistent with previous findings (e.g., Billings and Scherer 1988), that choices elicit more attribute based search than judgments.

H1A. Judgments evoke more alternative-based information search and more search in general.

H1B. Incidental learning (the memory for attributes of products involved in a decision situation after the decision has been made) is greater in the judgment task than the choice task, as judgments elicit a greater amount of information search.

Contingency weighting theory (Tversky, Sattath and Slovic 1988) suggests that weight of the most important attribute will be higher in the choice task than in the judgment task. According to the prominence hypothesis, this results from a greater use of a lexicographic rule in choice tasks. Hence, we expect choices to encourage people to focus only on the more important information. An increase in the weight of the most important attribute may arise from two different sources. One possibility is that people will not look at as much information in the choice task, and as a result the relative weight of those attributes that are looked at will be higher. Consistent with the prominence hypothesis, it might be the case that even when all information is looked at, the choice context simply causes people to weight the more important information higher than in the judgment task. Another component of contingency weighting theory is the compatibility principle, which suggests that weights are higher for attributes that are compatible with the response mode (Tversky, Sattath and Slovic 1988). For example, price might be more compatible with ratings than choices, as it is a continuous variable. Therefore, we would expect it to be more important for ratings than for choices. Interestingly, if price is the most important factor, there may be little difference between judgment and choice in terms of the coefficient for price, because the compatibility principle might cancel out the prominence effect and vice versa. In general, relative to the judgment condition, higher coefficients are expected for the more important attributes and lower coefficients for the lesser important attributes in the choice condition. Furthermore, coefficients would be expected to differ to an even greater extent if judgment and choice tasks produce traditionally observed differences in information use (i.e., the use of more holistic processing for judgments than choices).

H1C. Weights are higher for the most important attribute in choice tasks, relative to ratings tasks.

Coefficients produced from the choice tasks are expected to predict better than judgment coefficients to situations where a choice is required (e.g., a purchase situation).

H1D. Predictive ability is better for choices when the survey task and the target behavior are compatible; i.e., choice tasks predict actual choices better than do judgment tasks.

B. Hypotheses Regarding the Effect of a Nonpurchase Alternative

A second issue addressed by this experiment is the effect that permitting a subject to refuse purchase will have on information search, decision processes and the decision outcome. A model for the choice process involved in a two product situation where a nonpurchase alternative is present is shown in Figure 3-1. This will be referred to as the Nonpurchase Alternative (NPA) Model, and builds on Svenson's (1979) model of heuristic decision making processes. In the NPA model, information is first presented to the consumer. The information is then coded, and if one or more of the attributes for an alternative do not meet a minimum criterion, this alternative is dropped from consideration. For example, a person using a conjunctive rule might find that none of the products meet minimum values on all aspects. If one or more of the options meet minimum requirements, then further processing is required.

One product may be dominant, either because it is better on every dimension or because the other product was eliminated from the consideration set. However, the dominant alternative will be chosen if, and only if, it meets a minimum threshold for overall utility. That is, the decision maker may be able to identify the most preferred product but decide that the combination of price and quality for this option is not attractive enough to merit purchase.

If two or more products remain in the consideration set, and one does not dominate, then some additional form of decision rule must be used to determine which product will be chosen.

--- Insert Figure 3-1 About Here ---

The model differs in two key respects when the nonpurchase alternative is not available: (1) one is forced to choose between two products even if both are undesirable, and (2) it is not necessary to determine whether the better product exceeds a utility threshold. These two factors suggest that the presence of a nonpurchase alternative will make the choice easier when: neither product is acceptable; the nonpurchase option is chosen; and no further search is required to determine which product is the least unacceptable.

H2A. For choice tasks, search will be reduced and more attribute based when a nonpurchase alternative is available and none of the alternatives in a consideration set are acceptable (all are eliminated on the basis of a conjunctive strategy).

In contrast to the above scenario, where none of the products are unacceptable, the presence of a nonpurchase alternative will make the choice more difficult when one or more of the alternatives meet minimum standards on each of the attributes. This is because it must be determined whether the best product in the set surpasses the utility threshold. For example, if a person is buying a car they may not refuse to purchase it on the basis of any single attribute; however, when all of this information is weighted and combined it may not meet the minimum utility that a person requires from the product they purchase. The need to determine whether this minimum threshold is exceeded is hypothesized associated with increased incidental learning, a greater consideration of minor attributes and consequently, higher utility values for these attributes. Predictive ability to choices where the ability to refuse purchase is present is also expected to be higher due to greater process compatibility.

H2B. For choice tasks, search will be increased and more alternative based when a nonpurchase alternative is present and one or more of the alternatives are acceptable (none are eliminated by a conjunctive strategy).

H2C. The presence of the nonpurchase alternative enhances the ability of choice tasks to predict to choice situations where a nonpurchase alternative is present.

The nonpurchase alternative may act as a reference point for judgments, but it would have an even greater impact on choices. This is because it is believed that in judgments a holistic processing strategy is elicited regardless of the option; whereas in the choice task the presence of this option will encourage people to consider at least the more attractive alternative in a holistic manner, in an effort to ensure that the product passes the utility threshold.

H2D. Relative to choice tasks, the influence of the nonpurchase option will not be as great in the judgment task with respect to the amount of search, the amount of incidental learning, or the predictive ability.

C. Hypotheses Regarding the Effect of the Search Requirement

The third issue addressed by this experiment is the effect making people search for information has on decision processes and outcomes. Brucks (1985) notes that the use of IDBs suffer from the limitation that they place a well defined structure on purchase situations that are often not highly structured. A second limitation of IDBs is that they force people to consider information in a piecemeal fashion. Given that a standard frozen concentrated orange juice purchasing situation is highly defined, with the attributes openly displayed, the latter limitation is of greater importance here. If there are costs of information search (Stigler 1961; Shugan 1987), then we would expect decision outcomes from information display boards to differ from tasks in which information is presented simultaneously (i.e., none of the information is covered up). If information is presented simultaneously, people may search more and pay more attention to minor attributes than when information is presented piecemeal. Furthermore, if process tracing research using verbal protocols is an indication, asking people to search for information manually may impact on the outcomes as well (Biehal and Chakravarti 1989).

H3A. Minor attributes have less weight when search is required than when all of the information is presented simultaneously.

H3B. Minor attributes have lower levels of incidental learning when information search is required.

Payne et al. (1988) argue that the Mouselab computerized information display board does not significantly increase search time because the time required before the next piece of information is revealed is primarily a function of deciding what piece of information is required next. While this might be true, deciding what piece of information is required next would still take mental effort; whereas if they do not have to do this, the search process will proceed much more naturally--without conscious deliberation of the search pattern needed. Biases induced by this search process would likely hinder the ability to predict to situations where manual, piecemeal search is not required (e.g., ads or labels that present information about the product in a clear, up front manner).

H3C. The search requirement decreases the ability to predict to situations where search is not required (due to decreased process compatibility).

As noted above, judgment tasks, in general, elicit a greater amount of search. Hence, the search requirement will affect choices more, discouraging the use of holistic processing and encouraging a less demanding strategy (i.e., those requiring less search).

H3D. Requiring manual search for information has greater effects on choices than judgments in terms of differences in the amount of information searched and the part-worth utility estimates.

Chapter 4 outlines a method for testing the hypotheses in this chapter in an emperical manner.

CHAPTER 4

A METHOD TO EXAMINE THE INFLUENCE OF A NONPURCHASE ALTERNATIVE AND SEARCH ON JUDGMENTS AND CHOICES

An experimental approach is taken in this study due to the emperical nature of the problem, the desire to control for confounding factors. The primary between-subjects component of this experiment uses 2 X 2 X 2 full factorial design of: attribute presentation (immediately visible vs. requiring search); response alternative (the presence vs. absence of a nonpurchase alternative); and, response mode (judgment vs. choice).

As it was desired to make comparisons of findings with regular conjoint analysis, where only one product is evaluated at a time (as opposed to the above conditions where two or more alternatives are presented simultaneously), two additional between-subjects conditions were added: (1) a rating condition, with one alternative, and search required, and (2) a rating condition, with one alternative, and no search required. The following abbreviations will be used to describe the conditions: (1) for scale, C=choice, R=rating (two alternatives) and S=rating (single alternative), (2) for search requirement, M=no search required and Q=search required, and (3) for nonpurchase alternative, A=absent and P=present. Hence, RMA describes a rating task where two alternatives are present, information is presented simultaneously, and a nonpurchase alternative is not present. The experimental design, and codes associated wth each conditions are presented in Figure 4-1.

--- Insert Figure 4-1 About Here ---

METHOD

A. Subjects

Subjects for this study were undergraduate students at the University of Alberta, participating for credit in an undergraduate psychology course. Each person was screened on the basis of grocery shopping behavior (only those who shop for groceries one or more times per month could participate). Of those that did participate, only those who purchased orange juice in the past were used in the analysis. A total of 353 subjects participated in the research, however responses from 27 subjects who never purchased orange juice were discarded, and 26 surveys were incomplete due to computer failure at some point in the survey. The computer failures were due to problems resulting from the use of computer workstations by students when sessions were not being run (e.g., viruses and deletion of items from the hard disk) and were not particular to any one experimental condition.

B. Product

The product used for this experiment was orange juice. One reason for using this product was that it could be described by a large number of attributes. Second, it is purchased and consumed by students and is therefore relevant to the subjects. Finally, many of the attributes of orange juice, to be described shortly, make it a good product for an external validity test.

Dawes and Corrigan (1974) suggest that reasonably accurate first-choice predictions can be obtained from demonstrably inappropriate models if: the independent variable has a conditionally monotone relation with the dependent variable; the relative weights are not affected by error in the criterion weights; and there is error in measurement of the independent variable. These conditions apply to most, if not all, of the attributes of many products, and if we are able simply to specify the direction of the relationship a priori, the predictions derived from all the experimental conditions will fare well (Dawes 1979). With orange juice products on the market, more sweetness is not always preferred to less sweetness and more pulp is not always preferred to less pulp. Similarly, it is hard to specify a priori how a person should respond to a lower number of calories or a reduction in the acid level.Therefore, good predictions are not guaranteed simply because of the product class used, and a meaningful predictive validity test is possible. The assumption regarding the nature of the attributes is supported by frozen concentrated orange juices available on the market (e.g., some are high pulp and some are pulp reduced, etc.).

C. Experimental Design Issues

Embedded in the between-subjects design, described above, there is a within-subject design used to create the profiles chosen and/or rated by the subject. This design is double conditional in nature; one experimental condition is used to design profiles and another experimental condition is used to assign profiles to rating/choice sets. Profiles were constructed using a 2^6 main effects and selected two-way interactions plan (Hahn and Shapiro 1966). Based on a survey of a number of different grocery stores, it was determined that all of the frozen concentrated orange juices available in the local market could be described by seven attributes: (1) calorie level, (2) acid level, (3) sweetness, (4) pulp content, (5) grade, (6) price, and (7) size. The specific levels used for each of these attributes in this experiment were as follows: sweetness (unsweetened and sweetened), price ($1.10 and $1.90), size (regular-producing 8 cups and large-producing 12 cups), pulp (reduced pulp-99% of pulp removed and regular pulp-no pulp removed), acid level (reduced-80% of acid content removed or regular-no acid content removed), and calorie level (reduced-50% fewer calories versus regular). The other product profile in the choice or evaluation set was constructed by random assignment, without replacement of a product profile from the foldover of the above design. The foldover in this case was created by: (1) coding the original design matrix with -1 and 1, and (2) taking this design matrix and replacing 1 with -1, and -1 with 1. A foldover design is used as it is one method of ensuring that the set of paired alternatives are statistically equivalent (i.e., the attributes within this set remain uncorrelated). In the two conditions where only one alternative was shown per set, the profiles used were the ones created by the original design matrix.

D. Task

Computer based versions of information display boards, such as Mouselab (Johnson et al. 1988) offer a number of benefits relative to their manual counterpart. In addition to being able to monitor the pattern of search, they require less experimenter effort, reduce coding errors, and are able to monitor response times. A computerized decision board, similar to the Mouselab System developed by Johnson et al. (1988) was developed using the ToolBook program[1], and was run on IBM compatible 386 machines in a microcomputer lab with 30 independent computers.

E. Procedure

Subjects selected this project from a number of alternative experiments. When they arrived they were told about the general nature of the research and were instructed in the use of the computer. Approximately 25 subjects participated in each session, with each person randomly assigned to one of the ten experimental conditions. This was accomplished by giving each subject a password that they were required to type into the computer before the program would open. The version of the survey that the subject received was determined by the password typed in.

The computer survey had seven sections: (1) attribute description, (2) task instructions, (3) judgment or choice task, (4) incidental learning, (5) hold out responses to gauge predictive validity, (6) unacceptable value determination, where subjects

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[1] ToolBook is a software program by Assymetrix. It provides an object oriented programming language, facilitating the development of the interactive computer surveys.

indicated if any particular attribute level would cause them to refuse purchase, and (7) measures to assess perceived task difficulty and similarity to actual purchasing situations. After all of the tasks were completed by all of the subjects in a session, debriefing was conducted.

F. Dependent Variables

The dependent measures in this study may be broken down into measures of: (1) search, (2) outcome, (3) incidental learning, (4) task difficulty, (5) predictive ability, (6) rank order of attributes, and (7) unacceptable value identification.

1. Search Measures. In those conditions where search may be measured (where the information is not immediately available), two different measures used by Payne (1976) and Payne, Bettman and Johnson (1988) were obtained. A global measure of the total amount of processing is the number of pieces of information looked at, and it will be referred to as total acquisitions (TA). Pattern of search (PAT) was also considered, as it provides an indication of whether the search proceeds by attribute or alternative. When describing the pattern of search we may define each successive piece of information as being a Type 1 transition (within an alternative) or a Type 2 transition (within attribute). An aggregate measure developed by Payne (1976) for describing the pattern is calculated by dividing the difference between the number of Type 1 transitions and Type 2 transitions by the sum of the Type 1 and Type 2 transitions. This is expressed in the following equation:

$$\text{PAT} = \frac{(\text{Type1 Transitions}) - (\text{Type 2 Transistions})}{(\text{Type1 Transitions}) + (\text{Type 2 Transistions})} \qquad \text{Equation 4-1}$$

The value for PAT will lie between -1 and 1, with the negative numbers indicating the majority of search was between attributes and the positive values indicating a processing strategy with a majority of search within alternatives.

2. Outcome Measures. For choice tasks, the subjects were required to select an alternative. In half of the choice conditions they were required to choose one, and only one, of the alternatives presented to them. For the other half they also had the option of choosing "I would purchase neither of these alternatives", if they find that none of the options are attractive enough to purchase. Subjects indicated their judgments by clicking on a line mark scale, anchored by "definitely would not purchase" on the left, and "definitely would purchase" on the right . In an effort to make sure that no unintentional responses were recorded: (1) the scale changed color from the left to the point last clicked on, and (2) the subject had to click on a button to confirm the response or to change their response, before the next screen was presented.

3. Incidental Learning. For the incidental learning task, a total of 4 different descriptions of orange juice products were presented simultaneously, and were described using the same attributes as in the preceding task. Although the composition of these four brands was constant across experimental conditions, the response required was dependent on the experimental condition determined by the between-subjects design (i.e., judgment versus choice, search versus no search, and presence versus absence of a no purchase alternative). After these products were removed from the screen, subjects were required to perform a multiple choice recognition task to identify the attribute levels for each product. A global learning measure is the total number of attributes remembered correctly, minus those attributes remembered incorrectly (RMW).

4. Task Difficulty. Subjects were asked to respond to the statements, "This task required a great deal of mental effort," and "When I purchase orange juice the mental processes that I use are very similar to the ones required by this task." Seven point Likert scales were used, anchored with strongly disagree (1) and strongly agree (7). In order to ensure that any differences did not result from difficulty understanding the slight variations in instructions for the different tasks, subjects were also required to use a

seven point Likert scale to respond to, "I found the instructions explained clearly enough that I knew what I was supposed to do."

5. Predictive Ability. Two different types of predictive ability were assessed, the ability to predict to: (1) hold-out decisions of the same task (i.e., the condition they are randomly assigned to, and (2) choice situations where information is presented simultaneously, and a nonpurchase option is present (common to all conditions). This latter format was chosen as it provides a common basis to compare the predictive ability of the tasks, and it is believed that this situation most closely resembles the decision situation faced by consumers when shopping for orange juice.

For the same-task hold-out predictions, subjects were shown two sets with 3 alternatives and two sets with 4 alternatives.

For the common-task hold-out sets, there were two choice sets with 2 alternatives, two with 3 alternatives, and two with 4 alternatives. A seventh choice set was also added to this group. This last choice set contained 9 different orange juices chosen to resemble frozen concentrated orange juice offerings in a typical grocery store.

In a third type of hold-out task, subjects were presented with the set of nine orange juices that they had just seen; however instead of choosing one, they were allowed to purchase up to $5 worth. Subjects were told that there were allowed to purchase more than one can of each variety if they desired. Subjects were not led to believe that they would receive any of this orange juice.

6. Attribute Rankings. Subjects were asked to rank the seven attributes used to describe orange juice with respect to importance in making their responses in earlier sections of the survey. These responses were gathered to determine an ordinal measure of attribute importance, to be used in determining what attributes should be considered minor. Although somewhat arbitrary, in this experiment the top two and bottom two attributes will constitute the major and minor attributes respectively.

7. Unacceptable Value Identification. The attributes and their values were listed and the subject was asked to select any particular feature that would result in them not even considering the product. They were also asked to state the maximum amount that they would consider paying for a can of frozen concentrated orange juice. These values were necessary to determine how many alternatives in a set were not unacceptable, in order to test H2A and H2B.

CHAPTER 5

ANALYSIS OF DATA

The results of the analysis, with respect to each of the hypotheses, will first be discussed. Following this, the similarity of the experimental tasks to standard conjoint analysis will be examined. Finally, covariate measures of clarity of instructions, mental effort required, and similarity of experimental task to an actual purchasing situation will be considered for each of the tasks in the experiment.

TESTS OF HYPOTHESES

H1A. This hypothesis states that judgments evoke more alternative-based information search and more search in general. A 2 X 2 ANOVA with two between-subject independent variables: scale (judgment vs. choice); and nonpurchase option (present vs. absent), was conducted to examine predicted differences in type of information search (Table 5-1). A graph of the mean type of search for each condition is presented in Figure 5-1. These results indicate that judgments do evoke more alternative-based search (PAT=0.003) than in choices (PAT=-0.418).

A second analysis of variance was performed, with the same independent variables as above, but using the total amount of information searched as the dependent variable. Once again, a main effect was found for the scale variable, indicating that the amount of search (see Table 5-2 and Figure 5-2) was greater in judgment tasks (9.962 items/alternative) than choice tasks (6.537 items/alternative).

Findings from both of the analyses above are consistent with H1A, with judgments demonstrating both more search and more alternative-based search.

--- Insert Tables 5-1 and 5-2 About Here ---

--- Insert Figures 5-1 and 5-2 About Here ---

H1B. This hypothesis states that the amount of incidental learning is greater for judgment than choice tasks. To make comparisons of overall learning (RMW), a 2 X 2 X 2 ANOVA with the between-subject independent variables of scale (ratings task with two alternatives, and choice), search requirement (information presented simultaneously versus sequentially), and nonpurchase alternative (present versus absent) was conducted. Recall that the score reflects the number of right answers minus the number of wrong answers, hence a negative score is possible. As all conditions determined by a factorial combination of these independent variables were completed, it was possible to estimate all main effects and interactions (Table 5-3). H1B stated that more learning should occur in judgment than choice conditions; however, while the effect for scale is marginally significant (p=0.055) it is in the opposite direction, with means of 0.533 and -1.533 for the choice and judgment conditions respectively. Considering that the best score one could receive is 28, conditions differ very little and learning is remarkably poor.

Traditional conjoint analysis presents people with only one alternative. An additional test was performed to see if people using this conventional method produced different incidental learning scores than either those people who were required to rate two profiles, or those who had to rate two profiles and a nonpurchase alternative. For the incidental learning task, subjects who were assigned to the traditional conjoint task still had to evaluate four different products presented together on the screen. Hence, the incidental learning task for the SMA and SQA conditions was identical to the incidental learning task for the RMA and RQA conditions respectively. A 3 X 2 ANOVA, with the between-subject variables of number of alternatives in the rating task (1, 2 or 3), and search requirement (information presented simultaneously versus sequentially), indicates that neither the main effects nor the interaction are significant (see Table 5-4). The average learning score across these conditions was also poor, with an average of (-0.539).

--- Insert Tables 5-3 and 5-4 About Here ---

H1C. According to H1C, weights for the most important attribute in choice tasks are higher than those in judgment tasks. In order to test this, we must find some way of directly comparing outcomes of judgments and choices. The problem being that these tasks usually require different estimation procedures. With the judgment tasks, the evaluations provided are assumed to be interval in nature, hence Ordinary Least Squares (OLS) regression is appropriate to determine utility coefficients. On the other hand, data from the choice task are discrete and a Multinomial Logit (MNL) procedure is appropriate (Louviere 1988). Within this experiment, this difficulty may be overcome by converting the ratings data to choices.

For ratings tasks that contained two product profiles (RQA and RMA), or two product profiles and a nonpurchase option (RQP and RMP), ratings were converted to choices by assuming that the alternative in each set that was rated the highest was the one that would have been chosen. Hence, frequencies suitable for estimation procedures using MNL were available. While these frequencies could not be arrived at for SMA or SQA, where only one product profile was presented at a time, coefficients for these conditions were directly compared with other ratings tasks, as discussed in Section B below.

One method to compare choice frequencies would be to use a Chow Test within the MNL regression. However, as noted by Swait and Louviere (1992), such a test fails to take into consideration the scale parameter. A number of issues raised by Swait and Louviere (1992) should be mentioned at this point.

The MNL model, as typically presented in literature is given in Equation 5-1. where P_{in} is the probability that an individual n will choose alternative i , β is the vector of coefficient values and X_{in} is the vector of attribute values for alternative i. A more precise equation expressing the MNL model is Equation 5-2. While this equation is almost identical , it now contains the scale parameter μ, a value related to the variance of the error distribution. As the scale parameter is confounded with the regression coefficients, it is only possible to estimate the product of these two variables. This, however, does not usually pose a problem when interpreting results, as the scale parameter is constant across all variables.

$$P_{in} = \exp(\beta X_{in}) / \sum_{j \in C_n} \exp(\beta X_{jn}) \qquad \text{Equation 5-1}$$

$$P_{in} = \exp(\mu\beta X_{in}) / \sum_{j \in C_n} \exp(\mu\beta X_{jn}) \qquad \text{Equation 5-2}$$

In this experiment, however, that we want to compare two different data sets. The confound between μ and β now poses a problem, as any differences seen may be due to: (1) scale parameter differences, (2) regression coefficient differences, or (3) both of these factors. Swait and Louviere (1992) outline a procedure for comparing two sets of data that tests for both scale and parameter differences. First, each set involved in the comparison must be tested to ensure that Independence of Irrelevant Alternatives (IIA) holds. IIA is a fundamental assumption of the MNL model, and means that the ratio of choices for one alternative to another should not change with the introduction of a third alternative. If such violations do occur, more complex models such as Mother Logit need to be fitted.

Swait and Louviere (1992) present a method for testing if IIA violations exist[2]. Alternatives are excluded from the data set, one at a time and models with and without these options are compared to see if resulting prooortions for alternatives differ. By using alternative-specific coding (i.e., identifying whether the alternative was A, B, or Neither) for the intercept and each of the attributes, all of the conditions with three alternatives (two product profiles and the nonpurchase alternative) met the IIA assumption at conventional significance levels (Table 5-5). By definition, IIA must hold for those conditions where there are only two alternatives.

Tests of scale and regression parameter equality for comparisons of variables in the experiment are presented in Table 5-6 (See Appendix B for a review of this testing procedure). The hypothesis that judgments and choices have the same regression parameters, but with differing scale values is rejected. Stated differently, the variance in regression parameters was due to more than just a differing scale value. If coefficients differ only due to differing scale factors, then the coefficients from one set should plot linearly with the coefficients from the comparison set. In Figure 5-3 this is true for the most part, with the exception of two outliers in the upper left hand corner of the graph. Examining the coefficients (Table 5-7), we find that these outliers (indicated by an asterix), result from substantially different intercept values in the two conditions, not from variables that describe the orange juice per se. As predicted by the hypothesis, the coefficients for the attributes with the highest coefficients: sweetness, price and grade, are higher for choices than judgments. However these differences are not extremely large and would not lead to different managerial implications.

--- Insert Tables 5-5 through 5-7 About Here ---

[2] NteLogit, an MNL regression program developed by Intelligent Marketing Systems Inc., incorporates this test to examine whether IIA violations are present. This program is also able to test for scale and parameter differences.

--- Insert Figure 5-3 About Here ---

H1D. The prediction from this hypothesis is that choice tasks will predict choices better than judgment tasks. Market shares for judgment data were calculated by: (1) arriving at part-worth (utility) estimates for the different attributes using Ordinary Least Squares (OLS) regression at the individual level, (2) combining the part-worth estimates in an additive manner for each of the products in the hold-out set, (3) choosing the alternative with the highest utility for each individual, and (4) aggregating the choices to form the market share for each product.

For each of the choice conditions, MNL regression coefficients were used to predict shares for each hold-out set (Equation 5-2). Market share estimates using MNL regression coefficients, determined with frequencies obtained from converting judgments to choices, are also reported. As with the other choice data, these shares are calculated using the MNL equation. Given our desire to compare ratios, a Loglikelihood goodness of fit test is appropriate (Jobson, 1991). The root-mean-square error (RMSE) may also be used to describe the goodness of fit. Table 5-8 reports the ability of the different tasks to predict to hold-out sets involving the same task, and Table 5-9 indicates the ability to predict to choice tasks where all information is presented simultaneously, and a nonpurchase option is present. In both tables the RMSE and Loglikelihood ratio for every condition indicate an extremely good fit. H1D states that choices will predict better to choice tasks, however, it would appear that on average they predict equally well. H1D is therefore not supported.

--- Insert Tables 5-8 and 5-9 About Here ---

H2A and H2B. For choice tasks, the presence of a nonpurchase alternative was predicted to result in less search, and more attribute based search, when none of the alternatives in a consideration set are acceptable (H2A) and the opposite when one or more of the alternatives are acceptable (H2B).

Recall that subjects were required to indicate, for each attribute, if any level associated with the attribute would cause them to reject the product automatically (e.g., a person might refuse to purchase unsweetened orange juice). This provides us with an indication of which products will be rejected by a conjunctive decision strategy. Each two product scenario for each individual was classified as to whether it contained two, one or no acceptable alternatives. These within-subject independent measures, along with the between subject variables of scale (judgment vs. choice) and nonpurchase option (present vs. absent) effect codeses, were used in two 3 X 2 X 2 ANOVAs, with type and amount of search used as the d[illegible]endent variables in the first and second tests respectively (Table 5-10A and Table 5-11A). Simple-effects follow up tests by (1) number of acceptable alternatives and (2) number of acceptable alternatives and scale, were also conducted for both type of search (Tables 5-10B, 5-10C) and amount of search (Tables 5-11B, 5-11C). Figures 5-4 and 5-5 present a graph of the condition means for type of search and amount of search respectively.

Consistent with H2A, when none of the alternatives were acceptable, the amount of search decreased and the amount of attribute based search increased. Counter to H2B, when only one alternative was acceptable, the nonpurchase alternative did not have any effect on the type of search and decreased the total amount of search. Similarly, when two of the alternatives were acceptable, the nonpurchase alternative decreased the amount of alternative based search and the amount of search in general.

--- Insert Tables 5-10A through 5-11C About Here ---

--- Insert Figures 5-4 and 5-5 About Here ---

H2C. The RMSE and Loglikelihood values presented in Table 5-9, do not support the hypothesis that the presence of a nonpurchase alternative enhances the ability of choice tasks to predict to choice situations where a nonpurchase alternative is present.

H2D. Contrary to H2D, the nonpurchase option had considerable effects on the judgment task, decreasing both the amount of attribute based search (Tables 5-1A and 5-2A) and the total amount of search (Tables 5-2A,B and 5-13A,B). Despite this general trend, the failure to see an increase in the amount of search across the number of acceptable products for the ratings nonpurchase option (see Table 5-11C) is consistent with H2D, and is likely due to an implicit demand for a holistic strategy when a nonpurchase alternative is absent and a rating is required. Also supportive of H2D is the finding that the amount of search when both alternatives are acceptable is the same for both ratings conditions. This suggests that even when the nonpurchase option is present, a holistic use of information is elicited when making a rating, if the product can not be eliminated on the basis of a particular attribute level.

The effect of the nonpurchase option on the incidental learning variable was not significant at conventional levels (see Table 5-3). Hence, this portion of H2D is not supported.

Finally, H2D states that predictive ability of judgment tasks will not be affected by the presence of the nonpurchase alternative. Results in Table 5-8 and Table 5-9 suggest that the nonpurchase option neither helps nor hinders the predictive ability. Hence, H2D is not supported.

H3A. This hypothesis suggests that minor attributes have lower utility values when manual search is required than when all of the information is presented simultaneously. Results from the scale and parameter tests (Table 5-6) indicate that at a 95% confidence interval we can not reject the hypothesis that both parameters and scale values are the same. However, as we would reject the hypothesis of parameter equality at a 94% confidence interval, further investigation is warranted. A plot of the coefficients for each condition on each other (Figure 5-6) reveals no extreme outliers, and comparing the minor attributes in Table 5-12 (i.e., calorie, acid, pulp, calorie X acid, calorie X sweetness, and acid X sweetness) indicates that manual search conditions have lower utility values for these attributes in only 5 of the 12 cases. Hence, even if we rejected the hypothesis that parameter values are not different between the conditions, we would still not support this hypothesis.

--- Insert Table 5-12 About Here ---

--- Insert Figure 5-6 About Here ---

H3B. To test whether minor attributes had a lower level of incidental leaning when manual search was required, each individual's ranking of the attributes was paired with that individual's incidental leaning score for that attribute. This was necessary to accomodate individual differences in rankings, and therefore provide a better test of the hypotheses than if rankings had been aggregated. A 2 X 2 X 2 ANOVA of scale (judgment vs. choice), nonpurchase option (present vs. absent) and search requirement (information presented simultaneously vs. sequentially) was carried out for each ranking, with incidental learning score for the attribute as the dependent variable (Table 5-13). As only the second highest ranked attribute was affected by search, this hypothesis is rejected.

Spearman's rank order correlation coefficient may also be used to describe the relationship between attribute ranking and the incidental leaning value for that attribute. This value is -0.039, indicating no significant relation between these variables.

--- Insert Table 5-13 About Here ---

H3C. The search requirement did not decrease the ability to predict to situations where search was not required (Table 5-9). H3C is therefore rejected.

H3D. If requiring piecemeal search had affected incidental learning for choices more than judgments, either the scale*search, or the scale*search*nonpurchase alternative would have been significant in the regression of incidental learning on scale, nonpurchase alternative and search (Tabel 5-6). Neither of these terms are significant so we reject this portion of H3D.

According to the second portion of H3D, the search requirement should have affected the predictive ability of choices more than judgments. However, the search requirement had no systematic effect on either judments or choices (Table 5-9), hence we reject this aspect of H3D as well.

SIMILARITY OF STANDARD CONJOINT TO OTHER JUDGMENT CONDITIONS

The attribute coefficients for each of the judgment tasks are presented in Table 5-14. All conditions show sweetness, price, grade and size to be significant. Calorie Level was significant in only the rating conditions where one product was evaluated at a time. In fact, the two conditions with only one product have as many, or more, significant attributes than any of the two product scenarios. This may be due to the fact that only within alternative search is possible in the single product situation, which may produce more holistic processing, and consequently a greater number of significant attributes. Furthermore, both of these single product situations produce the greatest variability in coefficient values, and assign more weight to the most important attribute (grade) than the other rating conditions.

Examining which coefficients are significant in each of the conditions gives us some idea about how information may have been used differentially, however, it does not tell us if these conditions actually differed. In order to make this assessment, the judgment data were pooled, and a series of contrasts were conducted using repeated measures ANOVA, followed by a series of contrasts in MANOVA to test if marginal means for each attribute differed by condition.

The first set of contrasts looked at the effect that search and the nonpurchase alternative have on coefficient values (Table 5-15). The nonpurchase option affects the constant, the coefficient for acid level (Table 5-14 reveals that the coefficient for acid is lower when the nonpurchase option is present), and also results in a significantly higher calorie-by-acid interaction term. As well, the acid-by sweetness coefficient is also marginally higher when the nonpurchase option is present. Differences due to the presence of the nonpurchase alternative are not surprising when we consider its effect on both the amount and type of search discussed previously. However, the coefficients associated with these effects are relatively small, and while significant, are not of great importance. Search was not observed to alter the coefficients.

In the second set of contrasts (Table 5-16), where the number of alternatives (NA), search and NA X search interaction are examined, we find once again that search is exerting very little influence on the coefficients. The average amount of search witnessed for the judgment conditions (9.409/alternative) suggests the search requirement did not inhibit people from collecting a lot of information, hence it is likely that people were using the same information to make their evaluations. One important difference in this test was the effect of number of alternatives rated. The judgment conditions with only one alternative provided relatively higher coefficients for the two most important coefficients, grade and price.

--- Insert Tables 5-14 through 5-16 About Here ---

CLARITY OF INSTRUCTIONS, TASK DIFFICULTY AND SIMILARITY TO ACTUAL PURCHASING SITUATIONS

As with the incidental learning measure discussed above, two analysis of variance tests were performed to guage whether the independent variables studied impacted on the clarity of the instructions or mental effort required. The perceived similarity of each of these tasks to real life orange juice purchases was also examined.

A. Clarity of Instructions

Results of a 3 X 2 ANOVA with number of alternatives to rate (1, 2 or 3) and search requirement (simultaneous vs. piecemeal) indicate that something associated with the number of rating alternatives affected clarity of instructions (Table 5-17). Clarity was highest for the condition where only one product was rated (6.10/7.00) and lowest when two products and the nonpurchase alternative were present (5.39/7.00). A series of Tukey Pairwise HSD tests (Table 5-18) suggest that while these two values are significantly different from each other (p=0.009), these ratings do not differ significanly from the condition where there are two products and no nonpurchase option (5.80/7.00).

A 2 X 2 X 2 ANOVA with the three between-subject variables of scale (judgment vs. choice), search (simultaneous vs. sequential), and nonpurchase option (present vs. absent) (Table 5-19) suggest that instructions for the choice task were easier to understand (6.26/7.00) than those for the judgment task (5.60/7.00).

Although significant differences are observed in both of these ANOVAs, the average rating for the condition with the lowest value (5.39/7.00) is still high and represents a good understanding of the instructions. Furthermore, within the experiment, the subject was given the opportunity to practice the task as often as desired before responding to the actual questions. Hence, it is unlikely that we would expect conditions to differ on other dependent variables due to clarity of instructions.

--- Insert Tables 5-17 through 5-19 About Here ---

B. Mental Effort Required

The 3 X 2 and 2 X 2 X 2 ANOVA tests run for clarity of instructions were also performed using self reported mental difficulty of the task (Tables 5-20 and 5-21). Neither of these tests reveal differences for perceived task difficulty. The average rating over all conditions is 2.946/7, indicating that subjects slightly disagreed with the statement, "I found this task to be mentally demanding."

--- Insert Tables 5-20 and 5-21 About Here ---

C. Similarity to Actual Purchasing Task

Finally, the 3 X 2 and 2 X 2 X 2 ANOVAs above were repeated with perceived similarity to an actual purchasing situation used as the dependent measure. In the 3 X 2 test (Table 5-22A) the alternative by search interaction term was significant (p=0.002). Simple effects follow up tests reveal that the effect of the alternatives is significant when information is presented simultaneously but not when the subject is forced to search for it (Table 5-22B). Tukey HSD pairwise tests (Table 5-23) suggest that the SMA and RMP conditions were less similar than the RMA and SQA conditions to actual purchase situations.

The 2 X 2 X 2 ANOVA (Table 5-24A) indicated a significant three way interaction between scale, search and the presence of a nonpurchase alternative (p=0.001), as well as a significant two way interaction between search and the presence of a nonpurchase alternative (p=0.017). A simple effects follow up test (5-24B) suggests that scale is significant only when information is presented simultaneously. The Tukey HSD test (Table 5-25) indicates that the RMP condition is lower than the RMA, CQA and CMP conditions.

In the survey, the holdout task that was common to all subjects was a choice task with information presented simulatneously, and the ability to refuse purchase. This task was chosen as it was believed to be the best reflection of reality. Note that the mean level for this condition is the highest, granted it is not significantly higher than all other conditions.

--- Insert Tables 5-22A through 5-25 About Here ---

CHAPTER 6

DISCUSSION AND CONCLUSIONS

FRAMEWORK

Interest in the judgment-choice distinction has been increasing over the past twenty years. The framework proposed in the second chapter integrates previous research involving judgments and choices, and suggests an agenda for future investigations.

The identification of factors that may influence judgments and choices may also help to avoid confounded independent variables in studies comparing these response modes. For example, when studying the effect of time constraints we might find a large effect of this constraint on choices in experiments where task significance is low, but find small effects on choices in other experiments where the task significance is high. Without having noted this variable that differed between studies, the results would be impossible to interpret appropriately. Further research is needed to examine this, and other possible interactions among variables.

In this experiment, precautions were taken to control for factors, other than the independent variables, that would have resulted in large differences in processes underlying judgments and choices. These variables are discussed below.

EXPERIMENT

The findings regarding information search were consistent with previous studies of search processes in judgment and choice tasks (e.g., Billings and Scherer 1988); specifically, more search, and a greater amount of brand search was observed for judgments than for choice tasks (hypothesis H1A). Furthermore, this experiment contributes to our understanding of how the inclusion of a nonpurchase option influences search processes. In this task, the nonpurchase alternative reduces the amount of search and fosters more attribute-based search for both judgments and choices. This effect was anticipated for choices, given the ability to reject both products if neither met a minimum level on a given attribute. However, it was expected (H2B) that judgment conditions would consistently elicit a holistic search process, with or without the presence of a nonpurchase alternative. Contrary to this hypothesis, the nonpurchase alternative ha[illegible]ar effects on both judgments and choices, in terms of amount and type of [illegible] observed. One interpretation of this result is that when it became evident to the subject that both products were unacceptable, they terminated search and assigned a high rating to the option of not purchasing any product. Not only would this tend to decrease the amount of search required, but it would also make the use of attribute-based search more advantageous. For example, a person could look at just the attribute of price across products, and if all were too expensive it would be possible to give each product a low evaluation and the nonpurchase alternative a high rating.

The earlier discussion of factors that result in judgments and choices evoking similar decision processes focused on conditions where both judgments and choices are expected to elicit a holistic decision making strategy. On the contrary, the nonpurchase alternative in this experiment appeared to reduce the incidence of a holistic strategy for both judgment and choice tasks. Hence, further investigation is needed to determine what, if any, factors act differently on decision processes used in choices versus judgments.

Performance on the incidental learning task was unexpectedly poor, resulting in a floor effect that hindered the testing of hypotheses H1B, H2B and H3B. It is likely that this poor learning was due to the number of responses subjects had to make prior to the surprise aided-recall task. In most incidental studies (e.g., Johnson and Russo 1984) subjects are only given one decision situation prior to being asked what information they looked at. In this study however, subjects had completed 20 sets of alternatives prior to being asked to recall information. Subjects would have repeatedly found that remembering information from a given set was not necessary, and perhaps even a hindrance to making the next evaluation or choice. Stated differently, subjects may have learned to clear previous profiles from memory prior to responding the next set of stimuli. Alternatively, it may be the case that proactive interference hindered the ability to remember information from the set in question (i.e., attribute information from previous sets interfered with memory for the most recent set). Therefore, additional research using the standard incidental learning paradigm is needed to effectively test the hypotheses regarding incidental learning.

A. Comparison of Decision Processes and Outcomes

Despite the substantial differences in decision processes, as indicated by the amount and type of search conducted, the experimental conditions do not produce notably different outcomes (attribute coefficients) when one controls for variance in the error distribution in MNL models by considering the scale value (counter to H1C, H3A, and H3D). The finding that judgment and choice models do not differ is consistent with previous research (Elrod, Louviere and Davy 1992; Johnson, Louviere and Olsen 1992). Furthermore, this study provides three unique contributions: (1) judgments and choices are compared directly by converting the judgments to choices in a straight-forward, desegregate manner, (2) the product chosen is not described solely by attributes that ensure a robust linear model (Dawes and Corrigan 1974), and (3) both type and amount of search are witnessed to differ considerably among conditions. Each of these benefits is discussed below.

1. Comparison of Judgments to Choices. A number of different methods have been used to deal with the problem of converting judgments to choices. Johnson, Meyer and Ghose (1988) arbitrarily selected a point on the rating scale, such that a rating above that point was equated with a decision to purchase the product and a rating below that

point implied a decision not to purchase it. Johnson, Louviere and Olsen (1992) improved upon this method by estimating the cut-off point, but the estimate was based on aggregation of profiles and subjects, with the result that the variance of the predicted choices was artificially reduced relative to observed choices. The conversion of judgments to choices in this experiment avoided this problem by converting judgments to choices at the individual level, for each choice/rating set. Each choice/rating set contained two or more alternatives, and the highest rated alternative was assumed to be the one that would have been chosen.

2. Selection of Product Attributes. As noted when discussing the product used for this experiment, Dawes and Corrigan (1974) suggest that reasonably accurate first-choice predictions can be obtained from demonstrably inappropriate models when, in addition to other conditions, the independent variable has a conditionally monotone relation with the dependent variable. For example, Elrod, Louviere and Davy (1992) used a product described in terms of four attributes, all of which have a conditionally monotone relation with the dependent variable, with the result that the high levels of predictive validity observed in all their conditions may be due to the choice of stimuli, rather than the subjects' decision processes. The present study employs a stronger test of external validity, since the majority of the variables are not monotonically related to the dependent measure (i.e., it is not clear a priori whether fewer calories should be preferred to more calories, or whether less pulp should be preferred to more pulp). Results are consistent with previous studies; hypotheses regarding effects of task variables on predictive validity (H1D, H2D and H3C) were not supported, largely due to the lack of differences in coefficient values between conditions.

3. Process vs. Outcome. As noted above, judgments and choices result in substantially different types of search, and different levels of search overall. Hence, the finding that coefficients do not differ cannot be explained by suggesting that people used

the same decision processes in all conditions (decision processes in this experiment being inferred from amount and type of search). This is important, as it reconciles the seemingly divergent results found in process tracing research (e.g., Billings and Scherer 1988) with the work conducted in choice modeling (Elrod, Louviere and Davy 1992; Johnson, Louviere and Olsen 1992). Specifically, it is shown that different processes and common attribute weights may co-occur even when one controls for the sample, mode of stimulus presentation (a computer in this case), and extraneous variables (i.e., variables in the framework that were held constant in the study).

The finding that mathematical techniques to capture policy may specify actual decision processes very poorly is reminiscent of early work on paramorphic representation (Hoffman 1960). Hoffman suggested that a mathematical model may represent a good description of a decision making situation in the sense of predicting outcomes, even if it does not accurately reflect the decision process underlying that decision. This study extends this conclusion, indicating that such models may be incapable of discriminating between conditions for which decision processes are observed to be different.

This result emphasizes the axiom that the selection of a marketing research method depends upon the purpose of the study. If attribute utility values are the primary focus of the research (e.g., in forecasting) , marketing practitioners need not be concerned with whether their research employs a judgment or choice task; simultaneous or sequential search, or the presence or absence of a nonpurchase alternative. This extends the findings of Johnson, Louviere and Olsen (1992), that practice trials, order of attributes, order of product profile presentation, display of alternatives (simultaneous vs sequential), and description of alternative (paragraph vs. list) do not affect the parameter estimates per se. It should not be concluded, however, that choice of task requirements is not important. These results emphasize the need to use a method that controls for scale parameter differences between tasks. Given that the scale parameter is directly related to the variance of the error distribution ($\mu=6\Pi/\sigma^2$), it is important to look beyond the parameter estimates. Specifically, if parameter estimates are not different, practitioners must look for a task that provides the highest scale value.

On the other hand, understanding decision processes may be essential for planning certain marketing strategies. For example, an advertiser might wish to know what type of decision process is being used by consumers before determining what, and how much, information to present. If the target consumers rely on a lexicographic rule, the advertiser might want to focus only on the one or two best attributes, repeatedly stressing how the advertised product is superior to its competitors on these dimensions. However, if a minimax strategy is more widely used, then the advertiser should stress how well the product performs on the weakest characteristic. The results of this experiment indicate that outcome data (choices or ratings) are inadequate to reveal such processes, suggesting the need for a process tracing method, such as the interactive search program used in this stucy.

The failure to observe differences in coefficients between judgment and choice conditions does not imply that future work comparing ratings-based and choice-based conjoint should not be conducted. Recall that in the experiment the coefficients for the judgment tasks were calculated by converting ratings to choices for sixteen choice sets, each with 2 product profiles. While this method of conversion is preferable to methods based on aggregate data, it may not be sensitive enough to detect differences in attribute weighting. Stated differently, perhaps people did, in fact, weight information differently in the two tasks but these differences did not alter the observed choices. Using simulated decisions, Payne, Bettman and Johnson (1982) demonstrated that rank-order preferences for alternatives are insensitive to actual changes in decision policy. In part, this may be due to the translation of utilities from a continuous scale to a discrete choice; i.e., subtle differences in strength of preference cannot be expressed in a binary contingency choice task. A goal for future research is to identify or develop a task that evokes choice processes but provides more nearly continuous data that can be directly compared to ratings. For example, a paired comparison task, an allocation of weights task, or some modification might serve to accomplish this goal.

B. Interactions With Other Factors

Other factors in the framework, that were not manipulated in this study, may have influenced the results. For example this study used a main effects with selected two-way interactions plan, rather than a full factorial design to create products. Increasing the number of choice sets would permit the estimation of additional interaction terms and enhance the sensitivity to differences in attribute weights. The number of products used in each set may have also hindered the ability to see differences in judgment and choice coefficients. Going beyond two products per set could create an even greater disparity in search values between judgment and choice, encouraging a greater amount of between alternative search. This might ultimately result in different coefficient values.

Other factors might have also hindered the ability to see differences in judgment and choice coefficient values, by encouraging similar mental processes in both judgment and choice tasks. For example, because of the screening criterion that subjects shop once or more per month, and purchase orange juice, the respondents were likely very knowledgeable about the product, with relatively routinized preference functions for the different attributes. It is possible that if a product was used that the subjects were less familiar with (e.g., a food processor), subjects would have had a greater amount of trouble integrating the information presented. This would likely result in more search and a heavier reliance on between-alternative search (Bettman and Park 1980), which might then result in differences in judgment and choice task coefficients.

In addition to product knowledge, variables that might have encouraged judgments and choices to evoke similar mental processes include: minimal time and budget constraints; simultaneous, rather than sequential, presentation of alternatives; presentation of information in a list format; and, the presence of a limited number of alternatives. As discussed above, the evidence that judgments and choices did result in substantially different search measures suggests that different decision processes were being used. Hence, the finding that the coefficients do not differ can not be attributed to ineffective manipulation of the independent variables.

In summary, it is evident from the issues discussed above that more work is needed to explore the judgment-choice distinction as it applies to marketing research, and decision making in general. Such efforts must: (1) experimentally determine the impact of additional framework variables, (2) consider how framework variables, other than the ones manipulated, influence choices relative to judgments, (3) examine how variables in the framework interact, and (4) determine under what conditions different processes result in different outcomes.

TABLE 5-1

EFFECTS OF SCALE AND NONPURCHASE ALTERNATIVE
ON TYPE OF INFORMATION SEARCH

Source	S.S.	DF	M.S.	F-Ratio	P
Scale (S)	132.080	1	132.080	442.557	0.000
Nonpurchase Alt.(NPA)	3.870	1	3.870	12.967	0.000
S X NPA	0.749	1	0.749	2.509	0.113
ERROR	829.686	2780	0.298		

TABLE 5-2

EFFECTS OF SCALE AND NONPURCHASE ALTERNATIVE
ON AMOUNT OF INFORMATION SEARCH

Source	S.S.	DF	M.S.	F-Ratio	P
Scale (S)	26331.841	1	26331.841	191.255	0.000
Nonpurchase Alt.(NPA)	10763.174	1	10763.174	78.176	0.000
S X NPA	176.006	1	176.006	1.278	0.330
ERROR	382748.474	2780	382748.474		

TABLE 5-3

EFFECTS OF NUMBER OF ALTERNATIVES AND SEARCH ON INCIDENTAL LEARNING FOR JUDGMENT TASKS

Source	S.S.	DF	M.S.	F-Ratio	P
Number of Products (NPr)	46.822	2	23.411	1.160	0.316
Search (Se)	15.000	1	15.000	0.743	0.390
NPr X Se	40.744	2	20.372	1.009	0.367
Error	3512.500	174	20.187		

TABLE 5-4

EFFECTS OF SCALE, NONPURCHASE ALTERNATIVE AND SEARCH, ON INCIDENTAL LEARNING

Source	S.S.	DF	M.S.	F-Ratio	P
Scale (S)	62.017	1	62.017	3.718	0.055
Search (Se)	15.000	1	15.000	0.899	0.344
Nonpurchase Alternative (NPA)	46.817	1	46.817	2.807	0.095
S X Se	7.500	1	7.500	0.450	0.503
S X NPA	12.033	1	12.033	0.722	0.397
Se X NPA	32.033	1	32.033	1.921	0.167
S X Se X NPA	12.150	1	12.150	0.728	0.394
Error	3869.000	232	16.678		

TABLE 5-5

TESTS FOR IIA FOR CONDITIONS WITH THREE ALTERNATIVES

Condition	Excluded Alternative	Chi-Square	df	P
RMP	1	6.30	11	0.852
	2	16.30	11	0 130
	3	9.30	17	0.930
RQP	1	9.42	11	0.583
	2	11.39	11	0.411
	3	13.24	17	0.720
CMP	1	7.68	11	0.742
	2	6.27	11	0.854
	3	26.81	17	0.061
CQP	1	5.84	11	0.884
	2	10.22	11	0.510
	3	25.74	17	0.079

TABLE 5-6

TESTS FOR EQUALITY OF REGRESSION AND SCALE PARAMETERS

Contrast	Test	df	Chi-Square	P
Scale: Judgments vs. Choices	Equality of Parameters With Varying Scale	23	190.956	**0.000**
	Equality of Scale Given Equal Parameters[a]	1	12.8012	**0.000**
Nonpurchase Option: Present vs. Absent	Equality of Parameters With Varying Scale	23	33.051	0.080
	Equality of Scale Given Equal Parameters	1	0.348	0.555
Search: Simultaneous vs. Sequential	Equality of Parameters With Varying Scale	23	27.398	0.052
	Equality of Scale Given Equal Parameters	1	0.435	0.510

TABLE 5-7

ALTERNATIVE SPECIFIC COEFFICIENTS: JUDGMENTS VS. CHOICES

Alternative	Attribute	Judgment Coefficients	Choice Coefficients
1	Constant	-0.299	0.956
2	Constant	-0.580	0.892
1	Calorie Level	-0.062	-0.099
2	Calorie Level	0.009	0.029
1	Acid Level	0.061	-0.131
2	Acid Level	-0.151	-0.082
1	Sweentness	-0.286	-0.607
2	Sweetness	-0.337	-0.210
1	Price	-0.503	-0.388
2	Price	-0.354	-0.741
1	Grade	0.600	0.740
2	Grade	0.439	0.595
1	Pulp	-0.113	-0.277
2	Pulp	-0.225	0.061
1	Size	0.268	0.590
2	Size	0.228	0.247
1	Calorie*Acid	-0.053	0.111
2	Calorie*Acid	0.192	-0.141
1	Calorie*Sweetness	0.225	-0.127
2	Calorie*Sweetness	-0.053	-0.042
1	Acid*Sweetness	0.026	0.006
2	Acid*Sweetness	0.029	-0.209

TABLE 5-8

ABILITY TO PREDICT TO SAME TASK

Condition	RMSE	Loglikelihood Ratio	df
SMA	0.307	1.730[a]	13
SQA	0.246	1.439[a]	13
RMA-Rating	0.211	0.815[a]	13
RMA-Choice	0.240	1.006[a]	13
RMP-Rating	0.159	0.773[a]	13
RMP-Choice	0.186	0.756[a]	13
RQA-Rating	0.224	1.048[a]	13
RQA-Choice	0.253	1.235[a]	13
RQP-Rating	0.231	1.113[a]	13
RQP-Choice	0.232	1.079[a]	13
CMA	0.264	1.469[a]	13
CMP	0.195	0.380[a]	13
CQA	0.303	1.860[a]	13
CQP	0.252	1.360[a]	13

[a] $p < 0.005$

TABLE 5-9

ABILITY TO PREDICT TO CHOICE TASKS WHERE INFOMRATION IS PRESENTED SIMULTANEOUSLY AND A NONNPURCHASE ALTERNATIVE IS PRESENT

Set Predicted To	Condition	RMSE	Loglikelihood Ratio	df
"Choose One" from 2, 3, and 4 Product Sets	SMA	1.371	5.611[a]	18
	SQA	1.501	5.581[a]	18
	RMA-Rating	1.395	5.259[a]	18
	RMA-Choice	1.354	6.540[b]	18
	RMP-Rating	1.265	3.906[a]	18
	RMP-Choice	1.201	4.783[a]	18
	RQA-Rating	1.250	5.528[a]	18
	RQA-Choice	1.126	3.598[a]	18
	RQP-Rating	1.236	5.066[a]	18
	RQP-Choice	1.302	5.593[a]	18
	CMA	1.116	4.504[a]	18
	CMP	1.300	6.171[a]	18
	CQA	1.350	6.345[b]	18
	CQP	1.277	5.275[a]	18
"Choose One " from a 9 Product Set	SMA	0.120	0.253[a]	8
	SQA	0.106	0.231[a]	8
	RMA-Rating	0.112	0.235[a]	8
	RMA-Choice	0.099	0.319[a]	8
	RMP-Rating	0.084	0.149[a]	8
	RMP-Choice	0.081	0.159[a]	8
	RQA-Rating	0.083	0.033[a]	8
	RQA-Choice	0.100	0.291[a]	8
	RQP-Rating	0.106	0.228[a]	8
	RQP-Choice	0.077	0.198[a]	8
	CMA	0.081	0.212[a]	8
	CMP	0.222	0.236[a]	8
	CQA	0.332	1.033[a]	8
	CQP	0.251	0.214[a]	8
"Buy $5 Worth" from a 9 Product Set	SMA	0.162	0.209[a]	8
	SQA	0.174	0.087[a]	8
	RMA-Rating	0.164	0.213[a]	8
	RMA-Choice	0.158	1.832[c]	8
	RMP-Rating	0.154	0.390[a]	8
	RMP-Choice	0.144	1.160[a]	8
	RQA-Rating	0.144	0.098[a]	8
	RQA-Choice	0.147	1.310[a]	8
	RQP-Rating	0.154	0.472[a]	8
	RQP-Choice	0.143	1.458[b]	8
	CMA	0.150	1.063[a]	8
	CMP	0.129	0.932[a]	8
	CQA	0.115	0.679[a]	8
	CQP	0.124	0.805[a]	8

[a] $p < 0.005$ [b] $p < 0.010$ [c] $p < 0.050$

TABLE 5-10A

EFFECTS OF SCALE, NONPURCHASE ALTERNATIVE AND NUMBER OF ACCEPTABLE ALTERNATIVES ON TYPE OF INFORMATION SEARCH

Source	S.S.	DF	M.S.	F-Ratio	P
Scale (S)	39.848	1	39.848	130.264	0.000
Nonpurchase Alt.(NPA)	1.639	1	1.639	5.356	0.021
Number of Alts (NAc)	4.772	2	2.386	7.800	0.000
S X NPA	4.436	1	4.436	14.502	0.000
S X NAc	4.129	2	2.065	6.749	0.001
NPA X NAc	2.738	2	1.369	4.476	0.011
S X NPA X NAc	2.756	2	1.378	4.504	0.011
ERROR	706.019	2308	0.306		

TABLE 5-10B

SIMPLE EFFECTS FOLLOW UP TEST: EFFECTS OF SCALE AND NONPURCHASE ALTERNATIVE ON TYPE OF INFORMATION SEARCH, BY NUMBER OF ACCEPTABLE ALTERNATIVES

Source	S.S.	DF	M.S.	F-Ratio	P
Number of Acceptable Alts.= None					
Scale (S)	13.621	1	13.621	43.300	0.000
Nonpurchase Alt.(NPA)	2.375	1	2.375	7.550	0.006
S X NPA	0.120	1	0.120	0.382	0.537
ERROR	191.571	609	0.315		
Number of Acceptable Alts.= One					
Scale (S)	21.088	1	21.088	62.487	0.000
Nonpurchase Alt.(NPA)	0.136	1	0.136	0.403	0.526
S X NPA	0.272	1	0.272	0.806	0.369
ERROR	272.005	806	0.337		
Number of Acceptable Alts.= Two					
Scale (S)	39.848	1	39.848	146.773	0.000
Nonpurchase Alt.(NPA)	1.639	1	1.639	6.035	0.014
S X NPA	4.436	1	4.436	16.340	0.000
ERROR	242.443	893	0.271		

TABLE 5-10C

SIMPLE EFFECTS FOLLOW UP TEST: EFFECTS OF A NONPURCHASE ALTERNATIVE ON TYPE OF INFORMATION SEARCH, BY NUMBER OF ACCEPTABLE ALTERNATIVES AND SCALE

Source	S.S.	DF	M.S.	F-Ratio	P
Number of Acceptable Alts.= None. Scale=Choice					
Nonpurchase Alt.(NPA)	0.812	1	0.812	3.220	0.074
ERROR	67.579	268	0.252		
Number of Acceptable Alts.= None. Scale=Judgment					
Nonpurchase Alt.(NPA)	2.375	1	2.375	6.531	0.011
ERROR	123.993	341	0.364		
Number of Acceptable Alts.= One. Scale=Choice					
Nonpurchase Alt.(NPA)	0.136	1	0.136	0.520	0.471
ERROR	106.340	406	0.262		
Number of Acceptable Alts.= One. Scale=Judgment					
Nonpurchase Alt.(NPA)	0.136	1	0.136	0.328	0.567
ERROR	165.666	400	0.414		
Number of Acceptable Alts.= Two. Scale=Choice					
Nonpurchase Alt.(NPA)	2.944	1	2.944	14.768	0.000
ERROR	95.677	480	0.199		
Number of Acceptable Alts.= Two. Scale=Judgment					
Nonpurchase Alt.(NPA)	1.639	1	1.639	4.611	0.032
ERROR	146.765	413	0.355		

TABLE 5-10D

TUKEY HSD TESTS FOR TYPE OF SEARCH: MATRIX OF PAIRWISE COMPARISON PROBABILITIES BY CONDITION AND NUMBER OF ACCEPTABLE ALTERNATIVES

Condition	NAc	Mean (N)	cqa-0	rqa-0	cqp-0	rqp-0	cqa-1	rqa-1	cqp-1	rqp-1	cqa-2	rqa-2	cqp-2	rqp-2
cqa	0	-0.336 (124)	1.000											
rqa	0	0.141 (180)	**0.000**	1.000										
cqp	0	-0.446 (146)	0.890	**0.000**	1.000									
rqp	0	-0.023 (164)	**0.000**	0.182	**0.000**	1.000								
cqa	1	-0.355 (184)	1.000	**0.000**	0.941	**0.000**	1.000							
rqa	1	0.003 (175)	**0.000**	0.421	**0.000**	1.000	**0.000**	1.000						
cqp	1	-0.392 (224)	0.999	**0.000**	0.999	**0.000**	1.000	**0.000**	1.000					
rqp	1	0.042 (230)	**0.000**	0.805	**0.000**	0.991	**0.000**	1.000	**0.000**	1.000				
cqa	2	-0.310 (388)	1.000	**0.000**	0.300	**0.000**	0.999	**0.000**	0.824	**0.000**	1.000			
rqa	2	0.079 (341)	**0.000**	0.987	**0.000**	0.706	**0.000**	0.942	**0.000**	1.000	**0.000**	1.000		
cqp	2	-0.457 (326)	0.616	**0.000**	1.000	**0.000**	0.674	**0.000**	0.927	**0.000**	**0.017**	**0.000**	1.000	
rqp	2	0.060 (302)	**0.000**	0.918	**0.000**	0.916	**0.000**	0.995	**0.000**	1.000	**0.000**	1.000	**0.000**	1.000

NAc = Number of Acceptable Alternatives

TABLE 5-11A

EFFECTS OF SCALE, NONPURCHASE ALTERNATIVE AND NUMBER OF ACCEPTABLE ALTERNATIVES ON TOTAL AMOUNT OF INFORMATION SEARCH

Source	S.S.	DF	M.S.	F-Ratio	P
Scale (S)	1967.853	1	1967.853	19.070	0.000
Nonpurchase Alt.(NPA)	4.647	1	4.467	0.045	0.832
Number of Accept. Alts. (NAc)	1520.392	2	760.196	7.367	0.001
S X NPA	344.092	1	344.092	3.335	0.068
S X NAc	1778.490	2	889.245	8.617	0.000
NPA X NAc	118.644	2	59.322	0.575	0.563
S X NPA X NAc	620.545	2	310.273	3.007	0.050
ERROR	238165.969	2308	103.191		

TABLE 5-11B

SIMPLE EFFECTS FOLLOW UP TEST: EFFECTS OF SCALE AND NONPURCHASE ALTERNATIVE ON TOTAL AMOUNT OF INFORMATION SEARCHED, BY NUMBER OF ACCEPTABLE ALTERNATIVES

Source	S.S.	DF	M.S.	F-Ratio	P
Number of Acceptable Alts.= None					
Scale (S)	2712.946	1	2712.946	36.540	0.000
Nonpurchase Alt.(NPA)	1950.476	1	1950.476	26.271	0.000
S X NPA	0.020	1	0.020	0.000	0.987
ERROR	45215.418	609	74.245		
Number of Acceptable Alts.= One					
Scale (S)	2314.504	1	2[illegible].504	15.971	0.000
Nonpurchase Alt.(NPA)	2603.166	1	2603.166	17.963	0.000
S X NPA	278.912	1	278.912	1.925	0.166
ERROR	116802.989	806	144.917		
Number of Acceptable Alts.= Two					
Scale (S)	1967.853	1	1967.853	23.077	0.000
Nonpurchase Alt. (NPA)	4.647	1	4.647	0.054	0.815
S X NPA	[illegible]44.092	1	344.092	4.035	0.045
ERROR	76147.561	893			

TABLE 5-11C

SIMPLE EFFECTS FOLLOW UP TEST: EFFECTS OF A NONPURCHASE ALTERNATIVE ON TOTAL AMOUNT OF INFORMATION SEARCHED, BY NUMBER OF ACCEPTABLE ALTERNATIVES AND SCALE

Source	S.S.	DF	M.S.	F-Ratio	P
Number of Acceptable Alts.= None, Scale=Choice					
Nonpurchase Alt.(NPA)	1514.265	1	1514.265	33.519	0.000
ERROR	12107.102	268	45.176		
Number of Acceptable Alts.= None, Scale=Judgment					
Nonpurchase Alt.(NPA)	1950.476	1	1950.476	20.089	0.000
ERROR	33108.317	341	97.092		
Number of Acceptable Alts.= One, Scale=Choice					
Nonpurchase Alt.(NPA)	774.892	1	774.892	15.719	0.000
ERROR	20014.106	406	49.296		
Number of Acceptable Alts.= One, Scale=Judgment					
Nonpurchase Alt.(NPA)	2603.166	1	2603.166	10.758	0.001
ERROR	96788.884	400	96788.884		
Number of Acceptable Alts.= Two, Scale=Choice					
Nonpurchase Alt.(NPA)	619.495	1	619.495	8.049	0.005
ERROR	36941.403	480	76.961		
Number of Acceptable Alts.= Two, Scale=Judgment					
Nonpurchase Alt.(NPA)	4.647	1	4.647	0.049	0.825
ERROR	39206.158	413	94.930		

TABLE 5-11D

TUKEY HSD TESTS FOR TOTAL AMOUNT OF SEARCH: MATRIX OF PAIRWISE COMPARISON PROBABILITIES BY CONDITION AND NUMBER OF ACCEPTABLE ALTERNATIVES

Condition	NAc	Mean (N)	cqa-0	rqa-0	cqp-0	rqp-0	cqa-1	rqa-1	cqp-1	rqp-1	cqa-2	rqa-2	cqp-2	rqp-2
cqa	0	16.492 (124)	1.000											
rqa	0	22.450 (180)	**0.001**	1.000										
cqp	0	11.740 (146)	**0.034**	**0.000**	1.000									
rqp	0	17.744 (164)	0.999	**0.008**	**0.000**	1.000								
cqa	1	15.935 (184)	1.000	**0.000**	**0.046**	0.950	1.000							
rqa	1	22.829(175)	**0.000**	1.000	**0.000**	**0.003**	**0.000**	1.000						
cqp	1	13.165 (224)	0.288	**0.000**	0.991	**0.006**	0.391	**0.000**	1.000					
rqp	1	17.983 (230)	0.992	**0.005**	**0.000**	1.000	0.818	**0.002**	**0.001**	1.000				
cqa	2	19.938 (388)	0.138	0.390	**0.000**	0.659	**0.006**	0.197	**0.000**	0.663	1.000			
rqa	2	27.296 (341)	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.002**	**0.000**	**0.000**	**0.000**	1.000		
cqp	2	17.371 (326)	1.000	**0.000**	**0.000**	1.000	0.972	**0.000**	**0.002**	1.000	0.117	**0.000**	1.000	
rqp	2	23.877 (302)	**0.000**	0.977	**0.000**	**0.000**	**0.000**	0.998	**0.000**	0.000	**0.000**	**0.009**	**0.000**	1.000

NAc= Number of Acceptable Alternatives

TABLE 5-12

ALTERNATIVE SPECIFIC COEFFICIENTS: SIMULTANEOUS VS. SEQUENTIAL

Alternative	Attribute	Simultaneous Coefficients	Sequential Coefficients
1	Constant	0.154	0.278
2	Constant	0.040	-0.057
1	Calorie Level	-0.179	-0.038
2	Calorie Level	-0.080	0.105
1	Acid Level	-0.023	-0.002
2	Acid Level	-0.105	-0.105
1	Sweentness	-0.509	-0.293
2	Sweetness	-0.294	-0.183
1	Price	-0.456	-0.459
2	Price	-0.427	-0.566
1	Grade	0.631	0.607
2	Grade	0.546	0.412
1	Pulp	-0.263	-0.053
2	Pulp	-0.066	-0.108
1	Size	0.307	0.451
2	Size	0.131	0.333
1	Calorie*Acid	-0.041	0.061
2	Calorie*Acid	-0.081	0.045
1	Calorie*Sweetness	-0.078	0.112
2	Calorie*Sweetness	-0.049	-0.137
1	Acid*Sweetness	0.070	0.004
2	Acid*Sweetness	0.000	-0.101

TABLE 5-13

F-VALUE MATRIX: EFFECTS OF SCALE, NONPURCHASE ALTERNATIVE AND SEARCH ON INCIDENTAL LEARNING

	Rank						
Source	1	2	3	4	5	6	7
	F-value (df)	F-value (df)	F-value (df)	F-value (df)	F-value (df)	F-value (df)	F-value (df)
Scale (S)	1.275 (1,260)	4.194 (1,226)[a]	0.383 (1,230)	1.680 (1,219)	0.131 (1,215)	2.778 (1,225)[b]	0.127 (1,225)
Search(Se)	0.000 (1,260)	10.474 (1,226)[illegible]	[illegible]33 (1,230)	2.598 (1,219)	1.202 (1,215)	4.938 (1,225)[a]	3.422 (1,225)[b]
Nonpurchase Alt. (NPA)	0.000 (1,260)	3.140 (1,[illegible])[b]	[illegible].036 (1,230)	1.027 (1,219)	0.493 (1,215)	2.224 (1,225)	0.484 (1,225)
S X Se	0.026 (1,260)	7.015 (1,[illegible]	[illegible] (1,230)	0.846 (1,219)	0.000 (1,215)	2.665 (1,225)	0.151 (1,225)
S X NPA	1.577 (1,260)	7.669 (1,[illegible]	[illegible]0 (1,230)	1.847 (1,219)	0.271 (1,215)	1.462 (1,225)	0.992 (1,225)
Se X NPA	0.086 (1,260)	6.368 (1,226)[illegible]	[illegible]310 (1,230)[a]	5.075 (1,219)[a]	2.884 (1,215)[b]	3.900 (1,225)[a]	0.165 (1,225)
S X Se x NPA	0.070 (1,260)	6.886 ([illegible]	4.120 (1,230)[a]	3.925 (1,219)[a]	0.035 (1,215)	2.733 (1,225)	0.889 (1,225)

[a] P<0.005

[b] p<0.100

TABLE 5-14

COEFFICIENTS OF JUDGMENT TASKS-OLS REGRESSION

	Condition					
Variable	sma	sqa	rma	rqa	rmp	rqp
Constant	0.452[a]	0.511[a]	0.584[a]	0.570[a]	0.498[a]	0.540[a]
Calories	-0.019[b]	-0.023[b]	-0.019[c]	-0.007	-0.016	-0.004
Acid	-0.006	-0.038[a]	-0.012	-0.022[b]	0.004	-0.005
Sweetness	-0.026[b]	-0.046[a]	-0.058[a]	-0.041[a]	-0.071[a]	-0.059[a]
Price	-0.070[a]	-0.090[a]	-0.052[a]	-0.033[a]	-0.068[a]	-0.051[a]
Grade	0.138[a]	0.128[a]	0.084[a]	0.079[a]	0.074[a]	0.085[a]
Pulp	-0.012	-0.010	-0.031[b]	-0.015	0.000	-0.013
Size	0.035[a]	0.024[b]	0.024[b]	0.030[b]	0.039[b]	0.044[a]
Cal*Acid	-0.004	-0.002	-0.004	-0.002	-0.027[b]	-0.023[b]
Cal*Sweet	0.001	0.004	0.017	0.011	0.029[b]	0.019[c]
Acid*Sweet	-0.006	-0.001	0.006	0.000	0.012	0.016

[a] $p<0.001$
[b] $p<0.050$
[c] $p<0.100$

TABLE 5-15

COMPARISONS OF ATTRIBUTE MARGINAL MEANS FOR JUDGMENT TASKS BY SEARCH AND NONPURCHASE ALTERNATIVE: F-VALUE MATRIX

Variable	Constant	Search	Nonpurchase Alternative (NPA)	Search*NPA
Constant	3089.912[a]	0.542	8.687[b]	1.933
Calories	4.852[b]	1.267	0.086	0.002
Acid	4.962[b]	1.314	4.076[b]	0.001
Sweetness	44.579[a]	0.651	0.795	0.025
Price	78.554[a]	2.388	2.177	0.013
Grade	125.670[a]	0.040	0.017	0.288
Pulp	8.179[b]	0.017	2.504	1.962
Size	44.677[a]	0.270	1.911	0.000
Cal*Acid	10.195[b]	0.110	5.913[b]	0.014
Cal*Sweet	18.041[a]	0.784	1.227	0.034
Acid*Sweet	6.941[b]	0.035	2.870[c]	0.433

* (1, 116) degrees of freedom exist for each F-value

[a] $p<0.001$
[b] $p<0.050$
[c] $p<0.100$

TABLE 5-16

COMPARISONS OF ATTRIBUTE MARGINAL MEANS FOR JUDGMENT TASKS BY NUMBER OF ALTERNATIVES RATED AND SEARCH: F-VALUE MATRIX*

Variable	Constant	Number of Alternatives Rated (NA)	Search	NA X Search
Constant	3144.651[a]	25.613[a]	1.420	3.599[c]
Calories	10.316[b]	0.575	0.145	0.586
Acid	25.103[a]	0.362	7.077[b]	2.070
Sweetness	33.273[a]	0.876	0.011	1.496
Price	121.087[a]	11.474[a]	0.005	3.177[c]
Grade	217.315[a]	12.603[a]	0.238	0.024
Pulp	11.383[a]	1.454	0.786	0.480
Size	24.781[a]	0.040	0.053	0.484
Cal*Acid	0.901	0.002	0.123	0.005
Cal*Sweet	4.020[b]	2.101	0.052	0.296
Acid*Sweet	0.002	0.929	0.001	0.640

* (1, 116) degrees of freedom exist for each F-value

[a] $p<0.001$
[b] $p<0.050$
[c] $p<0.100$

TABLE 5-17

EFFECTS OF NUMBER OF ALTERNATIVES RATED AND SEARCH ON CLARITY OF INTSTRUCTIONS

Source	S.S.	DF	M.S.	F-Ratio	P
Number of Alternatives Rated (NA)	11.622	2	5.811	3.354	0.037
Search (Se)	0.339	1	0.339	0.196	0.659
NA X Se	2.158	2	1.079	0.623	0.538
Error	301.451	174	1.732		

TABLE 5-18

TUKEY HSD TESTS FOR CLARITY OF INSTRUCTIONS: MATRIX OF PAIRWISE COMPARISON PROBABILITIES BY CONDITION

Condition	Mean	N	sma	rma	rmp	sqa	rqa	rqp
sma	5.867	30	1.000					
rma	5.833	30	1.000	1.000				
rmp	5.316	30	0.586	0.651	1.000			
sqa	6.333	30	0.743	0.683	**0.033**	1.000		
rqa	5.767	30	1.000	1.000	0.771	0.544	1.000	
rqp	5.467	30	0.400	0.890	0.998	0.110	0.951	1.000

TABLE 5-19

EFFECTS OF SCALE, NONPURCHASE ALTERNATIVE AND SEARCH ON CLARITY OF INSTRUCTIONS

Source	S.S.	DF	M.S.	F-Ratio	P
Scale (S)	7.350	1	7.350	4.933	0.027
Search (Se)	0.339	1	0.339	0.228	0.634
Nonpurchase Alternative (NPA)	1.350	1	1.350	0.906	0.342
S X Se	0.921	1	0.921	0.618	0.433
S X NPA	0.008	1	0.008	0.006	0.940
Se X NPA	0.353	1	0.353	0.237	0.627
S X Se X NPA	2.303	1	2.303	1.546	0.215
Error	345.685	232	1.49		

TABLE 5-20

EFFECTS OF NUMBER OF ALTERNATIVES RATED AND SEARCH ON REPORTED DIFFICULTY OF TASK

Source	S.S.	DF	M.S.	F-Ratio	P
Number of Alternatives (NA)	6.689	2	3.344	1.328	0.268
Search (Se)	1.067	1	1.067	0.423	0.516
S X Se	5.633	2	2.817	1.118	0.329
Error	438.333	174	2.519		

TABLE 5-21

EFFECTS OF SCALE, NONPURCHASE ALTERNATIVE AND SEARCH ON REPORTED DIFFICULTY OF TASK

Source	S.S.	DF	M.S.	F-Ratio	P
Scale (S)	2.817	1	2.817	1.054	0.306
Search (Se)	1.067	1	1.067	0.399	0.528
Nonpurchase Alternative (NPA)	0.267	1	0.267	0.100	0.752
S X Se	0.675	1	0.675	0.253	0.616
S X NPA	0.008	1	0.008	0.003	0.956
Se X NPA	4.408	1	4.408	1.650	0.200
S X Se X NPA	4.267	1	4.267	1.597	0.208
Error	619.860	232	2.672		

TABLE 5-22A

EFFECTS OF NUMBER OF ALTERNATIVES RATED AND SEARCH ON REPORTED SIMILARITY TO ACTUAL PURCHASE SITUATIONS

Source	S.S.	DF	M.S.	F-Ratio	P
Number of Alternatives (NA)	9.356	2	4.678	2.010	0.137
Search (Se)	6.017	1	6.017	2.585	0.110
S X Se	30.478	2	15.239	6.548	0.002
Error	404.933	174	2.327		

TABLE 5-22B

SIMPLE EFFECTS FOLLOW UP TEST FOR INFLUENCE OF NUMBER OF ALTERNATIVES AND SEARCH ON REPORTED SIMILARITY TO ACTUAL PURCHASE SITUATIONS: BY SEARCH

Source	S.S.	DF	M.S.	F-Ratio	P
Search=Simultaneous					
Number of Alternatives (NA)	33.867	2	16.933	7.270	0.001
Error	202.633	87	2.329		
Search=Sequential					
Number of Alternatives (NA)	9.386	2	4.678	2.012	0.140
Error	202.360	87	2.325		

TABLE 5-23

TUKEY HSD TESTS FOR SIMILARITY TO ACTUAL PURCHASE SITUATION: MATRIX OF PAIRWISE COMPARISON PROBABILITIES BY CONDITION

Condition	Mean	N	sma	rma	rmp	sqa	rqa	rqp
sma	4.100	30	1.000					
rma	5.367	30	**0.016**	1.000				
rmp	4.033	30	1.000	**0.009**	1.000			
sqa	5.333	30	**0.022**	1.000	**0.012**	1.000		
rqa	4.633	30	0.755	0.426	0.649	0.481	1.000	
rqp	4.667	30	0.703	0.481	0.593	0.537	1.000	1.000

TABLE 5-24A

EFFECTS OF SCALE, NONPURCHASE ALTERNATIVE AND SEARCH ON REPORTED SIMILARITY TO ACTUAL PURCHASE SITUATIONS

Source	S.S.	DF	M.S.	F-Ratio	P
Scale (S)	2.017	1	2.017	0.827	0.364
Search (Se)	6.017	1	6.017	2.466	0.528
Nonpurchase Alternative (NPA)	0.017	1	0.017	0.007	0.752
S X Se	8.533	1	8.533	3.498	0.616
S X NPA	0.833	1	0.833	0.342	0.956
Se X NPA	14.008	1	14.008	5.742	0.200
S X Se X NPA	27.338	1	27.338	11.205	0.208
Error	566.033	232	2.440		

TABLE 5-24B

SIMPLE EFFECTS FOLLOW UP TEST FOR THE INFLUENCE OF SCALE AND SEARCH ON REPORTED SIMILARITY TO ACTUAL PURCHASE SITUATIONS: BY NONPURCHASE ALTERNATIVE

Source	S.S.	DF	M.S.	F-Ratio	P
NPA = Absent					
Scale (S)	8.067	1	8.067	3.416	0.067
Search (Se)	7.350	1	7.350	3.112	0.080
S X Se	20.008	1	20.008	8.472	0.004
Error	273.967	116	2.362		
NPA = Present					
Scale (S)	6.017	1	6.017	2.390	0.125
Search (Se)	2.017	1	2.017	0.801	0.373
S X Se	8.533	1	8.533	3.498	0.068
Error	292.067	116	2.518		

TABLE 5-25

TUKEY HSD TESTS FOR SIMILARITY TO ACTUAL PURCHASE SITUATION: MATRIX OF PAIRWISE COMPARISON PROBABILITIES BY CONDITION

Condition	Mean	N	cma	rma	cqa	rqa	cmp	rmp	cqp	rqp
cma	4.433	30	1.000							
rma	5.367	30	0.286	1.000						
cqa	5.333	30	0.333	1.000	1.000					
rqa	4.633	30	1.000	0.607	0.664	1.000				
cmp	5.467	30	0.170	1.000	1.000	0.437	1.000			
rmp	4.033	30	0.976	**0.021**	**0.028**	0.814	**0.009**	1.000		
cqp	5.033	30	0.614	0.992	0.996	0.976	0.962	0.204	1.000	
rqp	4.667	30	0.999	0.664	0.718	1.000	0.493	0.768	0.985	1.000

FIGURE 2-1

A FRAMEWORK TO STUDY THE JUDGMENT-CHOICE DISTINCTION

A. Decision Maker Knowledge

B. Situational Constraints
1. Time Constraints
2. Budget Constraints

C. Task Significance

D. Information Display
1. Physical Organization
2. Search Requirements
3. Form of Description

E. Response Task
1. Level of Committment Required
2. Number of Choice Options and Scale Length

F. Between Alternative Factors
1. Number of Alternatives
2. Nature of Alternatives
a) Presence of Other Product(s)
i) Similarity of Profiles
ii) Number of Acceptable Alternatives
b) Ability to Refuse/Delay Purchase

G. Within Alternaive Factors
1. Nature of Attributes
2. Dimensional Dependence
3. Number of Attributes

FIGURE 3-1

THE NONPURCHASE ALTERNATIVE MODEL

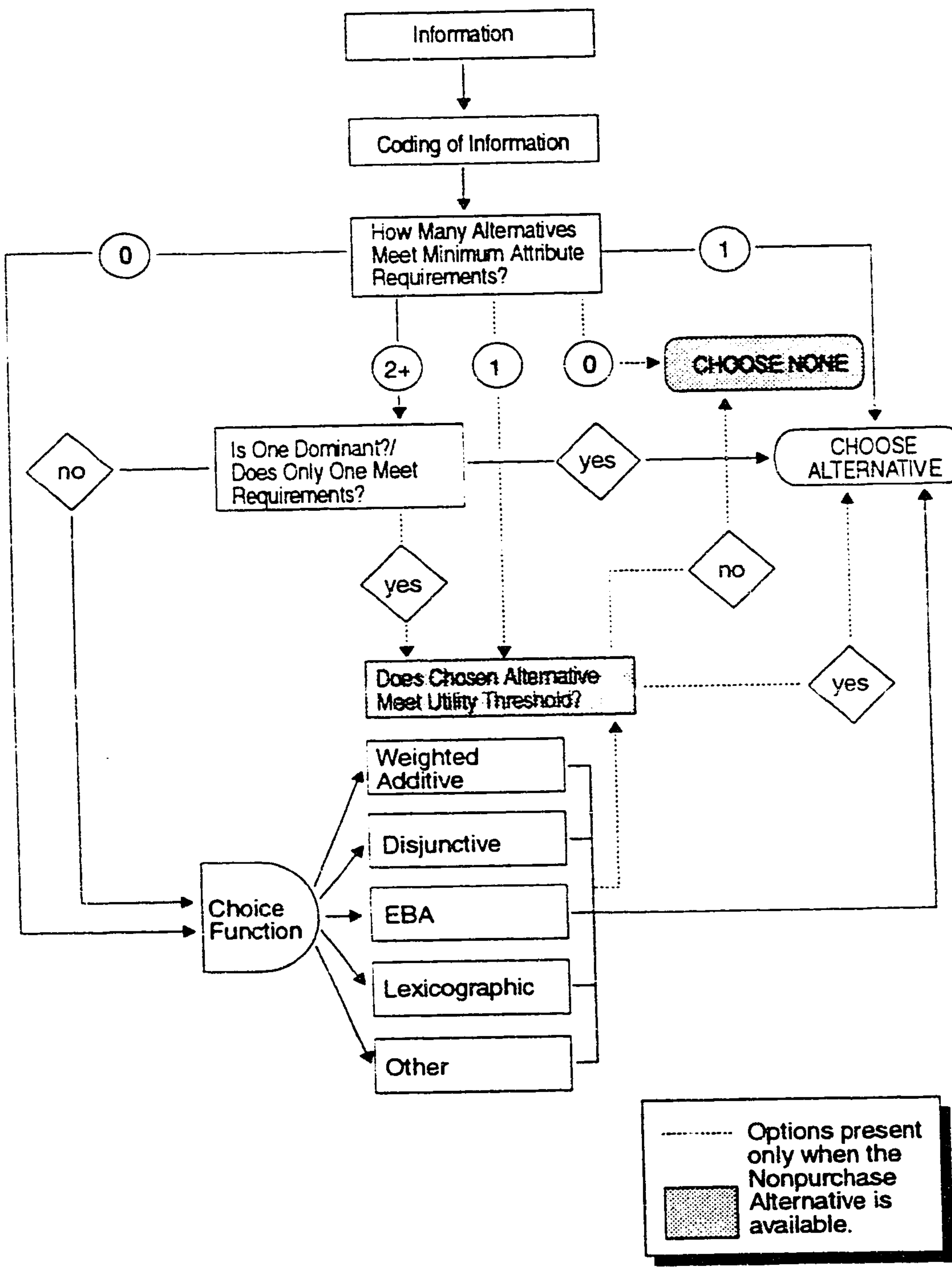


FIGURE 4-1

BETWEEN-SUBJECT EXPERIMENTAL DESIGN

		JUDGMENT		CHOICE	
		SIM. PRES.	SEQ. PRES.	SIM. PRES.	SEQ. PRES.
PAIRS OF PRODUCTS	A, B OR NEITHER	RMP	RQP	CMP	CQP
PAIRS OF PRODUCTS	A OR B	RMA	RQA	CMA	CQA
SINGLE PROD.	A OR B	SMA	SQA		

FIGURE 5-1
TYPE OF SEARCH BY CONDITION

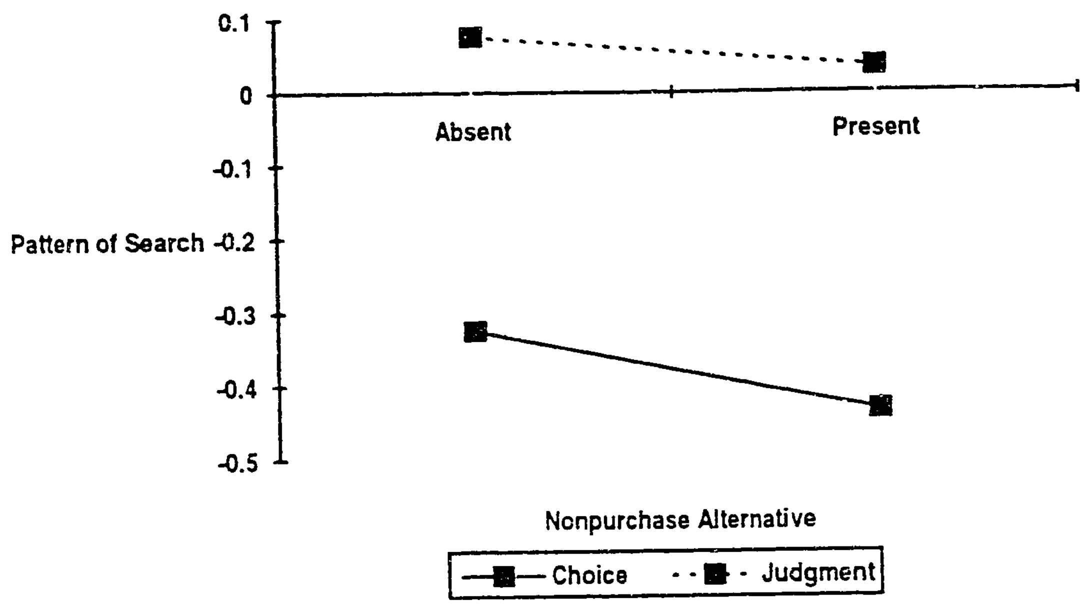


FIGURE 5-2
AMOUNT OF SEARCH BY CONDITION

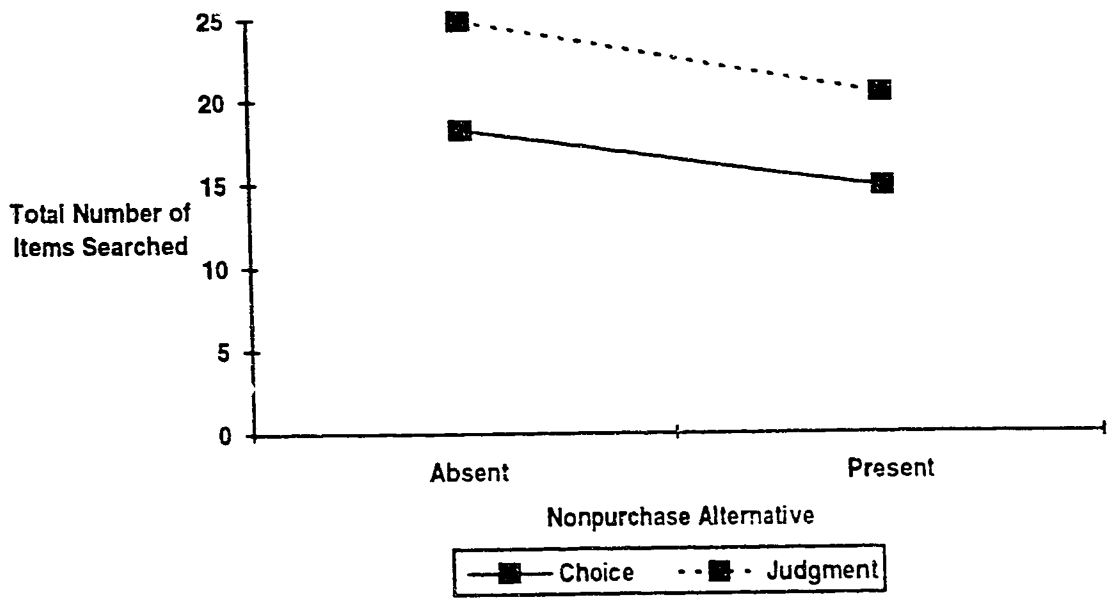


FIGURE 5-3

SCATTER PLOT OF ATTRIBUTE COEFFICIENTS:
CHOICE VS. JUDGMENT

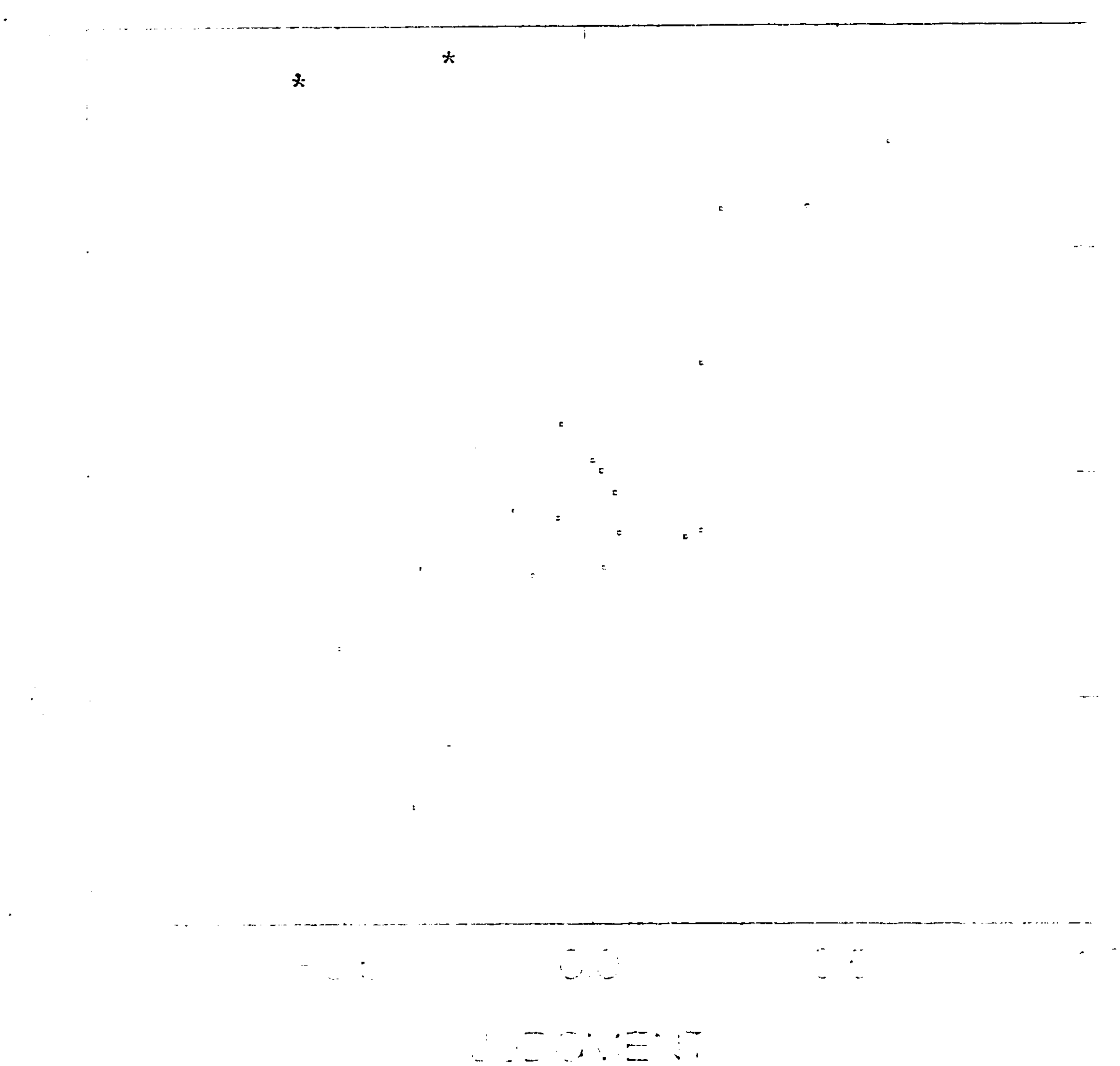


FIGURE 5-4
TYPE OF SEARCH BY CONDITION AND NUMBER OF ACCEPTABLE ALTERNATIVES IN TWO PRODUCT PROFILE SCENARIOS

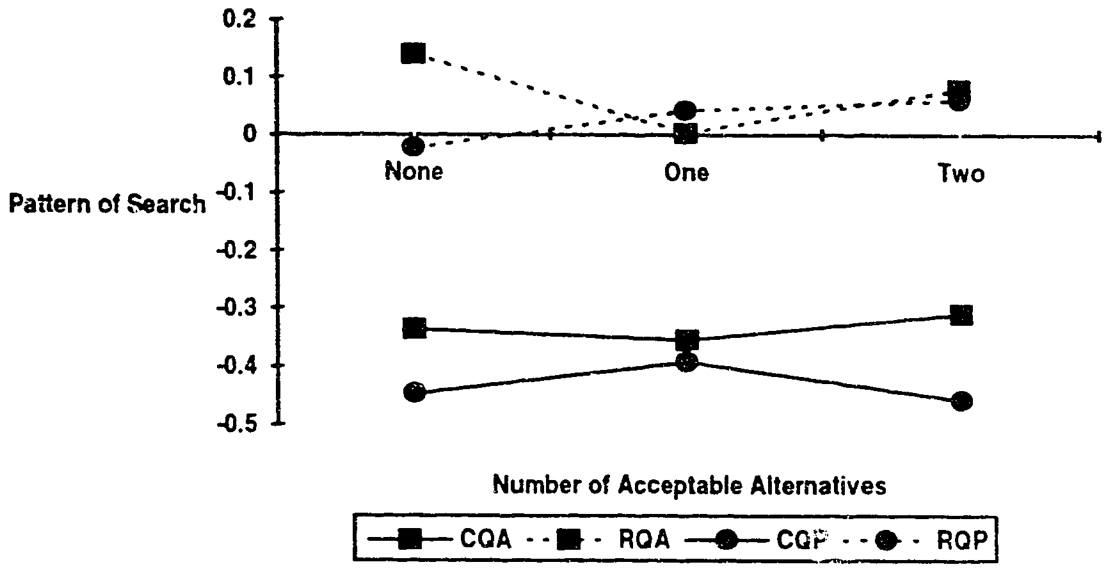


FIGURE 5-5
AMOUNT OF SEARCH BY CONDITION AND NUMBER OF ACCEPTABLE ALTERNATIVES IN TWO PRODUCT PROFILE SCENARIOS

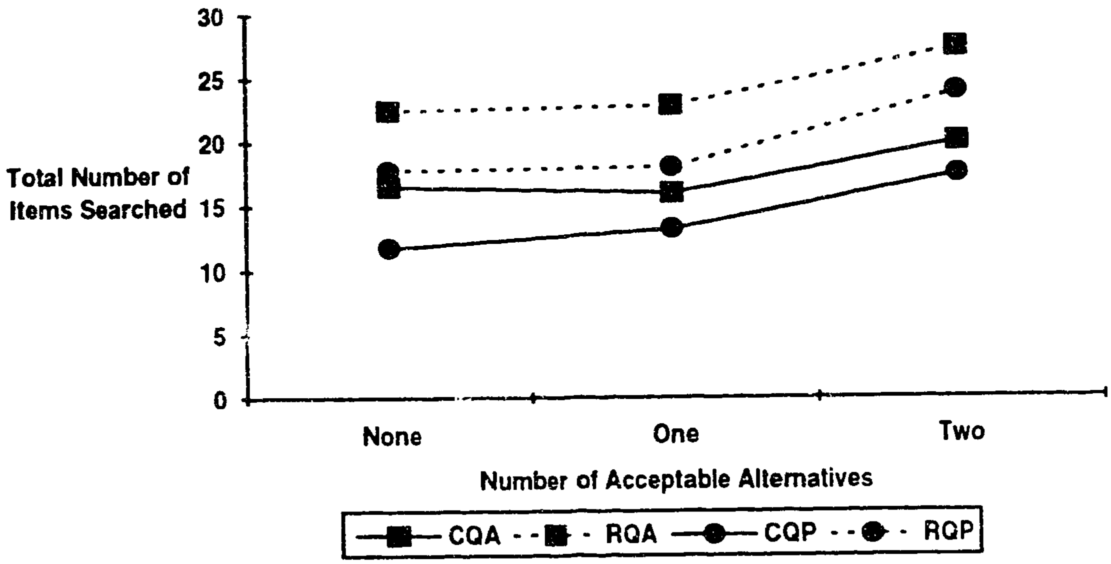
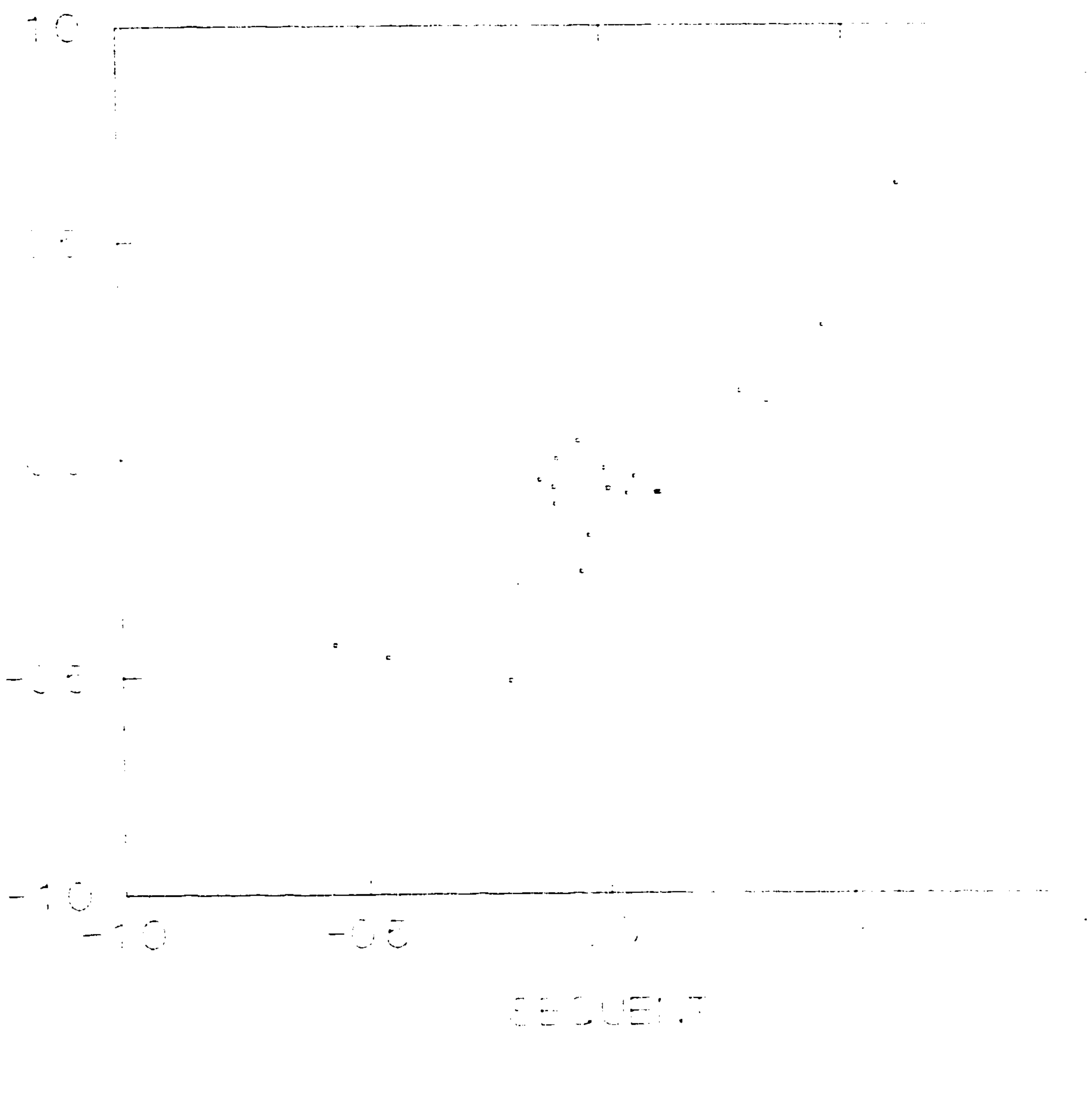


FIGURE 5-6

SCATTER PLOT OF ATTRIBUTE COEFFICIENTS:
SIMULTANEOUS VS. SEQUENTIAL SEARCH



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APPENDIX A

COMMONLY REFERENCED DECISION RULES

A number of different decision rules have been proposed. In an effort to ensure that the meanings associated with each of the terms remains constant, definitions are drawn from two sources: Payne, Bettman and Johnson (1988); and Shugan (1980).

COMMONLY REFERENCES DECISION RULES

DECISION RULE	DEFINITION
Weighted Additive	Compensatory processes which can be thought of as a version of expected value maximization. This strategy considers the values of each alternative on all of the relevant attributes (outcomes) and all of the relative importances (weights or probabilities) of different attributes (outcomes to the decision maker. The rule develops a weighted value for each attribute by multiplying the weight (probability) by the value and sums over all attributes to arrive at an overall evaluation of an alternative. The rule selects the alternative with the highest evaluation.[1]
Random	A rule that chooses an alternative at random with no search of the available information, providing a minimum baseline for measuring both accuracy and effort.[1]
Equal Weight Rule	A rule that examines all alternatives and all attribute values for each alternative. However, the rule ignores information about the relative importance (probability) of each attribute.[1]
Elimination By Aspects/	A rule that begins by determining the most important attribute. Then the cutoff value for that attribute is retrieved, and all alternatives with values for that attribute below the cutoff are eliminated. The process continues with the second most important attribute, then the third, and so on until one alternative remains.[1]
Majority of Confirming Dimensions	A rule that involves processing pairs of alternatives. The values for each of the two alternatives are compared on each attribute, and the alternative with a majority of winning (better) attribute values is selected. The process of pairwise comparison repeats until all alternatives have been evaluated and the final winning alternative identified.[1]

Satisficing	A rule that considers alternatives one at a time, in the order they occur in the set. Each attribute of an alternative is compared to a cutoff value. If any attribute value is below the cutoff value, that alternative is rejected. The first alternative which passes the cutoffs for all attributes is chosen, so a choice can be made before all alternatives have been evaluated. In the case where no alternative passes all the cutoffs, a random choice is made.[1]
Lexicographic	A rule where the most important attribute is determined, the values of all the alternatives on that attribute are examined, and the alternative with the best value on that attribute is selected. If there are ties, the second most important attribute is examined, and so on, until the tie is broken.[1]
Lexicographic Semi-Order	A rule similar to the strict lexicographic rule, but introduces the notion of a just-noticeable-difference (JND). If several alternatives are within a JND of the best alternative on the most important attribute, they are considered to be tied. The potential advantage of this rule is that it ensures that an option that is marginally better on the most important attribute but much worse on other attributes will not necessarily be selected. [1]
EBA + Weighted Average	A rule that uses an EBA process until the number of available alternatives remaining is three or fewer. A weighted additive rule is then used to select among the remaining alternatives.[1]
EBA + Majority of Confirming Dimensions	A rule that uses an EBA rule to reduce the problem size, and a majority of confirming dimensions rule to select from the remaining alternatives.[1]
Conjunctive	A rule where any product not meeting a minimum cutoff level on any characteristic is eliminated.[2]
Disjunctive (Maximax)	A rule where products are compared on their best attribute, and the product with the highest rating on its best characteristic is chosen.[2]
Minimax	A rule that requires that products be judged on their weakest characteristic, and the one with the strongest weakest characteristic should be selected.[2]

[1] Payne, John W. , James R. Bettman and Eric J. Johnson (1988) "Adaptive strategy selection in decision making," Journal of Experimental Psychology: Learning, Memory and Cognition 14 (July), 534-552.

[2] Shugan, Steven M. (1980) "The cost of thinking," Journal of Consumer Research, 7 (September), 99-111.

APPENDIX B

COMPARING CHOICE SETS USING MNL, WITH CONSIDERATION GIVEN TO DIFFERENCES IN SCALE PARAMETERS

The following is a procedure developed by Swait and Louviere (1992)[1] to compare MNL regression coefficients for two different choice sets, while considering possible differences in the scale parameter. The primary hypothesis is:

H1: $\beta_1=\beta_2$ and $\mu_1=\mu_2$

Where:

β_1, β_2 = regression coefficients for data sets 1 and 2 respectively
μ_1, μ_2 = scale parameters for data sets 1 and 2 respectively

This may be broken into two parts: H1A and H1B.

H1A: $\beta_1=\beta_2=\beta$
H1B: $\mu_1=\mu_2=\mu$

Testing H1A

Let X_1 be the data matrix for group 1, and X_2 be the data matrix for group 2. First, models for each data set are estimated using MNL, producing efficient estimators of β_1 and $\mu_2\beta_2$ (μ_1 is normalized to 1, and μ_2 is expressed as a value relative to μ_1). Each individual model will yield a loglikelihood goodness-of-fit value (L_1 and L_2 for data sets X1 and X2 respectively). A consistent estimate for the scale parameter μ_2 is obtained by pooling the two data sets, X_1 and X_2 and plotting the loglikelihood values at different levels of μ_2. The optimum μ_2 is found at the maximum for the loglikelihood function. A fully efficient estimate may be determined by using the Bernt-Hausman-Hall-Hall (1974)[2] step of the loglikelihood function.

Second, the two data sets may be pooled, concatenating X_1 and μ_2X_2, and the model estimated using a MNL procedure. The loglikelihood value for the combined model is L_μ. H1A may then be tested with the loglikelihood test statistic λ_A.

$$\lambda_A = -2[L_\mu - (L_1 + L_2)]$$

Where λ_A is an assymptotically chi-square distributed loglikelihood ratio with k+1 degrees of freedom, with k equal to the number of parameters in β. If H1A is not rejected, then H1B may be tested.

Testing H1B

Recall that H1B states that scale parameters are equal. Hence, the appropriate test is to compare the loglikelihood value, L_p, estimated from a pooled data set with the scale value adjustment (X_1 concatenated with $\mu_2 X_2$) to the loglikelihood value, L_{μ}, determined from the pooled model without the scale value adjustment (X_1 and X_2 are concatenated directly).

$$\lambda_B = -2[L_p - L_\mu]$$

The test statistic, λ_B, is assymptotically chi-square distributed with 1 degree of freedom. If H1B is also supported, then we may accept the initial hypothesis H1.

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[1] Swait, Joffre and Jordan J. Louviere (1992) "The role of the scale parameter in the estimation and use of generalized extreme value models," Submitted for publication to the Journal of Marketing Research.

[2] Berndt, E., J. Hausman, B. Hall and R. Hall (1974) "Estimation and inference in nonlinear structural models," Anals of Econ. and Soc. Meas., 3, 653-665.