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Product Assortment and Individual Decision Processes

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Research presented in this article examines the impact of product assortment on individuals' decisions. Four experiments report converging evidence that the impact of assortment is moderated by the degree to which individuals have articulated attribute preferences, whereby individuals with an articulated ideal point are more likely to prefer larger assortments than individuals without articulated preferences. The data further show that choices made from large assortments are associated with more selective, alternative-based, and confirmatory processing for individuals with articulated preferences and more comprehensive, attribute-based, and comparative processing for those without articulated preferences.

The assumption that more choice is always better is not only intuitively appealing but is also supported by numerous findings in social psychology, decision making, and economics (for a review, see Lancaster, 1990; Payne, Bettman, & Johnson, 1993; see Simonson, 1999). The rationale is straightforward: The more alternatives in the choice set, the higher the likelihood that the individual will find an optimal alternative. Larger assortments also lead to stronger preferences because they allow decision makers to maintain flexibility when making a choice (Kahn & Lehmann, 1991; McAlister, 1982; Reibstein, Youngblood, & Fromkin, 1975).

A recently advanced alternative viewpoint has suggested that larger assortments do not always benefit choice. It has been theorized that increasing the size of the choice set may have adverse consequences because it also increases the demand on individuals' cognitive resources, potentially leading to a cognitive overload (Greenleaf & Lehmann, 1995; Malhotra, 1982; Shugan, 1980). Recent research by Iyengar and Lepper (2000) went beyond theorizing and offered experimental evidence to support this proposition, showing that increasing the size of the decision set can actually decrease choice likelihood. Similar findings have been reported by other researchers as well (Huffman & Kahn, 1998).

Most of this recent research, however, has focused on documenting the adverse effect of large assortments on choice without investigating factors that moderate this effect. The current article advances the extant research by identifying factors that determine when large product assortments will strengthen an individual's preferences, as predicted by traditional economics literature, and when large assortments will weaken preferences, as suggested by recent findings in the decision literature. More important, this article offers insights into the psychological mechanisms and decision processes underlying the impact of assortment on choice.

The four experiments presented in this article identify the degree to which individuals have an articulated ideal point as a factor moderating the impact of assortment on choice. Specifically, I propose that individuals with an articulated ideal point are more likely to choose from larger assortments compared with individuals without articulated preferences. I further argue that preference articulation moderates the impact of assortment on individuals' decision processes. I propose that relative to individuals without an articulated ideal point, individuals with articulated preferences are (a) more selective in processing the available information; (b) more likely to rely on alternative-based rather than attribute-based processing; and (c) more likely to evaluate the available alternatives in a confirmatory manner, using their ideal attribute combination as a reference point. In contrast, individuals without articulated preferences are expected to be (a) more comprehensive in evaluating the available alternatives; (b) more likely to rely on attribute-based rather than alternative-based processing; and (c) more likely to evaluate the available alternatives in a comparative fashion, using the other options' performance as a reference point.

Experiments presented in this research use complementary methodologies to support the above theoretical propositions. Experiment 1 demonstrates that individuals without articulated preferences are less likely to choose from larger assortments relative to individuals with an articulated ideal point. Experiment 2 relied on a computer-based simulation to examine information search patterns, and Experiment 3 used a reason-based analysis to investigate how preference articulation moderates the impact of assortment on decision strategy. Finally, Experiment 4 adopted recall-based process measures to provide further support for the research hypotheses. The data from all four experiments present converging evidence in support of the notion that the impact of assortment on an individual's decision processes is moderated by the availability of an articulated ideal point.

Theoretical Background

People often approach decision problems with already formed product preferences and, provided that the preferred option is available, make their selection without evaluating all alternatives (Fishbein & Ajzen, 1972; Slovic, Finucane, Peters, & MacGregor, 2002; Wright, 1975). Yet on many occasions, individuals do not have a preferred option, or their preferred option is unavailable. In such cases, decision makers need to evaluate the attractiveness of

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the attributes and attribute levels describing these alternatives in order to form product preferences. These evaluations are often based on individuals' readily available ideal combination of various product attributes.

Individuals vary in the degree to which they have readily established attribute preferences. For example, consider two individuals who are choosing from the same set of alternatives, say chocolates. The first individual is aware of the key attributes describing chocolates and has a preferred combination of these attributes (e.g., milk vanilla-flavored truffle with almonds). In contrast, the second individual is aware of the key attributes describing chocolates (e.g., chocolate mix, flavor, chocolate type, nut content) but does not have a readily available ideal attribute mix. These individuals clearly differ in the degree to which they have articulated preferences: One of them has an articulated ideal attribute combination, whereas the other one does not.

A cornerstone of this research is the proposition that the degree to which individuals have articulated preferences moderates the impact of assortment on choice. This proposition is based on the notion that the availability of an articulated ideal attribute combination fundamentally affects individuals' decision processes. To make a choice, individuals without a readily available ideal point face the relatively complex task of simultaneously articulating their ideal attribute combination and searching for the option that best matches their ideal point. The difficulty of this dual task is compounded for larger assortments because of the increased number of attributes and/or attribute levels to be considered. As a result, for individuals without articulated preferences, choices from larger assortments might result in a more difficult decision and, consequently, lead to a lower choice likelihood. In contrast, individuals with a readily articulated ideal attribute combination are less likely to be adversely influenced by large assortments because they have the relatively simple task of identifying the "best" alternative, using their ideal point as a benchmark. Increasing the size of the assortment in this case might also complicate their decision but to a lesser degree than for individuals without articulated preferences. I therefore propose that the impact of assortment on decision processes is moderated by the degree to which individuals have an articulated ideal point, whereby larger assortments are more likely to complicate the decision for individuals without an articulated attribute combination than for those with readily articulated preferences. This increased decision complexity will, in turn, lead to a lower likelihood of choosing from larger assortments.

To better understand the impact of assortment on choice, it is important to examine whether and how assortment influences individuals' decision processes. Prior decision research has found that information-processing strategies vary as a function of the number of alternatives (Bettman, Luce, & Payne, 1998). Specifically, it has been shown that the search is less complete, more selective, and more attribute based as the number of options increases (Payne, 1976; Payne & Braunstein, 1978; Timmermans, 1993). This article extends prior findings and argues that the impact of assortment on individuals' selection of a decision strategy is further moderated by the availability of an articulated ideal attribute combination.

How do individuals with and without an articulated ideal point evaluate the available alternatives? Building on the notion that people evaluate choice alternatives relative to a reference point (Tversky & Kahneman, 1991), it is proposed that individuals with articulated preferences are more likely (relative to those without articulated preferences) to use their ideal attribute combination as a reference point in evaluating choice alternatives. On the other hand, individuals without an articulated ideal point are more likely (relative to those with articulated preferences) to use as a reference point the attribute values of the other choice options (Simonson & Tversky, 1992). Thus, one can expect that the availability of an articulated ideal attribute combination will affect the type of reference point used in evaluating choice alternatives.

The availability of a readily articulated ideal attribute combination might also lead to more confirmatory processes that are characterized by reliance on positive-test strategies and selective processing of the available information (Chernev, 2001; Klayman & Ha, 1987; Wason & Johnson-Laird, 1972). This implies that individuals with a readily articulated ideal attribute combination are more likely to limit their efforts to identifying the alternative that matches the articulated ideal point and would not necessarily explicitly compare that alternative to all available options. In contrast, individuals without an articulated ideal point are likely to adopt strategies that involve comparing the available alternatives without the confirmatory goal of matching alternatives to an existing ideal point.

The above reasoning implies that contingent on the availability of an articulated ideal attribute combination, individuals can adopt different decision strategies: Those with articulated preferences will focus primarily on searching for the alternative matching their ideal point, whereas those without articulated preferences are more likely to focus on searching for the alternative that dominates the other available options.

In sum, I predict that assortment can have a significant effect on an individual's decision processes and that this effect is moderated by the degree of preference articulation. Specifically, individuals with an articulated ideal point are more likely to prefer larger assortments than individuals without a readily available ideal attribute combination. I further argue that preference articulation moderates the impact of assortment on individuals' decision strategies, leading to a more selective, confirmatory processing for individuals with an articulated preference and more comprehensive, comparative processing for those without an articulated ideal attribute combination. These propositions are tested in a series of four experiments presented below.

Experiment 1

This experiment examined how preference articulation moderates the impact of assortment on choice. Specifically, it investigated the impact of the availability of an ideal point and assortment on (a) the likelihood of choosing from a larger versus a smaller assortment and (b) the decision strategy underlying the choice process.

Method

Design. Respondents, 101 Northwestern University undergraduates, were assigned to the conditions of a 2 (preference articulation) × 2 (assortment) between-subjects factorial design. Preference articulation was

manipulated by asking some of the participants to state their attribute preferences prior to making a choice. The assortment was manipulated by varying the size of the choice set. The experimental procedure is outlined in more detail in the next section.

Experimental procedure. Respondents were informed that the experiment examined individuals' preferences for chocolates. Some of the participants were given a preference articulation task and were asked to describe their ideal chocolates. They were given four key attributes, each with four levels, and asked to indicate their preferences for each attribute. The four attributes used to describe individuals' preferences were chocolate type (solid, truffle, praline, caramel), chocolate mix (dark, milk, white, espresso), flavor (original, vanilla, cherry, strawberry), and nut content (without nuts, almonds, pecans, hazelnuts). An example of an individual's ideal attribute combination would be solid chocolate, dark chocolate, vanilla flavor, without nuts. The remainder of the respondents were presented with the chocolate attribute information but were not asked to articulate their preferences. Thus, all respondents were made aware of the key attributes and attribute levels, but only those in the preference-articulation condition were asked to state their preferences by identifying their ideal chocolate.

Next, respondents were asked to make a choice from a selection containing chocolates from two French fine chocolate confectionaries: Au Duc de Praslin and Arnaud Soubeyran. The brand names and descriptions of these confectionaries were selected to be similar in terms of potential name-based inferences. The brand names were also counterbalanced across the experimental conditions to account for possible name-specific effects. Some of the respondents were presented with a selection of 20 chocolates and the others with a selection of 8 chocolates. These selections were designed to include products from both brands. Chocolates in the 8-chocolate selection were evenly split between the two brands (4 chocolates each), whereas chocolates in the 20-chocolate selection were split so that one of the brands had 4 chocolates (small assortment) and the other had 16 chocolates (large assortment).

Choice alternatives were labeled *Chocolate A–Chocolate T* (20-chocolate selection) and *Chocolate A–Chocolate H* (8-chocolate selection) and grouped by brand so that in both conditions the first four options (Chocolate A–Chocolate D) represented the brand with the smaller assortment. All of the options offered by the brand with the smaller selection (4 chocolates) were also available in the selection offered by the brand with the larger selection (16 chocolates). Thus, among the 20 alternatives, only 16 had unique attribute values, and the remaining 4 were replicates. In the 8-chocolate selection, options offered by both brands were identical in their attribute values; hence, there were only 4 unique attribute combinations.

Overall, there were four experimental conditions: 20-option selection/articulated preferences (29 respondents), 20-option selection/nonarticulated preferences (29 respondents), 8-option selection/articulated preferences (21 respondents), and 8-option selection/nonarticulated preferences (22 respondents). The first two conditions were the focal conditions for the purposes of this research, whereas the latter two conditions were used as a control.

Respondents were asked to select the chocolate they liked the most from either the 20-chocolate or the 8-chocolate selection. They were further asked to rate the attractiveness of the selected chocolate and indicate how confident they were that the selected alternative dominated all other available options. On completion of the experiment, respondents were paid $5 for participating.

Dependent variables. The key dependent variables were (a) the likelihood of choosing from a larger versus a smaller assortment, (b) individuals' evaluations of the attractiveness of the chosen alternative, and (c) their confidence that the selected alternative dominated all other alternatives in the choice set. The likelihood of choosing from a larger versus a smaller assortment was operationalized by comparing the relative choice shares from the larger (16 options) and the smaller (4 options) assortments across the two preference-articulation conditions.

Respondents' evaluations of the attractiveness of the chosen alternative were measured by their answers to the following question: "How would you rate the attractiveness of the alternative you selected?" (100-point scale from 0 = *not attractive at all* to 100 = *very attractive*). Respondents' confidence that the selected alternative dominated all other options in the choice set was measured by their responses to the question, "How confident are you that the option you selected is the one that you enjoy the most among all of the above options?" (100-point scale from 0 = *not confident at all* to 100 = *very confident*). Thus, the confidence question was framed to capture the perceived attractiveness of the selected option relative to the other options in the set. The rationale for this approach was that a relatively low confidence that the chosen alternative dominates all other options is more indicative of a selective pattern of information processing, whereas a high confidence that the selected alternative dominates all other options is indicative of a more comprehensive processing (Iyengar & Lepper, 2000).

Results

Manipulation check. The difference in the perceived assortment was pretested prior to the main experiment, using a sample of 40 respondents from the same population. Participants were presented with the set of alternatives described in the previous section and were asked to evaluate the brand-specific assortment (4 vs. 16 alternatives). The mean assortment evaluations were $M = 4.09$ ($SD = 0.70$) for the small set and $M = 2.14$ ($SD = 0.47$) for the large set (5-point scale: 1 = *very extensive*, 5 = *very limited*); $F(1, 40) = 111.32$, $p < .001$.

Choice data. The data show that when choosing from a set offering small-assortment and large-assortment brands (20-chocolate selection), respondents in the preference-articulation condition were more likely to make a selection from the larger assortment (96%) than respondents who were not asked to articulate their preferences (72%). In contrast, when choosing among two small-assortment brands (8-chocolate selection), respondents in both preference-articulation conditions appeared to be rather indifferent in choosing between the two assortments (54% and 43%). These data are summarized in Figure 1.

The significance of the observed effects was examined by testing a model in which respondents' choice is a function of preference articulation, assortment, and their interaction. Categorical analysis (Stokes, Davis, & Koch, 2001) shows that assortment has a significant main effect on preferences, $\chi^2(1, N = 101) = 16.54$, $p < .001$, and, more important, that this impact is moderated by preference articulation, $\chi^2(1, N = 101) = 4.14$, $p < .05$.

Further analysis shows that the difference in the likelihood of choosing the large-assortment brand (16 chocolates) was significantly greater for respondents with articulated preferences compared with respondents who were not asked to articulate their preferences, $\chi^2(1, N = 58) = 7.25$, $p < .01$. The corresponding difference for respondents in the control condition (8-chocolate selection) was nonsignificant, $\chi^2(1, N = 43) = .60$, $p > .20$. These data are consistent with the prediction that preference articulation moderates the impact of assortment on brand choice.

An additional insight into individuals' choice processes can be gained by analyzing the pattern of choices of options that were available in both the larger (16 alternatives) and the smaller (4 alternatives) brand-specific assortments. Recall that the stimuli

were constructed so that options in the smaller set are replicates of some of the options in the larger set; hence, in each choice there were four replicates. The data show that overall there were 28 choices that involved an option that was available both in the large and the small assortments; 19 respondents selected the replicate from the large assortment and 9 from the small assortment. Respondents were equally split across the two preference-articulation conditions, with 14 respondents in each condition. The majority (93%) of the respondents in the preference-articulation condition selected the replicate from the larger assortment compared with only 43% of the respondents who did not articulate their ideal point, $\chi^2(1, N = 28) = 11.25$, $p < .001$. Thus, when choosing among options available both in the large and the small assortment, individuals without articulated preferences were less likely than those with articulated preferences to choose from the larger assortment.

Decision confidence. Individuals' responses to the confidence question show significant differences across the experimental conditions. Individuals were generally more confident that they had selected the optimal alternative when choosing from a smaller ($M = 83.30$, $SD = 13.52$) than from a larger ($M = 73.07$, $SD = 20.82$) set. These confidence ratings were also a function of preference articulation, whereby respondents with articulated preferences were less confident that they had selected the optimal alternative when presented with a larger rather than a smaller assortment ($M = 67.69$, $SD = 23.70$ vs. $M = 86.05$, $SD = 14.24$). Respondents who were not asked to articulate their preferences were also less confident that their selection was the best in the context of a larger set than a smaller set, but the magnitude of this difference was less pronounced ($M = 78.45$, $SD = 16.15$ vs. $M = 80.68$, $SD = 12.56$).

Analysis of variance (ANOVA) shows that the main effect of assortment on confidence is significant, $F(1, 97) = 8.35$, $p < .005$, as is the moderating effect of preference articulation, $F(1, 97) = 5.12$, $p < .05$. The difference in confidence levels for the respondents choosing from larger assortments was significant as well ($M = 78.45$ vs. $M = 67.69$), $F(1, 97) = 5.38$, $p < .05$, whereas the corresponding difference for respondents choosing from smaller assortments was nonsignificant, $F(1, 97) < 1$.

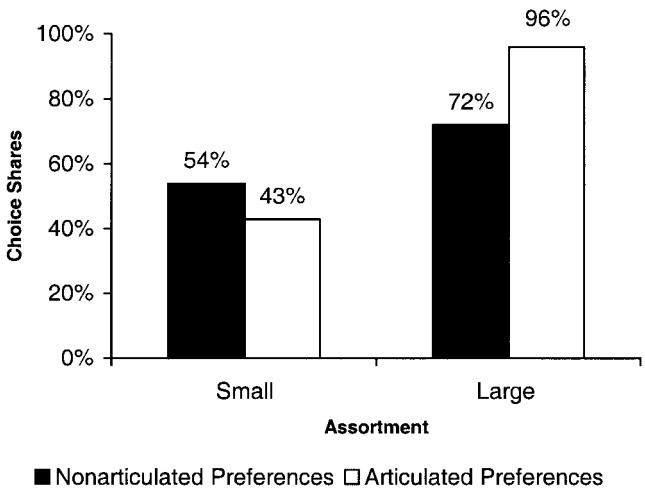

Figure 1. Choice share data as a function of product assortment and the degree of preference articulation (Experiment 1).

Respondents' ratings of attractiveness of the selected option revealed no significant differences across the experimental conditions, $F(1, 97) < 1$. Thus, individuals in all conditions appeared, on average, to be equally satisfied with the selected alternative, yet individuals with articulated preferences were less confident that they had selected the best alternative from the available choice set.

Discussion

The data show that the impact of assortment on choice is moderated by the availability of an articulated ideal attribute combination, whereby individuals with an articulated ideal point were more likely to choose from larger assortments than were individuals without articulated preferences. This data pattern is consistent with the experimental predictions, although it did not replicate prior findings showing that large assortments can have a negative impact on choice. Indeed, the data reported in this experiment show that overall, respondents were more likely to select the brand offering a larger rather than a smaller assortment. Note, however, that this finding does not necessarily contradict prior research because the overall preference for the larger set is also likely to be a function of the experimental design and the calibration of the stimuli (e.g., set size, attractiveness of the available options). Thus, it is possible that further increasing the assortment and/or varying the attractiveness of the alternatives in the choice set will lead to a preference for smaller assortments (as shown by Huffman & Kahn, 1998; Iyengar & Lepper, 2000; see also Brenner, Rottenstreich, & Sood, 1999).

Preference articulation also had significant impact on individuals' confidence that the selected option dominates all other available options. This finding is consistent with the notion that when faced with larger assortments, individuals with articulated preferences are likely to be more selective in evaluating the available alternatives. This selective processing could, in turn, have resulted in a lower confidence that the selected alternative is actually the best alternative in the set.

The data furnished by Experiment 1, although consistent with the theoretical predictions, offer only indirect evidence of the impact of assortment on an individual's decision strategy. Indeed, information processing in this experiment is inferred, primarily on the basis of individuals' perceived confidence in selecting the best option. An alternative approach to understanding individuals' decision processes is to examine more directly individuals' information search patterns. This approach was adopted in Experiment 2.

Experiment 2

The goal of this experiment was to directly examine the impact of product assortment and preference articulation on individuals' information search patterns. The methodology used was similar to the Mouselab approach (Payne et al., 1993), in which individuals presented with an interactive computer simulation have to reveal the initially hidden attribute information.

Method

Design. Fifty-nine Northwestern University undergraduates were assigned to the conditions of a 2 (preference articulation) × 2 (assortment),

mixed factorial design. Preference articulation was manipulated between subjects: Some of the participants were asked to articulate their attribute preferences prior to making a choice, whereas others were not given a preference-articulation task. The assortment was manipulated within subjects: All participants were asked to make a choice from two sets, one with 4 alternatives and one with 16 alternatives.

Experimental procedure. The experiment was designed as an interactive computer simulation, programmed in Authorware (Macromedia Inc., 1999) and individually run for each participant. The introduction screen informed respondents that the experiment was examining preferences for chocolates and that they would be asked to make a selection from several sets of chocolates manufactured by Godiva—an upscale chocolate manufacturer. Following the introduction, respondents were randomly assigned to one of the two preference-articulation conditions.

Respondents in the preference-articulation condition were asked to think about their ideal chocolate and to state their preferences on four attributes: chocolate type (solid, truffle, praline, caramel), chocolate mix (dark, milk, white, espresso), flavor (original, vanilla, cherry, strawberry), and nut content (without nuts, almonds, pecans, hazelnuts). These questions were presented sequentially, each on a separate screen. After indicating their chocolate preferences, respondents were shown a summary of their preferences—for example, "Based on your selections, your ideal chocolate is solid, milk chocolate, original flavor, with hazelnuts." The remainder of the respondents were presented with the attribute information but were not asked to articulate their preferences. The rest of the experimental procedure was identical for the respondents in both preference-articulation conditions.

Following the preference articulation manipulation, participants were familiarized with the information-search task and were given a sample table containing product-attribute information similar to the ones used later in the experiment. Next, respondents were given the actual choice sets. Each participant was asked to make two choices from either the small or the large assortment. The order of presenting these choice sets was counterbalanced across respondents: Some were initially asked to make a choice from a smaller assortment (4 chocolates) and then from a larger assortment (16 chocolates), whereas others were asked to first choose from a larger and then from a smaller assortment. All participants were asked to select the chocolate they liked most from each of the two assortments.

Product information was presented in a product–attribute matrix, with product information displayed in columns and attribute information displayed in rows. For the smaller set, the product–attribute matrix had 16 cells (4 products $\times$ 4 attributes), as shown in the Appendix. For the larger assortment, the information was presented as four product–attribute matrixes similar to the one used in the small assortment scenario.[1] All four matrixes were displayed on the same screen, and each of these matrixes was equal in size to the product–attribute matrix used in the small assortment condition. Choice options were identified as *Chocolate A–Chocolate D* in the small assortment condition and *Chocolate A–Chocolate P* in the large assortment condition.

The chocolate descriptions were initially hidden and could be viewed either by specific chocolate (by clicking on one of the columns; Appendix, Panel B) or by a specific chocolate attribute (by clicking on one of the rows; Appendix, Panel C). The information could be revealed one column or row at a time, as many times as desired by the respondents.

Finally, respondents were asked a set of manipulation check questions. Specifically, they were asked to rate the variety offered by each of the choice sets as well as indicate how often they ate chocolate in general and Godiva chocolate in particular. On completing the experiment, respondents were paid $10 for participating.

Dependent variables. The main dependent variable in this experiment is the information acquisition strategy used by individuals. Building on the existing research (Bettman & Sujan, 1987; Payne et al., 1993), this experiment adopted two measures of information acquisition strategy: (a) the information search pattern (by attribute vs. by alternative) and (b) the total amount of processing. The operationalizations of these two measures are described in more detail below.

Results

Manipulation check. Assortment was manipulated by varying the number of alternatives in the choice set. The effectiveness of this manipulation was measured by comparing respondents' assortment ratings. The mean evaluation for the small set was $M = 4.00$, significantly different from $M = 2.42$, the mean evaluation of the variety in the large set (the scale was identical to the one used in Experiment 1); $F(1, 55) = 203.28$, $p < .001$. These data show that the larger set was perceived to offer more variety and that the variety offered by both the large and the small sets was not likely to produce ceiling effects. The data further show that respondents' perceptions of variety were not a function of preference articulation; respondents in both preference-articulation conditions did not differ significantly in their variety perceptions; $F(1, 55) = 1.76$, $p > .10$, for the interaction and $F(1, 55) < 1$ for the main effect.

Information search pattern. One strategy for understanding individuals' information processing strategy is to analyze the pattern of the first search: whether individuals started their search by displaying the information by product (i.e., column) or attribute (i.e., row). The resulting binary measure, denoted APPROACH, indicated whether a particular individual started his or her search by displaying the hidden information by column (product) or by row (attribute).

A summary of the data is shown in Figure 2. Only respondents' first search was analyzed; hence, there were 59 observations in total. Of the respondents in the preference-articulation condition, 92% started their search by revealing the information by product in the context of a larger assortment, compared with only 63% in the context of a smaller assortment. For the respondents who were not asked to articulate their preferences, the effect was reversed: 33% approached the decision task by revealing the information by product when given a larger assortment compared with 42% in the context of a smaller assortment.

The significance of the observed effects was examined by testing a model in which the APPROACH variable was a function of preference articulation, assortment, and their interaction. Categorical analysis shows that the difference in the information search approach (by alternative vs. by attribute) across the two preference-articulation conditions was significant in the context of a larger assortment, $\chi^2(1, N = 31) = 19.53$, $p < .001$, and nonsignificant in the context of the smaller assortment, $\chi^2(1, N = 28) = 1.24$, $p > .20$. Furthermore, the difference between the

[1] The reason for using four separate matrixes instead of one larger matrix was to keep the product versus attribute search costs similar across the large and small assortments. Indeed, in the case of 16 alternatives, a single product–attribute matrix would have yielded 16 columns (products) and only 4 rows (attributes). Such asymmetric design would have potentially led to a bias toward using attribute-based processing as a more efficient search strategy: A search by attribute would simultaneously reveal 16 attribute values, whereas processing by alternative would reveal only four attribute values per search. Breaking down the larger set into four symmetric 4 $\times$ 4 matrixes allowed keeping the product versus attribute costs similar across conditions.

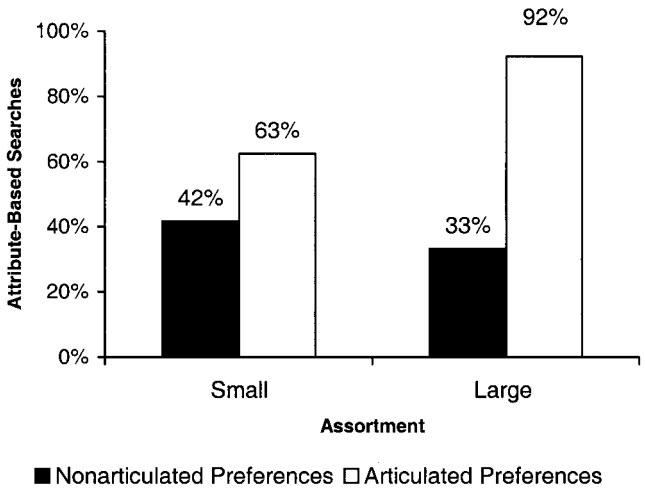

Figure 2. Information search pattern as a function of product assortment and the degree of preference articulation: Percentage of alternative-based searches for the first information item revealed (Experiment 2).

information search patterns for respondents in the preference-articulation condition was significant, $\chi^2(1, N = 29) = 4.42$, $p < .05$, and the overall interaction effect was marginally significant, $\chi^2(1, N = 59) = 2.76$, $p < .10$.

An alternative and more precise approach to examining individuals' information search strategy is to operationalize the search pattern in terms of the sequence of information acquisitions. A measure of the relative amount of alternative-based and attribute-based information search developed by Payne (1976; see also Payne & Braunstein, 1978; Payne et al., 1993) is obtained by calculating the number of alternative-based transitions minus the number of attribute-based transitions divided by the sum of these two types of transitions. This measure of the relative use of alternative-based versus attribute-based processing, denoted PATTERN, potentially ranges from a value of –1.0 to +1.0. A relatively more positive number indicates more alternative-based processing, and a more negative number indicates relatively more attribute-based processing.

Each of the 59 respondents was presented with two decision tasks, yielding a total of 118 observations. The data show that respondents in the preference-articulation condition were more likely to search by alternative (PATTERN > 0) and that this alternative-based search pattern was more pronounced in the context of a larger rather than a smaller assortment ($M = .44$, $SD = .70$ vs. $M = .29$, $SD = .70$). In contrast, individuals who were not asked to articulate their preferences were more likely to search by attribute (PATTERN < 0). This attribute-based search pattern was more pronounced in the context of a larger rather than a smaller assortment ($M = -.26$, $SD = .71$ vs. $M = -.41$, $SD = .79$).

The significance of these data is examined by testing an ANOVA model, where PATTERN is a function of preference articulation, assortment, and their interaction. The Articulation × Assortment interaction is significant, $F(1, 55) = 4.47$, $p < .05$, indicating that the impact of assortment on consumer decision strategy is indeed moderated by the availability of an ideal attribute combination. The main effect of preference articulation, $F(1, 55) = 17.37$, $p < .001$, as well as the simple effects, $F(1, 55) = 12.79$, $p < .001$, for the large assortment, and $F(1, 55) = 5.37$, $p < .05$, for the small assortment, were significant as well. The simple effects of assortment for both preference-articulation conditions, although directionally consistent with the experimental predictions, did not reach the conventionally accepted norms of statistical significance, $F(1, 55) = 2.28$, and $F(1, 55) = 2.18$, for the articulated and nonarticulated preference conditions, respectively.

Total amount of processing. An additional measure, indicative of the type of decision strategy, is the total amount of processing. One measure of the amount is the total number of times information items were opened for a particular decision, denoted SEARCH. Higher values of this measure are indicative of a more comprehensive processing, whereas lower values are more likely to be associated with more selective processing.

The data, summarized in Figure 3, show that the total amount of processing is a function of both assortment and preference articulation. Respondents who were not asked to articulate their preferences were likely to search more extensively in the context of the larger ($M = 22.07$) rather than the smaller ($M = 7.40$) assortment. For respondents with articulated preferences this effect was in the same direction but less pronounced ($M = 13.45$ and $M = 6.14$).

The data were analyzed using a model where SEARCH is a function of both articulation and assortment. The Articulation × Assortment interaction is significant, $F(1, 55) = 15.57$, $p < .001$, indicating that the impact of assortment on the total amount of processing is moderated by preference articulation. For larger assortments, the difference in the amount of processing for respondents with and without articulated preferences is significant, $F(1, 55) = 40.82$, $p < .001$, whereas for smaller assortments the corresponding difference is nonsignificant, $F(1, 55) = 1.33$. These findings suggest that when presented with larger assortments, individuals with articulated attribute preferences are likely to process less information than individuals who were not asked to articulate their attribute preferences.

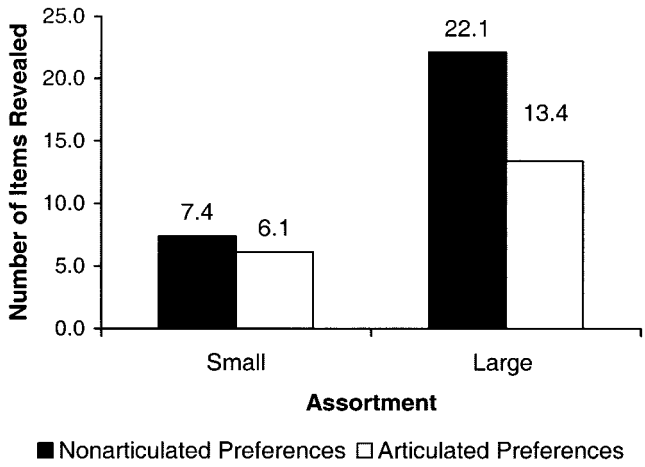

Figure 3. Total amount of processing as a function of product assortment and the degree of preference articulation: The overall number of information items revealed (Experiment 2).

An additional test of the proposition that preference articulation moderates the impact of assortment on decision processes is provided by analyzing the within-subject pattern of responses. Recall that each subject was asked to make two choices, one from a smaller and one from a larger set. Thus, it can be expected that for respondents without articulated preferences, the initial selection could have helped articulate their ideal point and, as a result, their second choice would be more similar to that of the respondents in the preference-articulation condition. Furthermore, because larger assortments offer greater opportunity for preference articulation compared with smaller assortments, it can be argued that this effect should be more pronounced for respondents who were initially presented with the larger assortment than for respondents who were initially presented with the smaller assortment.

The data show that for choices made from small assortments, the total amount of processing was $M = 9.17$ when this was the first choice and $M = 6.22$ when the choice was preceded by a choice from a larger selection, $F(1, 28) = 2.63$, $p = .11$. This within-subject, choice-based preference articulation is directionally consistent with the hypothesized predictions. The corresponding values for choices made from the larger set are $M = 21.61$ and $M = 22.75$; $F(1, 55) < 1$, *ns*. The interaction was significant, $F(1, 55) = 5.49$, $p < .05$, indicating that the choice-based preference articulation had a significant effect on the total amount of processing.

Discussion

The data reported in this study examined two aspects of individuals' information acquisition strategy: the information search pattern and the total amount of processing. Two measures of the information search pattern were collected: the pattern of the first search and the total number of attribute-based relative to product-based searches. Both search pattern measures offer converging data showing that individuals with articulated ideal points preferred alternative-based to attribute-based searches relative to individuals without articulated ideal points—an effect more pronounced in larger rather than smaller assortments. The data reflecting the total amount of processing further show that the search was more comprehensive in the absence of articulated preferences than when an articulated ideal point was readily available.

The observed data pattern is in agreement with the evidence that suggests that information processing in complex decisions is more attribute based early in the process and more alternative based later in the process (Bettman & Park, 1980). Thus, individuals without a readily articulated ideal point are more likely to first process the information by attribute to understand the attribute structure of the choice set, form their attribute-based preferences, and then apply these preferences to find the alternative that best matches their ideal point. In contrast, individuals with a readily available ideal attribute combination can process the information by alternative and are more likely to stop the evaluation process once they reach an alternative that matches or is sufficiently close to the ideal. This, in turn, leads to more selective evaluations, whereby the total amount of processing for individuals with articulated preferences is likely to be lower relative to individuals without articulated preferences.

Experiment 2 tested the impact of preference articulation and assortment on choice by directly examining individuals' information search patterns. The assumption underlying this approach was that the information search pattern is indicative of the underlying decision process. An alternative approach that does not rely on this assumption is to use postchoice measures such as reason-based analysis. This approach is adopted in Experiment 3.

Experiment 3

This experiment offers an alternative strategy for examining how preference articulation affects individuals' decision processes in the context of large assortments. This experiment built on the assumption that individuals' self-generated justifications of their choices are indicative of the decision processes (Ericsson & Simon, 1980; Shafir, Simonson, & Tversky, 1993; Simonson, 1989). Specifically, this experiment asked respondents to provide justifications for their decisions and offered an analysis of the rationale laid out in these justifications to impute the underlying decision strategy.

Method

Design. Fifty-one Northwestern University undergraduates were given a paper-and-pencil task of choosing a box of chocolates. The experimental stimuli were similar to the ones used in Experiment 2, with the main difference that all of the product information was readily available. Similar to Experiment 2, respondents were randomly assigned to a preference-articulation task and then asked to choose from a selection of Godiva chocolates. On choosing one of the chocolates, respondents were asked to write down the rationale for their decision. They were also asked to rate the assortment of the chocolates presented to them (on a 5-point scale identical to the one used in the first two experiments). On completion of the experiment, respondents were offered a box of chocolates for participating.

Building on the data reported in the first two experiments, the focus of this study was on differences in individuals' decision processes for choices made from larger assortments. Consequently, all respondents were presented with stimuli containing large assortments (16 alternatives); hence, there were only two experimental conditions. The preference-articulation manipulation was similar to the one used in Experiment 2. Respondents in the articulation condition were asked to select the attribute levels of their ideal chocolate. The remainder of the respondents were presented with the attribute information but were not asked to articulate their ideal attribute combination.

Dependent variables. The pattern of information processing was operationalized in terms of individuals' focus on either confirmatory (e.g., "I like truffles") or disconfirmatory (e.g., "I do not like dark chocolate") reasoning. The underlying rationale for this operationalization is that individuals processing the available information in a confirmatory manner are more likely to use a positive test strategy (Klayman & Ha, 1987; Wason & Johnson-Laird, 1972) and are less likely to focus on disconfirming information.

Results

Manipulation check. Individuals' perception of the assortment offered by the choice set is given directly by their ratings. Consistent with the experimental manipulation, the majority of the respondents rated the 16-alternative assortment to be extensive ($M = 2.06$, $SD = 0.96$). The difference in the perceptions of variety across the two preference-articulation conditions was non-

significant, $F(1, 48) = 1.11$, $p > .20$. These data are consistent with the findings reported in the first two experiments, suggesting that the manipulation procedure was effective.

Choice justification. Of the total 51 respondents, 8 did not write down their reasons for choice and therefore were excluded from further analysis. Of the remaining 43 respondents, 24 were in the articulation condition and 19 in the nonarticulation condition. The methodology of coding individuals' reasons was similar to the one used for coding thought protocols (e.g., Wright, 1974).

Individuals' responses were blind coded into either confirmatory reasons or disconfirmatory reasons. Complex statements containing multiple evaluations were coded as several independent reasons. To illustrate, the rationale "I like truffles, I like dark chocolate, and I do not like nuts" was coded as having two confirmations and one disconfirmation.

A test of whether individuals who articulated their ideal attribute combination were likely to display less disconfirmatory reasoning was given by comparing the relative number of disconfirmatory reasons across the two preference-articulation conditions. A measure of the relative number of disconfirmations was developed by calculating the number of confirmatory reasons minus the number of disconfirmatory reasons divided by the total number of reasons. This measure potentially varies between -1.0 and $+1.0$, whereby a more positive number indicates relatively more confirmatory processing. The total number of evaluations across the two experimental conditions was similar ($M_{ART} = 2.21$ vs. $M_{NOART} = 2.17$), ensuring against self-selection bias in reporting choice reasons.

The data show that the degree of confirmatory reasoning varied across the experimental conditions. Respondents in the preference-articulation condition displayed stronger bias toward using confirmatory arguments ($M = .77$, $SD = .57$) than respondents who were not asked to articulate their preferences ($M = .27$, $SD = .84$); $F(1, 38) = 4.44$, $p < .05$. Further analysis indicated that the relative number of confirmatory reasons was similar across the experimental conditions ($M = .64$ for respondents with articulated preferences vs. $M = .60$ for respondents who did not articulate their attribute preferences), whereas the difference in the number of disconfirmatory evaluations ($M = .11$ vs. $M = .32$) was more pronounced.

Discussion

The data reported in this experiment are consistent with the proposition that when choosing from large assortments, an individual's decision strategy is a function of preference articulation. Specifically, individuals with an articulated ideal point were more likely to use confirmatory than disconfirmatory reasons compared with individuals who were not asked to articulate their attribute preferences. This data pattern is consistent with the experimental propositions.

Experiment 3 tested the impact of assortment on consumer information processing by examining self-reported choice justifications. The assumption underlying this approach was that these justifications are indicative of the actual decision processes. An alternative approach that does not rely on this assumption is to infer the actual decision processes from the pattern of recalling the available information. This approach was applied in Experiment 4.

Experiment 4

Building on the rationale that the total number of alternatives recalled as well as the pattern of recall of the available information can be used as an indication of the decision strategy, Experiment 4 offered an alternative test of the hypothesis that the impact of assortment on choice is moderated by the degree of preference articulation.

Method

Fifty-nine Northwestern University undergraduates were given a paper-and-pencil task of choosing a fruit spread. They were presented with a selection of 20 alternatives, each described on two attributes: consistency (jam, jelly, preserve) and flavor (strawberry, raspberry, blueberry, apricot, blackberry, boysenberry, orange). Respondents were informed that all products were manufactured by Knott's Berry Farm (a California-based manufacturer offering a large assortment of fruit spreads). Choice alternatives were presented in a 5×4 matrix, each option indexed with a letter (A–T) and a small picture of the particular fruit spread located next to the description. Respondents were asked to choose the fruit spread they liked the most. On the next page, respondents were presented with a 5×4 product matrix identical to the one they had just evaluated with the exception that product descriptions were missing. Respondents were asked to recall as many options as they could. On completion of the experiment, respondents received $5 for their participation.

All respondents were presented with the same selection of 20 alternatives, which, in the context of the experiments reported so far, is a large assortment. Respondents were randomly assigned to one of the two preference-articulation conditions: Some were initially asked to describe their ideal fruit spread in terms of consistency (jam, jelly, or preserve) and flavor (strawberry, raspberry, blueberry, apricot, blackberry, boysenberry, or orange), whereas the others were simply informed about the attributes and attribute levels used to describe various fruit spreads. On the basis of a random assignment, there were 30 respondents in the preference-articulation condition and 29 in the nonarticulated-preference condition.

The dependent variables were (a) total amount of recalled information and (b) recall pattern. The total amount of recalled information was measured by the number of options listed in the recall section of the questionnaire. The higher number of recalled options was then interpreted as indicative of more comprehensive rather than selective evaluations and vice versa (Cacioppo & Petty, 1979; Craik & Lockhart, 1972; Craik & Tulving, 1975). The information-recall pattern was operationalized in terms of the relative location of the recalled alternatives by comparing the number of options recalled from the upper and the lower half of the product list. An even distribution between the options recalled from the upper and the lower part of the available product matrix was interpreted as indicative of a more comprehensive strategy, whereas a bias toward recalling options from the upper part was viewed as an indication of a more selective processing.

Results

Manipulation check. The difference in the perceived assortment was pretested on a sample of 43 respondents from the same population. Consistent with the goals of the experimental manipulation, the majority of the respondents rated the 20-alternative assortment to be extensive ($M = 2.02$, $SD = .55$), whereas the difference in the perceptions of variety across the two preference-articulation conditions was nonsignificant, $F(1, 41) < 1$. These data are consistent with the findings reported in the first three

experiments, suggesting that the manipulation procedure was effective.

Total amount of recalled information. Total amount of recalled information was analyzed by comparing the number of options recalled for the two preference-articulation conditions. The data show that respondents in the preference-articulation condition recalled fewer alternatives than those who were not asked to articulate their preferences ($M = 4.45$, $SD = 3.08$ vs. $M = 7.77$, $SD = 4.67$); $F(1, 57) = 10.32$, $p < .005$. This pattern of responses was consistent with the experimental predictions, suggesting that individuals with articulated preferences are likely to process less information than those who were not asked to articulate their ideal attribute combination.

The above analysis includes all options that were written down without explicitly controlling for recall precision. Consequently, this approach does not account for instances where respondents, instead of actually recalling, randomly generated some of the options reported in the recall section. To test for this, additional analysis was conducted. Specifically, the recalled alternatives were checked for accuracy, and all false recalls (options that were reported in the recall section but were not on the original product list) were excluded from the data set and analyzed separately. The resulting data were consistent with the findings reported above ($M = 3.83$, $SD = 3.14$ vs. $M = 6.27$, $SD = 4.66$); $F(1, 57) = 5.52$, $p < .05$. Further analysis shows that false recalls were proportionately distributed across the two experimental conditions. Specifically, a measure for false recalls was developed that equaled the difference between the total number of recalled alternatives minus the number of correct recalls divided by the total number of recalled options. The false responses were equally distributed, $F(1, 57) < 1$, *ns*, between the two experimental conditions, thus eliminating the possibility of a false-recall bias of the reported data.

Information recall pattern. The information recall pattern was operationalized by comparing the number of options recalled from the upper and the lower part of the product matrix. For that purpose, all responses were coded on the basis of their location in the original list. A measure of the information recall pattern was given by calculating the number of options recalled from the upper part of the list minus the number of options recalled from the lower part divided by the total number of options recalled. This measure, denoted RECALL, potentially ranges from a value of –1.0 to +1.0. A more positive number indicates a bias toward recalling options from the upper part of the list, 0 indicates that respondents were equally likely to recall options from either part of the list, and a more negative number indicates a bias toward recalling options from the lower part of the list.

The data show that respondents who were not asked to articulate their ideal attribute combination were equally likely to recall options from either part of the list ($M_U = 3.13$, $SD = 2.60$; $M_L = 3.14$, $SD = 2.33$; RECALL = −.01, $SD = .34$). In contrast, respondents in the preference-articulation condition displayed a bias toward recalling options from the upper part of the list ($M_U = 2.24$, $SD = 1.79$; $M_L = 1.59$, $SD = 1.68$; RECALL = .31, $SD = .51$). The difference in these information-recall patterns is significant, $F(1, 55) = 7.89$, $p < .01$, lending support for the proposition that in larger assortments the availability of an articulated ideal attribute combination is associated with more selective information processing.

Discussion

The data reported in this experiment show that individuals who were not asked to articulate their ideal attribute combination were likely to recall more alternatives than individuals who were asked to articulate their preferences prior to the choice task. Building on the notion that more extensively processed information is likely to be better remembered and hence recalled on an unaided basis (Cacioppo & Petty, 1979; Craik & Lockhart, 1972; Craik & Tulving, 1975), it can be concluded that individuals without articulated preferences were more comprehensive in evaluating the available information compared with those with an articulated ideal point, who were more selective in their evaluations.

Furthermore, the recall of respondents without articulated preferences was more systematic and less biased by options' location in the choice set, compared with individuals in the preference-articulation condition whose recall pattern was biased toward the options located at the beginning of the product list. Assuming a top-down pattern of information processing as the default (Haber & Hershenson, 1973), it can then be inferred that respondents in the preference-articulation condition were more likely to remember the information about the alternatives encountered first. Given the link between the amount of processing and recall, it can further be theorized that individuals in the preference-articulation condition more actively processed the information about alternatives encountered first, whereas individuals who were not asked to articulate their preferences were less likely to be affected by the order in which choice alternatives were evaluated. More generally, these findings further support the proposition that in large assortments the availability of an articulated ideal point is likely to be associated with more selective processing.

General Discussion

The four experiments reported in this article yielded converging evidence that the impact of assortment on individual decision processes and choice is moderated by the degree to which individuals have articulated attribute preferences. The data show that individuals with an articulated ideal point are more likely to choose from larger assortments than individuals without a readily available ideal attribute combination. Furthermore, these experiments offer insights into the impact of preference articulation and assortment on individuals' decision strategies. Specifically, preference articulation is shown to be associated with more selective, alternative-based, and confirmatory processing for individuals with an articulated ideal attribute combination and more comprehensive, attribute-based, and comparative processing for those without articulated preferences.

The theoretical account for the data is based on the notion that the availability of an ideal attribute combination affects the structure and the complexity of the decision process. Thus, individuals with a salient ideal point face the relatively simple task of searching for the alternative that best matches their already articulated attribute preferences. In contrast, individuals without an articulated ideal point face the more complex task of evaluating the available alternatives while at the same time forming the very criteria to be used in the evaluation process. As the size of the choice set increases, so does the complexity of the decision task. This in-

crease in the complexity of the decision is, in turn, likely to lead to avoiding choices from large assortments and consequent preference for smaller assortments.

This research offers a new perspective on the proposition that choices from large assortments are more likely to use the "satisficing" rule (Iyengar & Lepper, 2000; Mills, Meltzer, & Clark, 1977), whereby individuals try to identify an option that is simply "good enough" (i.e., it meets or exceeds a set of predetermined criteria) but is not necessarily the best among the available options (Simon, 1955; Wright, 1975). The data reported in this article are in agreement with the notion that large assortments lead to more satisficing decisions (as suggested by the prior research) but only for individuals with an articulated ideal point. Specifically, the data from Experiment 1 show that individuals with articulated preferences are less confident that they have selected the best available option than individuals without articulated preferences, which can be attributed to the less comprehensive processing associated with a satisficing choice. The less comprehensive information search pattern of individuals with articulated preferences reported in Experiment 2 can also be viewed as consistent with a satisficing choice (because the satisficing strategy does not require individuals to examine all available alternatives). Furthermore, the alternative-based search pattern, observed in the case of respondents with an articulated ideal point, is consistent with the notion that a satisficing search is a serial rather than a parallel process, whereby alternatives are considered one at a time (March, 1994). Because satisficing relies on a set of internal criteria for evaluating the available alternatives, the bias toward using confirmatory reasoning, which is more common for respondents with an articulated ideal point (Experiment 3), is also consistent with the satisficing approach. Finally, the finding reported in Experiment 4 that individuals with an articulated ideal point are more likely to focus on the data encountered first is also consistent with satisficing decisions, given that individuals using a satisficing strategy are likely to stop their search as soon as they encounter an alternative that meets their criteria.

The data reported in this article can also be considered in a broader context that goes beyond the traditional view of context-dependent preferences (Bettman et al., 1998; Simonson & Tversky, 1992). A more encompassing way to think about the impact of assortment on choice is in the context of the more general personality constructs. Thus, it has been proposed that an individual's preference for variety is a function of the degree to which the freedom of choice is fundamental for an individual's self-determination (Schwartz, 2001). This proposition follows from the view of freedom of choice as an opportunity for self-determination, leading to the idea that the preference for variety is contingent on the degree to which one's self-construal is centered on the notions of independence and autonomy. In this context, it has been further suggested that self-determination is not always a monotonic function of the preference for more choice; extreme self-determination can turn the freedom of choice into a "tyranny" of choice (Schwartz, 2000). This tyranny of choice is arguably caused by the lack of constraints (e.g., too many alternatives), which ultimately makes the goal of self-determination difficult to accomplish. The data reported in this article are in agreement with the self-determination-based tyranny of choice and show that imposing constraints on the decision problem by limiting the size of the choice set can actually increase the utility derived from choice.

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(*Appendix follows*)

Appendix

An Overview of the Information Presentation Format (Experiment 2)

A. Initial Screen

View Information by individual chocolate

View information by chocolate attribute

	Chocolate A	Chocolate B	Chocolate C	Chocolate D
Chocolate Type				
Chocolate Mix				
Flavor				
Nuts				

B. Example of an alternative-based search pattern

	Chocolate A	Chocolate B	Chocolate C	Chocolate D
Chocolate Type		Solid		
Chocolate Mix		Milk		
Flavor		Vanilla		
Nuts		Almonds		

C. Example of an attribute-based search pattern

	Chocolate A	Chocolate B	Chocolate C	Chocolate D
Chocolate Type				
Chocolate Mix	Dark	Milk	White	Espresso
Flavor				
Nuts				

Figure A1. Descriptions were initially hidden (Panel A) and could be viewed either by specific alternative (by clicking on one of the columns; Panel B) or by specific attribute (by clicking on one of the rows; Panel C).

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