

The Differential Processing of Product Category and Noncomparable Choice Alternatives

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This article contrasts consumer choice processing of single products from different categories (noncomparable alternatives) with the processing of multiple products from different categories (product category alternatives). It is unclear whether choosing among single or multiple alternatives from different product categories will drastically affect choice processing. Theoretically, the processing of product categories should be more hierarchical or top-down, and the processing of non-comparables should be more constructive or bottom-up. The results reported here support the theoretical predictions and demonstrate the perceptual and processing differences between the two types of choices.

Consumer researchers have examined the choice processing of two different types of across-category alternatives: product categories and noncomparables. Product category alternatives are defined as a minimum of two alternatives from each of two or more product categories (Howard 1977). Noncomparable alternatives are defined as one and only one alternative from each of two or more product categories (Johnson 1984). For example, a product category choice set may contain as few as two televisions and two stereos, while a noncomparable choice set may contain a particular television, a particular stereo, and a particular video cassette recorder. What conceptually distinguishes the noncomparable from the product category alternatives is that they are more likely described by a number of very different, concrete, nonprice attributes on which they cannot be directly compared (Johnson 1988).

A growing number of studies demonstrates how these two types of across-category choices differ from more comparable, brand-level choice processing (Bettman and Sujan 1987; Boote 1975; Johnson 1984, 1988; Park and Smith 1989). However, the difference between product category and noncomparable choice processing is not as clear. The focus here is on the choice of a particular product or service from

among the available array. It is not at all obvious that having single or multiple alternatives available within categories will drastically affect a choice across categories. Because both product category and noncomparable alternatives cross traditional category boundaries, their processing may be similar, calling into question the usefulness of the distinction. At the same time, the theoretical development of these different choices suggests that important and systematic differences should exist.

This article examines the differential processing of noncomparable and product category alternatives. Theoretically, a choice among product category alternatives should be more hierarchical in nature (Howard 1977). Consumers should proceed by choosing among succeeding more concrete categories of alternatives, beginning with a relatively abstract choice among categories themselves and ending with a more concrete choice among particular brands. In contrast, a choice among noncomparables has been conceptualized as a constructive abstraction process. Consumers may use products' concrete attributes to construct more abstract representations on which the alternatives may then be compared (Johnson 1984). After reviewing recent consumer research on across-category choice, the theoretical differences between product category and noncomparable choice are developed into a set of research hypotheses. A test of the hypotheses supports both processing and perceptual differences between the two types of choices.

ACROSS-CATEGORY CHOICE PROCESSING

Early examinations of consumer choice processing focused on choice among relatively similar brands

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from the same product category (see Bettman 1979, 1986; Johnson and Puto 1987 for reviews of this literature). More recent research has moved beyond brands to study choices involving products from traditionally different categories. Two different types of across-category choice alternatives have been studied: product categories and noncomparables. Yet it is unclear whether these supposedly different choice alternatives are represented and processed differently by consumers.

Product Category Choice

Consumers often choose among an array of alternatives from each of two or more product or service categories. For example, when deciding what to order in a restaurant, a consumer may decide among multiple beef and fish entrees (Tversky and Sattath 1979). Having saved enough money to invest in a major durable, a consumer may evaluate a range of televisions, dishwashers, and microwaves (Katona 1981). And when selecting a vacation alternative, consumers may consider several Caribbean cruises, ski packages, and European tours. Yet relatively little empirical research exists regarding how such decisions are made.

Theoretically, choice among product category alternatives has been viewed as a hierarchical process (Howard 1977; Howard and Sheth 1969). Hierarchical processing involves a sequence of choice points where groups of alternatives are compared and eliminated in order to reduce the choice set (Currim, Meyer, and Le 1988; Tversky and Sattath 1979). In the context of product category alternatives, consumers begin choosing among more abstract and inclusive product categories and proceed in a hierarchical or top-down fashion to a choice among subcategories and brands (Hauser 1986; Howard 1977). Hierarchical processing of product category alternatives is particularly advantageous in that products are generally more homogeneous within than across categories. By considering and eliminating alternatives as members of a similar group or category, hierarchical processing allows for an efficient reduction of choice alternatives, since each alternative does not have to be individually processed and evaluated (Hauser 1986; Johnson 1988; Klein 1983; Simon 1969).

Consistent with memory and categorization research in psychology (Anderson 1983; Collins and Loftus 1975; Rosch 1975; Rosch et al. 1976), Howard (1977) hypothesized a hierarchy of abstract-to-concrete choice criteria (i.e., product attributes) to correspond to a hierarchy of products. More abstract categories are described using more abstract attributes, and more concrete categories and brands are described using more concrete attributes (Johnson and Fornell 1987). This led Howard to predict that as consumers move hierarchically from categories to subcategories to brands, there should be a corresponding

decrease in the level of abstraction of their choice criteria. Broad product categories should be evaluated on the basis of basic needs, goals, or other abstract attributes (e.g., the necessity or practicality of washing machines versus stereos), and subcategories and brands should be evaluated using more concrete attributes (e.g., the load capacity of different washing machines). Boote's 1975 study contrasting category- and brand-level appliance choices supports this general prediction.

In a recent study, Park and Smith (1989) extended this research by contrasting product category choice with and without an explicit choice goal. In one experiment, subjects chose among product category alternatives (e.g., VCRs, compact disk players, rowing machines) after being provided with an explicit choice goal (satisfaction of entertainment needs).¹ The choice task for subjects in the main experimental condition was hierarchically constrained; subjects first chose among the categories themselves and later chose among alternatives within the selected category. In a further experiment, another group of subjects faced the same choice alternatives but were not provided an explicit choice goal. Following Howard (1977), the processing of these product category alternatives should be relatively top-down or goal-driven. Moreover, Park and Smith hypothesized that providing an explicit or well-defined choice criteria or goal should facilitate subjects' retrieval of goal-relevant criteria and subsequent top-down processing. These predictions were confirmed. The study also revealed that subjects relied more on alternative-based processing of the products' attributes than on attribute-based product comparisons in both the goal and no-goal conditions.

Noncomparable Choice

Consumers also face across-category choices involving single alternatives from different categories, or noncomparable alternatives (Johnson 1984). Consider the choice between a particular stereo described by its sound quality and power and a particular bicycle described by its style and number of speeds. Such alternatives are relatively noncomparable in that they are likely described or represented on very different, concrete, nonprice attributes. Noncomparable choice alternatives arise in various contexts for various reasons. A choice across categories involving noncomparable alternatives may occur (1) after prior, independent processing within categories, (2) when supply constraints exist within categories, (3) when processing constraints require initial product elimination

¹ Specifically, subjects were provided with the names of five brands that were available in each product category, their prices, and the general performance characteristics of each type of product.

within categories, and (4) when there is considerable heterogeneity of alternatives within categories.²

In the first instance, noncomparable alternatives may result after prior processing among alternatives within each of two or more categories. At some later point in time, consumers might choose among or between previously chosen alternatives that were originally independent decisions. When shopping for grocery products, for example, one may choose which of several soft drinks and which of several fruit juices to buy. Later, at home, a consumption decision may be made between the previously chosen soft drink and fruit juice (e.g., Pepsi versus Tropicana orange juice). Alternatively, consumers may independently choose preferred appliances within each of two or more categories (e.g., a stereo and a bicycle) and then realize that a budget constraint forces them to choose between or among the previously chosen products.

The existence of supply constraints within categories may also lead to a choice among noncomparables. When considering alternatives from across categories in response to some basic need (e.g., entertainment), the consumer may find only one alternative available in each category. When choosing an evening's entertainment, for example, the choice may be whether to attend the only basketball game in town, attend the only play, or read a particular novel.

Under a third scenario, processing constraints or knowledge limitations may turn product category alternatives into a choice among noncomparables. When shopping for a gift, consumers may sequentially consider products category by category, moving from department to department or store to store. Memory limitations may preclude all but the top candidate in each category from being considered sequentially through the shopping process. Alternatively, a consumer with limited knowledge of the product classes involved in a choice (e.g., compact disk players and VCRs) may identify, in the process of learning about each class, the best alternative in each class.

Finally, significant heterogeneity of alternatives within categories may dictate an initial choice within categories prior to any choice across categories. Although products are generally more heterogeneous across than within categories, in many cases product heterogeneity within categories may be sufficient to make hierarchical processing inappropriate. Consider, for example, the range of sizes and styles of both light trucks and passenger cars on the market. Again the product category choices may be reduced to noncomparables.

There are two general strategies that consumers might use to compare these noncomparable alterna-

tives (Johnson 1984). The first is a straightforward, alternative-based strategy (e.g., an additive or linear compensatory strategy). Whether choosing among comparable or noncomparable alternatives, concrete descriptive attributes may be combined or examined holistically for each alternative and a choice made on the basis of the resulting overall evaluations (i.e., overall worth or value). The second is an attribute-based strategy with abstraction. Consumers may compare the alternatives directly on descriptive, non-price attributes (using, for example, an additive difference strategy; Tversky 1969), but only after they form a more abstract, comparable representation of the alternatives. The more noncomparable the alternatives, the more abstract the required representation and resulting attribute-based comparisons. While, for example, two bicycles may be compared directly on size and number of speeds, a stereo and a bicycle may be described and compared directly on entertainment value and usefulness.

The abstraction of product representations under the latter, attribute-based strategy is considered a two-stage process (Johnson 1984, 1986). Consumers first derive a set of overlapping abstract attributes and then form values for the alternatives on these attributes.³ Just how overt or constructive this value formation is will vary from consumer to consumer and choice to choice. In many cases, an abstract representation may be constructed from the products' concrete attributes in order to directly compare the alternatives (Johnson 1984). An overt construction of abstract attribute values implies an initial mapping of each product's concrete attributes into values on more abstract attributes (Johnson 1986). That is, alternative-based processing of the products' concrete attributes provides the abstract attribute representations on which more abstract, attribute-based processing then occurs.

Alternatively, abstract attribute values may simply be recalled from memory. Recall should be possible, for example, when consumers are very familiar with the particular products in the choice set and have abstract evaluations available in memory (Howard 1977; Wright 1975). At the other extreme, Bettman and Sujan (1987) suggest that novice consumers, being unable to understand and process products at a more concrete level, may rely on more general product category knowledge to represent and process noncomparables. A novice may, for example, assume that a particular motorcycle is unsafe because motorcycles in general are considered unsafe.

Another factor that may mitigate any overt abstraction process is the existence of an explicit or well-defined choice goal (Bettman and Sujan 1987; Park and Smith 1989). When goals are well defined, or consum-

² The author thanks Reviewer B for helping to lay out these conditions and for providing some of the examples described in this section.

³ It is recognized that in some cases this process may occur in reverse order (see Johnson 1986).

ers focus on a specific and familiar need (Bettman and Sujan 1987), a substantial amount of experience-based information on how to achieve the goal should be available in memory. Park and Smith (1989) therefore suggest that an overt abstraction process is more likely for noncomparable alternatives in the absence of a well-defined goal.

Johnson (1984) reports on two studies that test for the use of the alternative-based strategy and the attribute-based strategy with abstraction when processing noncomparables. Consistent with the two general strategies, the subjects' attribute-based comparisons became more abstract while concrete-level, alternative-based processing continued (in fact increased) as choice comparability decreased. More recently, Johnson (1988) found convergent results using multi-alternative choices and actual consumer products as stimuli.

The Johnson (1988) study also contrasted noncomparable and brand choice alternatives with more "high comparability variance" choices. High variance choices were defined as multiple alternatives that varied in the comparability or similarity of each possible pair of alternatives in the set (e.g., a coffee maker and two toasters). Under the current distinction between noncomparable and product category alternatives, many of these high variance choices were, in fact, product category alternatives (e.g., two desk clocks and two desk lamps). Recall that such alternatives should be processed in a more hierarchical fashion, with products being eliminated as members of groups or categories. This prediction was supported. Unfortunately, this finding does not necessitate a distinction between product category and noncomparable choice processing. One would expect such a result based solely on the similarity relationships among the products (Ranyard 1987; Tversky 1972).

In another recent study, Bettman and Sujan (1987) examined expert and novice consumers' impressions of comparable and noncomparable products (two 35mm cameras or a 35mm camera and a personal computer). Though their tasks and method were different from those in the Johnson (1984, 1988) studies, their results support the notion raised earlier that novices may be less able to process products at a concrete level than experts (see also Sujan 1985).

DIFFERENTIAL PROCESSING IN ACROSS-CATEGORY CHOICE

Unfortunately, all these studies fail to distinguish between noncomparable and product category choice processing. It is not obvious that choosing among single or multiple alternatives from different categories should drastically affect either the type or the level of abstraction of processing that occurs.

In addition, the results reported to date fail to clearly demonstrate Johnson's (1984) original contention that consumers overtly construct abstract attribute values to directly compare noncomparable alternatives. Under the proposed construction process, alternative-based processing of the products' concrete attributes should lead to subsequent abstract comparisons (Johnson 1984, 1988). That is, one should observe an increase in attribute abstraction through the course of a noncomparable choice with alternative-based attribute combinations preceding attribute-based product comparisons.

Recall, however, that in many cases the processing of noncomparables may not require an overt construction of abstract attribute values. Highly knowledgeable consumers may be able to recall abstract attribute values for choice alternatives (Johnson 1984) and may also have well-defined or explicit choice goals, which result in more goal-driven or top-down processing (Park and Smith 1989). Novices, meanwhile, may not be able to understand and evaluate products at a concrete level, instead relying on more general product category knowledge (Bettman and Sujan 1987; Sujan 1985). As a result, many consumers may process noncomparable alternatives at a relatively abstract level throughout the course of choice processing.

Aggregating across consumers making noncomparable and product category choices, some general differences should still emerge. For the noncomparables, the use of a constructive abstraction process on the part of some consumers should cause an increase in attribute abstraction through the course of choice processing. Similarly, alternative-based combinations should precede attribute-based comparisons in the aggregate. In contrast, the product category alternatives should be processed in a more hierarchical or top-down fashion (Park and Smith 1989). Product category choice should proceed hierarchically from the abstract to the concrete as the consumer narrows from categories to brands (Howard 1977). And whether the consumer is choosing among categories early on or brands later in the process, the representations should be relatively comparable. Theoretically and empirically, more superordinate or inclusive categories are described using more abstract attributes (Collins and Loftus 1975; Johnson and Fornell 1987; Rosch et al. 1976) or choice criteria (Howard 1977). As a result, attribute-based processing should not be dependent on alternative-based processing through the course of a product category choice; both types of processing can be applied directly to superordinate categories, subordinate categories, or brands (Johnson 1988).

There should also be a basic perceptual difference between noncomparable and product category alternatives. A growing number of studies supports products' being described by a range of concrete-to-ab-

stract attributes (Bettman and Sujun 1987; Johnson 1984, 1988; Johnson and Fornell 1987; Park and Smith 1989; Sujun 1985). Consider that noncomparable alternatives overlap on relatively abstract attributes, while product category alternatives, containing more than one alternative or brand per category, overlap on both abstract and concrete attributes. Therefore, when consumers are presented with noncomparable and product category alternatives, the noncomparables should activate perceptually more abstract information on average than the product categories. This perceptual difference should be reflected in the attributes used to evaluate the different alternatives.

Finally, it is natural for consumers to assess their basic need for across-category choice alternatives (Howard 1977; McAlister 1982). A screening of products on the basis of need should be quite different for product category and noncomparable choices. The hierarchical nature of product category choice implies that high level, need-based eliminations occur very early in the process. For example, consumers first decide whether they need a toaster or a mixer and then, having established a need for one of the available categories, choose among the available brands. If, as hypothesized, noncomparable alternatives are evaluated on a more individual, product-by-product basis, then an initial screening of the entire choice set on need is unlikely. Need assessments should be more distributed throughout the choice process as consumers consider, in turn, each available alternative.

The preceding discussion suggests a number of testable hypotheses regarding the differential processing of noncomparable and product category alternatives. Two hypotheses focus on attribute abstraction.

H1: The level of abstraction of evaluative attributes increases for noncomparable alternatives and decreases for product category alternatives through the course of choice processing.

H2: Evaluative product attributes are more abstract for noncomparable alternatives than for product category alternatives.

Hypothesis 1 follows directly from the constructive abstraction process presumed to underlie many noncomparable choices and the hierarchical processing presumed to underlie many product category choices. A basic perceptual difference between noncomparable and product category alternatives drives the second hypothesis; single alternatives from different categories should stimulate or make salient more abstract attributes, on average, than multiple alternatives from different categories.

A third hypothesis concerns the nature of the evaluation process at different stages of a choice.

H3: Alternative-based attribute combinations generally precede attribute-based product comparisons through the course of processing noncomparable alternatives, while combinations and comparisons are each more equally distributed through the course of processing product category alternatives.

Again, alternative-based processing should precede attribute-based processing for many noncomparables (i.e., when abstract representations are constructed on a product-by-product basis) but not for product categories. Finally, the hierarchical nature of product category choice should result in consumer need assessment occurring earlier for categories of alternatives than for noncomparables.

H4: The assessment of consumer needs occurs earlier for product category alternatives than for noncomparable alternatives.

The next section describes the data used to test these hypotheses, the analyses, and the empirical results.

EMPIRICAL TEST

Data

A reexamination and extension of the Johnson (1988) study provides a test of the research hypotheses. Subjects in the study made choices among comparable products (brands), noncomparables, and a mixture of comparables and noncomparables. Most of the mixed choices involved product category alternatives. Following the conceptualization of product category alternatives presented herein, those mixed choices containing at least two specific product alternatives from each of two or more categories were treated as product category alternatives. These choices are contrasted directly with the available noncomparable choices from the study, which contained single alternatives from each of two or more categories.

The five available product category choices were: (1) two desk clocks and two desk lamps, (2) two cameras and two fire extinguishers, (3) three desk clocks and three desk lamps, (4) three toasters and three blow dryers, and (5) two toasters, two mixers, and two desk clocks. The eight available noncomparable choices were: (1) a corn popper and a toaster, (2) a smoke detector and a heating pad, (3) a corn popper, mixer, wok, and coffee maker, (4) a coffee grinder, electric razor, heating pad, and camera, (5) a toaster, mixer, corn popper, coffee grinder, wok, and coffee maker, (6) a corn popper, desk lamp, fire extinguisher, electric razor, heating pad, and pocket camera, (7) a desk clock, desk lamp, smoke detector and fire extinguisher, and (8) an electric razor, blow dryer, mixer, toaster, desk clock, and desk lamp. These

choices constitute 13 of the original 17 choices in the study. Of the remaining choices, three involved brands from the same category, and the other involved two woks, a mixer, and a desk clock. This final choice is problematic because it contains both a category of alternatives and single alternatives from different categories and was, therefore, excluded from the present analysis.

All of the choice sets involved actual products. Thirty subjects were each asked to make a choice among products from each of the individual choice sets. Subjects were able to keep one of their chosen products as compensation. Verbal protocols were collected, and the subjects were videotaped concurrently during the experiment. The videotapes were used to help identify the products associated with the processing in the protocols. Prior to making their choices, subjects rated their knowledge of the products' attributes. Three judges unaware of the research goals coded the protocols for product attributes and then classified each attribute as being (1) the basis of an attribute-based comparison, (2) part of an alternative-based combination of attributes, or (3) a stand-alone description of a product or product group. The coding reliabilities for attributes processed, calculated as the conditional probability that an attribute coded by one judge was also coded by a second judge, were all reasonably high ($\bar{X} = 0.69$), and the classification reliabilities for the coded attributes were all significantly positive (Cohen's Kappa ranged from 0.53 to 0.58). Coding and classification agreement by two out of three judges provided a common code. (See Johnson 1988 for details of the procedure and protocol coding.)

Attribute concreteness-abstractness ratings were obtained by averaging across 25 judges who rated the coded attributes on a scale from 0 (very concrete) to 10 (very abstract). Following established definitions of attribute abstractness (Johnson 1984; Johnson and Fornell 1987; Paivio 1971), more abstract attributes were described as more indirectly and completely describing any given product, while more concrete attributes were described as more directly and specifically describing any given product. For example, the judges' average ratings for product usefulness, sturdiness, and size were 7.12, 5.65, and 3.77, respectively. As noted previously (Johnson 1988), these measures were very consistent with those used in earlier studies. Those attributes classified as comparisons (i.e., attribute-based processing) and combinations (i.e., alternative-based processing) were used to test Hypotheses 1, 2, and 3 ($n = 848$).

Need Assessment

Hypothesis 4 was tested using descriptions of product need or necessity ($n = 153$). There is a good argument for treating descriptions of product need sepa-

rately. When a subject makes a stand-alone, blanket statement regarding need or lack of need for a product, it strongly suggests an overall screening of the product from further consideration. Descriptions of need are qualitatively different from comparisons or combinations involving need. When need is used to compare alternatives (i.e., "I need a toaster more than a blow dryer."), the absolute level of need for the products involved is unclear. When used as part of an alternative-based combination of attributes (i.e., "I need the toaster and it's the right color for my kitchen."), need constitutes only one of two or more attributes used to evaluate an alternative.

Stage of Processing

The ordinal information available in the original protocol codes was used to operationalize a stage of processing variable. (Attributes were coded in the order they were mentioned in the protocols.) Stage of processing equaled $p/(T + 1)$ where p is an attribute's position in the order of processed attributes from a given choice protocol and T is the total number of attributes coded from that protocol. This creates a variable with a constant mean of 0.5 for each choice protocol of each subject. This continuous stage of processing measure is the dependent variable used to test Hypotheses 3 and 4.⁴ Stage of processing is treated as an independent variable to test Hypotheses 1 and 2. Attributes were classified into early, intermediate, and late stages of processing for the purpose of testing these hypotheses. This three-level classification was based on a three-way split of the relevant observations with respect to $p/(T + 1)$.

Analysis

A series of general linear models was used to test the hypotheses. Given the potential importance of product knowledge, a knowledge covariate (the subjects' self-rated knowledge of each choice set) was included along with the independent variables of interest. Recall, for example, that knowledge may affect consumers' ability or need to overtly construct abstract attribute values for noncomparable alternatives. Very knowledgeable consumers may simply re-

⁴ The stage of processing variable supports the separate treatment of stand-alone descriptions of product need and their role in screening choice alternatives. Stage of processing was calculated for all of the attributes in the choices studied here ($n = 1566$). An analysis of variance reveals an overall significant difference among the different types of attributes coded ($F(3,1562) = 11.57, p < 0.001$), while a contrast of means reveals that the stand-alone need assessments occurred significantly earlier than the alternative-based combinations, the other coded product descriptions, and the attribute-based comparisons (stage of processing equaled 0.426, 0.486, 0.513, and 0.543, respectively, for these four groups). All of these means were significantly different at the $p < 0.05$ level.

call abstract attribute values (Johnson 1984) or have a very well-defined choice goal (Park and Smith 1989), while novices may rely on more general product category knowledge (Bettman and Sujan 1987; Sujan 1985).

In the first model, the level of abstraction of the evaluative attributes (comparisons and combinations) was the dependent variable used to test Hypotheses 1 and 2. The independent variables in the model were the type of choice (noncomparable versus product category), the stage of processing (three levels: early, intermediate, late), the covariate for choice set knowledge, the interactions involving these variables, a repeated measures variable for subjects (30 levels), a random choice set size variable nested within type of choice, and a random choice set variable nested within choice set size.⁵ Hypothesis 1 predicts a significant interaction between the type of choice and the stage of processing on the level of abstraction of evaluated attributes. Hypothesis 2 predicts a main effect for type of choice on attribute abstraction.

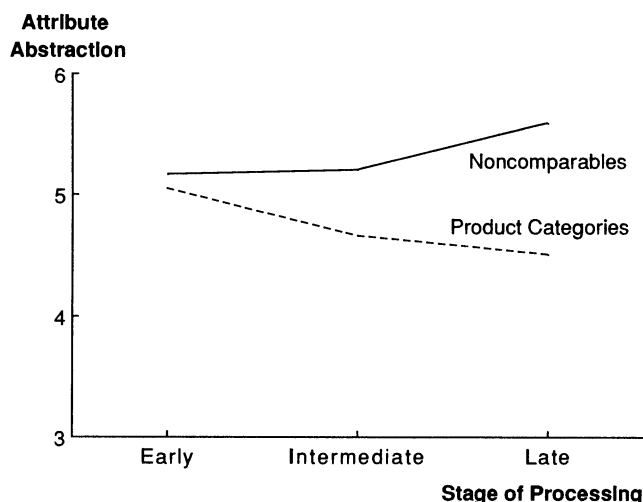
In the second model, stage of processing was the dependent variable used to test Hypothesis 3. The independent variables were the type of choice (two levels), how the evaluative attribute was processed (alternative-based attribute combination versus attribute-based product comparison), the knowledge covariate, the interactions involving these variables, a repeated measures variable for subjects, and random effects variables for set size nested within type of choice and choice sets nested within set size. Hypothesis 3 predicts an interaction between the type of choice and the type of processing (combination versus comparison) on the stage of processing.

In a third model, stand-alone descriptions of product need were used to test Hypothesis 4. The dependent variable was the stage of processing of need assessment. The independent variables included the type of choice, knowledge, a type of choice by knowledge interaction, subjects, and the nested effects of set size and choice set. The prediction is a significant main effect for the type of choice on the stage of processing of need assessment.

Results

The results of the first model, presented in the Figure, reveal the significant interaction predicted by Hypothesis 1 ($F(2,796) = 3.83, p < 0.05$). The level of abstraction of evaluated attributes increased for the noncomparables and decreased for the product cate-

FIGURE
ABSTRACTNESS OF EVALUATIVE ATTRIBUTES



gory choices through the course of choice processing. For the noncomparable choices, the average abstractness of the evaluative attributes was 5.17, 5.20, and 5.60, respectively, for the early, intermediate, and late stages of processing. The corresponding averages for the product category choices were 5.05, 4.66, and 4.51.⁶

Each of these trends was examined in separate analyses. The increase in abstraction for the noncomparables was itself only marginally significant ($F(2,459) = 2.15, p = 0.12$). As discussed earlier, certain contingencies may be mitigating a larger increase; i.e., knowledgeable consumers may simply be recalling abstract attribute values or have well-defined choice goals, novices may not be able to process the alternatives at a concrete level and instead rely on general category knowledge.⁷

⁶ Concreteness-abstractness measures for the evaluative attributes studied here ranged from a low of 1.65 to a high of 8.81 with a mean of 5.07. Therefore, within this range, evaluative attributes were relatively abstract for the noncomparable alternatives and relatively concrete for the product category alternatives through the course of choice processing.

⁷ These considerations suggest that an abstraction process may be more pronounced for intermediate knowledge consumers. These consumers should be able to construct, yet not able to recall, abstract attribute values for the choice alternatives (see also Bettman and Park 1980). Three levels of knowledge were operationalized to explore this possibility using a three-way split of the relevant observations on the knowledge covariate. Interestingly, attribute abstraction for the intermediate knowledge subjects averaged 4.88, 4.98, and 5.59 for the early, intermediate, and late stages of processing. The corresponding averages for the low knowledge subjects were 5.36, 5.28, and 5.58, while the averages for the high knowledge subjects were 5.26, 5.32, and 5.62. Although this knowledge by stage of processing interaction did not approach significance, analysis of the separate linear trends provides some support for the suggested contingencies. The increase in abstraction for the intermedi-

⁵ The model, in keeping with Hypotheses 1 and 2, does not distinguish between attribute-based product comparisons and alternative-based attribute combinations. The differential use of comparisons and combinations is explicitly modeled in Hypothesis 3 (see also Johnson 1988).

Turning to the product category alternatives, the decrease in abstraction depicted in the Figure was again only marginally significant ($F(2,309) = 2.24, p = 0.11$). With only two or three alternatives per category, the product category choice sets studied here represent a very conservative operationalization of product category alternatives. The small number of brands available within each category may have limited the amount of concrete, brand-level processing that occurred in the later stages of these choices or may have made a strictly hierarchical processing strategy unnecessary in some cases. Importantly, there was a sufficient amount of bottom-up processing of the noncomparables and top-down processing of the product category alternatives to produce an overall significant interaction and provide support for Hypothesis 1.

The first model also revealed a significant main effect for the type of choice on attribute abstraction ($F(1,796) = 17.26, p < 0.0001$). As shown in the Figure, evaluative attributes were more abstract for the noncomparable choices than for the product category choices across all three stages of processing. Independent contrasts support significant differences for both the intermediate ($p < 0.05$) and late ($p < 0.001$) stages of processing. These results support Hypothesis 2, which posits a general perceptual difference between noncomparable and product category choice alternatives. In hindsight, the relatively abstract perceptions of the noncomparable alternatives observed here may be another factor mitigating any large increase in abstraction through the course of processing.

Of the remaining independent variables in the model, there was a significant effect for subjects ($F(29,796) = 3.34, p < 0.0001$) and a significant random effect for the different choice sets nested under set size ($F(8,796) = 3.17, p < 0.01$). The stage of processing main effect, the covariance due to knowledge, the remaining interactions, and the random effects of set size were not significant.

The results of the second model reveal that, as predicted, combinations occurred earlier than comparisons for the noncomparable, but not the product category, alternatives. Overall there was a significant interaction between type of choice and type of processing on stage of processing ($F(1,800) = 20.18, p < 0.0001$). For the noncomparable choices, the average stage of processing of the alternative-based combinations and the attribute-based comparisons was 0.47 and 0.63, respectively. (This difference was itself significant; $F(1,461) = 34.64, p < 0.0001$.) For the product category choices, the corresponding averages were 0.52 and 0.51 (no significant difference). The main effect for type of processing was also sig-

nificant ($F(1,800) = 13.76, p < 0.001$), although driven by the significant type of choice by type of processing interaction. There were no other significant effects in this model. The results show that combinations generally preceded comparisons only for the noncomparables, supporting Hypothesis 3. When combined with the support for Hypothesis 1, the results support the notion that consumers overtly construct abstract attribute representations to directly compare many noncomparable alternatives.

Finally, the need assessment model reveals a significant difference in the stage of need assessment for the different choices ($F(1,112) = 28.41, p < 0.0001$). The average stage of processing for need assessment was 0.27 for the product categories, compared to 0.47 for the noncomparables, supporting Hypothesis 4. The subjects used stand-alone statements of need much earlier in the processing of the product category alternatives. This is consistent with the more hierarchical nature of product category choice in which categories of alternatives are initially screened on the basis of need. There were no other significant effects in this model.

In summary, the results support differences in both the processing and the perception of product category and noncomparable choice alternatives. Evaluative attributes became more abstract through the course of the noncomparable choices, with alternative-based processing occurring earlier than attribute-based processing. Evaluative attributes became more concrete through the course of the product category choices, with need assessment occurring early in the process. And the noncomparable alternatives were evaluated at an overall higher level of abstraction than were the product category alternatives.

DISCUSSION

These observations extend our understanding of across-category choice processing on several dimensions. They contrast the hierarchical or top-down processing of product categories with the more constructive or bottom-up processing of noncomparables. It is apparent that product category and noncomparable alternatives are very different in their composition and potential processing, which underscores their differential treatment in consumer choice research.

Following the lead of previous studies (e.g., Biehal and Chakravarti 1986; Lussier and Olshavsky 1979; Payne 1976), the results demonstrate the value of examining processing by choice phase. The observation that relatively concrete attribute combinations precede more abstract attribute comparisons supports the contention that consumers construct representations to compare noncomparables. In contrast, evaluative attributes decreased in abstraction, while alternative-based and attribute-based processing were

ate knowledge level was marginally significant ($F(2,136) = 2.32, p < 0.10$), but the increases for the low and high knowledge levels did not approach significance.

equally distributed through the course of the product category choices. Need assessment also occurred earlier for the categories than for the noncomparables. These later findings, combined with the observed hierarchical elimination of product category alternatives (Johnson 1988), strongly support a hierarchical view of product category choice (Bettman 1970; Hauser 1986; Howard 1977).

The differences in processing observed here may have important implications for future research on consumer judgment and choice. Consider that hierarchical elimination is the basis of such common choice strategies as elimination by aspects (Tversky 1972) and related choice models (Hauser 1986; Kahn, Moore, and Glazer 1987; Tversky and Sattath 1979). Indeed, a hierarchical approach to problem solving is an extremely efficient way of handling a large number of alternatives (Simon 1969). The present study suggests, however, that hierarchical strategies and models may be more applicable to product category than noncomparable choice alternatives.

The revealed perceptual difference between noncomparable and product category alternatives is also significant. Recall that evaluative attributes were more abstract for the noncomparable alternatives than for the product category alternatives. The Johnson (1988) study revealed similar perceptual differences for noncomparable alternatives of increasing size. It appears that noncomparable alternatives stimulate more abstract attributes, on average, than do categories of alternatives. This finding reinforces the need for consumer researchers to adopt a more perceptual view of contingent decision behavior (Payne 1982).

Finally, it is interesting to contrast the two types of across-category choices studied here with more comparable choice processing. To illustrate the differences, the evaluative attributes from the three comparable (brand-level) choices in the Johnson (1988) study were combined with those for the product category and noncomparable choices in this study and analyzed. A general linear model similar to that used to test Hypotheses 1 and 2 revealed significant differences in processing abstractness across all three types of choices ($F(2,993) = 24.82, p < 0.0001$). Attribute abstraction averaged 5.31, 4.72, and 4.30 for the noncomparable, product category, and comparable alternatives, respectively (all significantly different at $p < 0.05$). The fact that the brands were processed at a universally more concrete level is consistent with the notion that brands can be compared directly on their concrete attributes without the need to form a more abstract representation (Johnson 1984).

Similar to the noncomparable alternatives, the comparable brands showed an increase in attribute abstraction from the two early stages to the later stage of processing. Attribute abstraction for the brands averaged 4.15, 4.04, and 4.73 for the early, intermediate,

and late stages, respectively, and these means were significantly different ($F(2,168) = 3.70, p < 0.05$). The more abstract brand processing in the last stage suggests that consumers formed more abstract, summary evaluations near the end of the choices. A final analysis revealed that, unlike the noncomparables, the brands showed no significant difference in the stage of processing of product comparisons and attribute combinations, which equaled 0.48 and 0.51, respectively. This result is consistent with the notion that brands, being comparable, may be processed in a straightforward fashion using either an alternative-based or attribute-based strategy (Johnson 1984).

Overall, when combined with earlier studies of within- versus across-category choice (Bettman and Sujan 1987; Boote 1975; Johnson 1984, 1988; Park and Smith 1989), these results suggest a tripartite view of consumer choices. Consumers face brand, category, and noncomparable choice alternatives that may elicit very different evaluative processing. This is not to say that processing will always be different in the three cases. Experimental manipulations, such as the provision of an explicit choice goal (Park and Smith 1989) or priming of well-defined decision criteria (Bettman and Sujan 1987), may result in the similar processing of product categories, noncomparables, and comparable brands.

Important questions for future consumer choice research is when, where, and how these qualitatively different choices arise. Given the variety of observed decision-making processes, any search for an all-encompassing theory of choice may be in vain. The conditions leading to a choice among noncomparables, such as those presented at the beginning of this article, need to be more systematically explored. For example, do budget constraints force consumers to choose among noncomparables? Are product category alternatives more likely in purchase situations and noncomparable alternatives more likely in consumption situations? And when do processing constraints and knowledge limitations cause within-category choices to precede across-category choices and result in noncomparable alternatives? Future research should attempt to understand and predict the existence of different consumer choices themselves.

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