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## The Effect of Decision Order on Purchase Quantity Decisions

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## **The Effect of Decision Order on Purchase Quantity Decisions**

### **Abstract**

Consumers often resolve tradeoffs in a particular order. For example, when making flavor and size decisions, consumers might first decide which flavors to choose, and then decide which sizes of those flavors to choose. This research examines the effect of such a decision order on purchase quantity decisions. We build on past work on decision difficulty and conflict to show that consumers choose more overall, and more variety, when a less replaceable attribute is considered in an earlier, rather than a later, stage in the purchase decision. For example, we find that a greater quantity is chosen when flavor (or brand) decisions precede, rather than follow, size decisions. We also find that the degree of attribute replaceability moderates the effect of decision order on quantity chosen. Furthermore, we find that marketers can influence the amount chosen by altering the organization of the shelf display. Finally, we find that when consumers explicitly consider the possibility of deferring their decisions, the effect of decision order is reduced.

Imagine that a consumer is choosing between different types of yogurt, and is focusing on tradeoffs involving size and flavors. This consumer might first decide which flavors and how many of those flavors to choose, or this consumer might first decide which sizes and how many of those sizes to choose. While past research on consumer decision making has commonly focused on choice and choice incidence, relatively little research has focused on another important aspect of consumer decision making – the quantity of the product that is chosen (e.g., Chernev 2008; Wansink, Kent, and Hoch 1998). A major finding in past research on choice and choice incidence is that they are influenced by the context, or the set of alternatives under consideration, and by the task, or the procedure through which the decision is made (e.g., Huber, Payne, and Puto 1982; Simonson et al. 2001). In this research, we examine how the purchase quantity decision may also be influenced by certain aspects of the context or task – in this case, the order in which decisions are made, such as in the example about yogurt above.

Prior work on consumer choice and choice incidence has shown that decision conflict is an important variable in determining what is chosen and whether a choice is made. Our research builds on this work by suggesting another important consequence of decision conflict; namely, that it can also affect the amount that is chosen. In particular, we propose that as the decision becomes more difficult, consumers will resolve this difficulty by choosing a greater variety and therefore greater overall quantity. By distributing the choice of options across several different product configurations, consumers can resolve this decision conflict.

If the purchase quantity decision is also systematically affected by decision difficulty, this can have important consequences for decision making that occurs in stages. Because consumers often make decisions in a specified sequence, we posit that the order in which these

decisions are considered (e.g., Tversky and Sattath 1979) will have a systematic effect on the overall quantity that is chosen. If a more difficult attribute tradeoff is confronted in the first stage of a decision, we predict that the consumer will then choose a greater variety and a greater quantity of this attribute than if an easier tradeoff is considered in the first decision stage. When more of an attribute is chosen in the first stage, this can translate into more chosen in the second stage as well. For instance, if a consumer decides among different flavors before deciding among different sizes, the greater difficulty in making tradeoffs among flavors than sizes will lead to a greater quantity chosen than if the size decision precedes the flavor decision.

We conduct seven studies to test our framework and predictions. We begin by focusing on tradeoffs involving flavors (a more difficult tradeoff, as shown below), and tradeoffs involving sizes (an easier tradeoff). Across the experiments, we find that when the flavor decision precedes the size decision, more overall is chosen and more variety is chosen than if the decision order is reversed. We then show that our framework is not limited to flavor and size decisions, but also can account for other types of tradeoffs that differ in terms of decision difficulty, such as brand and size decisions, or brand and flavor decisions. We also show that when the difficulty of a tradeoff is reduced, this eliminates the effect of order on the amount chosen. Furthermore, we examine the implications of our findings for the way in which products should be organized on store shelves. Finally, we show that the effect of decision order on quantity chosen is reduced when consumers have alternative ways of resolving decision conflict, such as by electing to defer the choice altogether.

## **RESOLVING ATTRIBUTE TRADEOFFS ACROSS DECISION STAGES**

In this research, we focus on how the order in which decision tradeoffs are resolved can affect the amount and variety that is chosen. For example, in the case of yogurt, a consumer might want to decide how many and which type of flavor to buy first, and then decide which sizes of those flavors to choose. The order in which consumers consider the different comparisons can happen because the retailer sets up the store display to encourage that the flavor decision be made first, or because the consumer naturally chooses flavors first due to an internal decision rule. Alternatively, a consumer might decide to make the yogurt purchase in the opposite order; namely, the size decision is made before the flavor decision. Note that from a normative perspective, the decision order should not affect the amount and variety that is chosen. If the flavor decision is made first, then the size decision follows. In the other order, the exact same decisions are made, yet just in a different sequence. However, we argue that the decision order can in fact exert a systematic effect on the amount and variety chosen, which we next consider in more detail.

### **Purchase Quantity Decisions and Decision Difficulty**

Prior work on consumer decision making has focused on the degree to which attribute tradeoffs influence decision difficulty (e.g., Carmon, Wertenbroch, and Zeelenberg 2003; Kivetz 2003). This research has found that certain types of attributes are more difficult to trade off than

others (e.g., Luce, Bettman, and Payne 2001). In particular, attributes differ in the degree to which they offer unique benefits and can be directly compared and exchanged (e.g., Hsee 1996; Nowlis and Simonson 1997; Yeung and Soman 2005; Zhang and Markman 1998). Those attributes that are the same along a common dimension and can be directly compared and exchanged are easier to trade off than attributes that are not as easily compared and exchanged. For example, attributes that are quantitative in nature, such as prices and quality ratings, are easier to tradeoff and exchange than attributes that are qualitative in nature, such as brand names. This idea is also consistent with research showing currency decisions are easier than commodity decisions (Beattie and Barlas 2001), and comparable attributes are easier to tradeoff than noncomparable attributes (e.g., Slovic and MacPhillamy 1974).

Building on this prior literature, we propose that the more “replaceable” an attribute, the easier it will be for consumers to make tradeoffs involving that attribute. We focus on this particular dimension of tradeoff difficulty because it is most relevant for the types of decisions we consider in this paper – decisions that consumers frequently make among relatively mundane attributes such as size, flavor, or brand name. As mentioned above, this proposition is in line with work showing that tradeoffs involving a directly comparable and substitutable dimension typically lead to easier decisions. On the other hand, a decision involving an attribute that offers unique advantages and disadvantages will be more difficult because it requires more tradeoffs. Thus, when one attribute can simply replace a different level of that same attribute, there are no separate advantages and disadvantages to consider, since it is just a matter of exchanging one amount for another amount. However, when an attribute offers unique characteristics that cannot

be easily exchanged, this requires more difficult tradeoffs, as one aspect of the attribute must be traded off against a different aspect.

For instance, consider a consumer who is buying yogurt at the grocery store, and is first deciding which flavor or flavors of yogurt will be selected. In such a situation, flavors are not directly replaceable, as, for instance, vanilla yogurt offers unique advantages and disadvantages over cherry yogurt, and one cannot directly replace the other. Thus, one flavor cannot be easily exchanged for the other flavor, since one flavor is inherently different from another flavor along dimensions that are unique. On the other hand, some attributes, such as sizes, can be more easily exchanged and therefore can act as replacements. For instance, four 8 ounce packages of vanilla yogurt can replace one 32 ounce package.

We posit that these differences in ease of replacement can affect decisions when the consumer can choose more than one option. For instance, if a consumer is choosing among flavors, that consumer can then choose multiple flavors. We propose that in such a situation, the less replaceable the attribute, the more the consumer will pick greater variety and therefore greater overall quantity, as a way to resolve this conflict (e.g., Dhar 1997). For example, a consumer could resolve the difficulty of choosing between a vanilla and a coffee yogurt by choosing one of each. On the other hand, a consumer would not be as likely to follow this strategy for a more replaceable attribute, such as sizes. For sizes, there is not as much conflict since one size can replace a different size, and there is thus less of a need to resolve this conflict by choosing multiple sizes. This idea is also consistent with research showing that consumers resolve preference uncertainty by choosing a greater variety of options, as a means to insure that changing preferences can be matched with the appropriate option (Simonson 1990).

It should be emphasized that in this research we are looking specifically at purchase situations, where a variety of options is available and the consumer can choose multiple options. On the other hand, we are not looking at situations where the consumer has already purchased multiple options and is then trying to decide which one item to choose for consumption. Thus, we argue that consumers can “spread out” their choices over multiple options at the time of purchase, but will most likely only choose one item at the time of consumption. In addition, we later consider what effect the ability to defer choices can have on how attribute replacability influences quantity decisions.

We next go into more detail on how our general proposition will relate to the specific attributes that we study in this research. We start with flavor and size decisions, and later in the paper discuss other attributes. We propose that flavor tradeoffs will be more difficult to resolve, as flavors are not as replaceable as other attributes. For example, as mentioned earlier, one flavor cannot serve as a direct replacement for another flavor. In comparison to flavor decisions, we believe that size decisions will be easier to resolve, as they are more replaceable. In order to test this basic idea, we need to run a pilot study.

### **Pilot Study**

Participants were 80 undergraduate marketing students fulfilling a course requirement. They were asked to rate the degree of difficulty in making tradeoffs involving flavors and sizes. For example, for the flavor decision in the ice cream category, subjects were told to imagine that they were deciding among different flavors of ice cream at a store, and were deciding among chocolate, vanilla, and strawberry. They were then asked to rate the degree of difficulty in

deciding on three 11-point scales, ranging from 0 to 10, with endpoints not at all difficulty/very difficult, not at all simple/very simple, and not at all likely to regret/very likely to regret (Chatterjee and Heath 1996; Dhar and Nowlis 2004). Each subject rated the decision difficulty in three different categories (ice cream, juice, and cookies), with each category appearing on a separate page of the survey. The particular flavors and sizes that we chose to test in each category were all standard levels that consumers can find in the marketplace. The order of the categories was counterbalanced and we found no significant order effects.

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Insert table 1 about here

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Given the high correlation between the three measures of decision difficulty, we used a composite measure ( $\alpha = 0.81$ ). The results, which show the degree of difficulty, are reported in table 1. Consistent with our assumptions, subjects found decisions among flavors to be more difficult than size decisions ( $t = 4.13, p < 0.01$ ). This pilot study shows that, as we predicted, flavors and sizes differ in predictable ways in terms of their tradeoff difficulty. We next consider how these differences will impact the effect of decision order on purchase quantity.

### **Asymmetries in Decision Order**

Although a major focus of choice research has been on the simultaneous evaluation of options, decisions that involve processing information according to some hierarchical structure have also received attention (e.g., Bettman and Park 1980; Gensch and Ghose 1992; Huber

1982). Typically, hierarchical processes arise in choices involving a large number of attributes or options, or in sets where there is variance in the comparability among the options (Bettman and Sujan 1987). A number of studies show that constraints in the order of processing can lead to systematically different outcomes in comparison to what would be expected in the absence of constraints (e.g., Glazer, Kahn, and Moore 1991; Tversky and Sattath 1979). In contrast to previous work that examines the effect of partitioning a larger choice set into subgroups, we examine how the order of the decision process can affect the amount and variety that is chosen.

When consumers face a more difficult decision in the first stage of the decision sequence, they are more likely to resolve this difficulty by choosing multiple options, as mentioned above. Furthermore, prior research has found that, when decisions are made in stages, the results from the first stage have a systematic carryover effect on the results in the second stage (e.g., Dhar, Nowlis, and Sherman 1999; Dhar and Nowlis 2004). In particular, a great deal of prior work has shown that the choice process becomes more discriminating in later stages of the decision process (e.g., Bettman and Park 1980). For example, the decision process often results in an initial phase where options are screened out, and then a more deliberate phase where the remaining options are more carefully compared. As a result, we propose that the decision process from the first stage will lead to more discrimination in the second stage.

To apply this concept to a specific example, consider the decision to choose flavors and sizes. When the flavor decision is made first, this will result in more variety chosen and a greater quantity chosen, as consumers resolve this conflict by choosing more. However, when the flavor decision is made second, the decision process will then be influenced by the size decision, which now comes first. The size decision is resolved by choosing fewer units, which means that the

consumer is becoming more discriminating. This discrimination process will then pass on to the second stage of the decision, thus making consumers also more discriminating when they choose flavors. This leads to the first hypothesis.

**H1a:** Consumers who make decisions among less replaceable attributes (e.g., flavors) before making decisions among more replaceable attributes (e.g., sizes) will choose more overall quantity than if the decision process were to occur in the opposite order.

In addition to affecting the overall amount chosen, the choice order should have a systematic effect on the variety chosen across the two decision stages. When flavors are chosen in the first stage, the selection of more variety will be a means to resolve the decision conflict. However, when the size decision precedes the flavor decision, we predict that consumers will then choose less flavor variety (in the second phase of the decision), due to the influence of the decision process from the first stage. As mentioned earlier, we expect the decision process to encourage greater discrimination across stages. When sizes are chosen first, consumers should be less likely to use increased variety as a means to resolve this conflict. We then expect this decision process to influence the second stage of the choice, when flavors are chosen. In sum, we expect that more flavor variety will be chosen when the flavor decision occurs before the size decision, rather than when the size decision precedes the flavor decision.

While we expect decision order to affect flavor variety, we do not expect it to affect size variety. When the size decision is first, consumers are not expected to resolve the decision by choosing greater variety. When the size decision is second, we do not expect the greater flavor

variety that occurred in the first stage to affect the size variety chosen in the second stage since sizes are easy to choose from already. This idea is also consistent with research finding that consumers choose greater variety among flavors than sizes within shopping trips (Harlam and Lodish 1995), yet this prior research does not offer an explanation for why this occurs.

**H1b:** Consumers who make decisions among less replaceable attributes (e.g., flavors) before making decisions among more replaceable attributes (e.g., sizes) will choose more variety along the less replaceable attribute than if the decision process were to occur in the opposite order.

## **STUDY 1: QUANTITY DECISIONS INVOLVING FLAVORS AND SIZES**

### **Method**

Participants were 85 undergraduate marketing students fulfilling a course requirement. They were asked to imagine that they were shopping at a warehouse store, and needed to make purchases in two different product categories (bagels and ice cream). There were two between-subjects conditions. In one condition, participants made size decisions before flavor decisions (see figure 1 for an example of this decision). They were asked to circle the size or sizes they would buy and write in each box the number they would buy of each size. After making decisions in the two product categories, participants then read, on the last page of the questionnaire: “You have just finished choosing which sizes you would buy. Next, we would like you to go back to the beginning of the survey, and write in how many you would buy of each flavor, so that you match the numbers you put in for the number of sizes you would buy. In

other words, for each size you chose, fill in below each size, on the lines, which flavor or flavors you would buy of each size (and make sure the numbers equal each other).” In the second condition, participants made flavor decisions before size decisions, following a parallel procedure. The order of the categories was counterbalanced and we found no significant order effects. The instructions in this and subsequent studies also emphasized that there were no right or wrong answers and that the respondents should choose the option that best reflected their preferences.

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Insert figure 1 about here

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## Results

The results, which show the amount of product and flavor variety chosen, are reported in table 1. Consistent with H1a, more of the product was chosen in the flavor-size (3.36) than in the size-flavor condition (1.92). We tested H1a with an ANOVA model.<sup>1</sup> The dependent variable was how much of the product was chosen, and was modeled as a function of the following independent variables: (1) the order of the decision, and (2) an interaction between the manipulation and the two categories, which tests whether the effects were different across the problems (e.g., Chernev 1997; Dhar 1997). Consistent with H1a, the main effect of variable (1) was statistically significant ( $F(1, 168) = 9.97, p < .01$ ). We also found that there were no significant differences in the effects across the two categories ( $F(1, 168) = 1.38, ns$ ).

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<sup>1</sup> In addition to examining the number of units chosen, we also examined the volume of units chosen. For instance, sizes can be measured both in terms of number of items, and in terms of the volume of the content in the sizes. The results were similar across either measure.

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Insert table 2 about here

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The variety chosen was calculated with the Herfindahl index (Simonson and Winer 1992; Tirole 1989). This index is the sum of squares of the item's choice shares. For instance, if a respondent chooses 2 orange, 3 grape, and 5 lemon flavors, their score would be  $(2/10)^2 + (3/10)^2 + (5/10)^2 = 0.38$ . The lower the score, the greater the variety chosen. However, in order to make this score more intuitive, we report it throughout the paper after we subtract it from one. Thus, in the example above, we would report the score as 0.62 ( $1 - 0.38$ ). We do this so that the greater the score, the greater the variety that was chosen, which is a more intuitive way to think about this calculation.

Consistent with H1b, more flavor variety was chosen in the flavor-size (0.35) than in the size-flavor condition (0.20). We tested this effect in the same manner that was done for H1a, except here the dependent measure was the Herfindahl index. The main effect of the manipulation was significant, ( $F(1, 168) = 4.61, p < .05$ ), and there were no significant differences across the two categories ( $F < 1$ ). In addition, there was no difference in size variety across the conditions. In particular, size variety was 0.04 averaged across the categories when the size decision was first, and 0.08 when the flavor decision was first. We tested this in the same manner as H1b, and found this difference was not significant ( $F < 1$ ).

In sum, study 1 finds that consumers choose more overall, and more variety, if the flavor decision precedes the size decision. Furthermore, this study finds that size variety is not affected by decision order. This finding allows us to rule out an alternative explanation. In particular, it could be argued that consumers will simply find the first stage of a decision to be more stimulating than the second stage, which will then result in more variety chosen. However, if this were true, there should be greater variety of either the flavor or size attribute when that attribute was resolved in the first stage. Since we only found that the flavor variety was affected by decision order, while size variety was not, this gives less weight to the alternative explanation, and more weight to our account.<sup>2</sup>

So far, we have shown that consumers choose more overall, and more variety, when the flavor decision precedes the size decision. We suggested that this result is driven by the underlying replacability of the attribute tradeoffs. To provide a stronger test of our predictions, we next explicitly manipulate the replacability of the attribute tradeoff. This allows us to provide stronger support that the results are not due to characteristics of the particular attribute itself, but to the underlying replacability of those attributes. For example, we can describe flavors, as we have done up to this point, in terms of the flavor itself (e.g., vanilla or strawberry). However, we can also describe flavors in a way that makes them easier to tradeoff as they become more replaceable. This can be done by describing flavors in terms of their taste ratings. For example, a vanilla flavor can also be shown with a taste rating, which then makes this flavor more

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<sup>2</sup> Another alternative explanation would be that our results are due more to differences in attribute importance than tradeoff difficulty. In particular, prior research has found that brands and sizes are the first and second most important product attributes in consumer decision making (Kumar and Divakar 1999). Thus, if the size decision were more important than the flavor decision, this would mean that more should be chosen when the size decision preceded the flavor decision – but the opposite occurred.

replaceable for a strawberry flavor that also is shown with a taste rating. As the flavor tradeoff becomes more replaceable, this should reduce the effect of the decision order, which leads to the next hypothesis.

**H2:** The degree of attribute replacability will moderate the effect of decision order on the amount chosen. When the attribute that is chosen first becomes more replaceable, the effect of decision order on the amount chosen will be reduced.

## **STUDY 2: THE MODERATING EFFECT OF ATTRIBUTE REPLACABILITY**

### **Method**

Subjects were 121 undergraduate marketing students fulfilling a course requirement. There were three between-subjects conditions. In one condition, participants made size decisions before flavor decisions. In the second condition, participants made flavor decisions before size decisions. In the third condition, participants made flavor decisions before size decisions, and were also given taste ratings for those flavors. This was done to increase the replacability of the flavor tradeoffs. In particular, participants were told, “You may encounter products which you have never seen (such as unfamiliar flavors or sizes) which are only sold in certain parts of the country. Because some of these flavors may be unfamiliar, we are also providing you with taste ratings of each flavor, as judged by *Consumer Reports*, an independent agency.” Thus, for this manipulation respondents saw flavors and also a taste rating (between 1 and 100) with each flavor. Each subject made choices in two different categories (chips and soda), with each

category appearing on a separate page of the survey. Furthermore, the flavors were pretested to be unusual, such that it would make sense to provide taste ratings as a way to increase attribute replacability. For instance, the chip flavors were Parmesan & Garlic, Salt & Cracked Pepper, and Smokehouse Cheddar. The order of the categories was counterbalanced and we found no significant order effects.

We also pretested the degree of difficulty in deciding when taste ratings were provided, using the same scales as were discussed in the main pretest, and with a group of 45 students. Averaged across the two categories and three measures, we found that decision difficulty was rated as 4.77, which is significantly less than 6.35, the rating for flavors ( $t = 2.62, p < 0.01$ ). This finding suggests that our manipulation of providing taste ratings will make the flavor decision more replaceable.

## Results

The results, which show the amount of product chosen and flavor variety, are reported in table 3. Consistent with H1a, a greater quantity of the product was chosen in the flavor-size (4.81) than in the size-flavor condition (3.54). We tested the hypotheses with an ANOVA model, as was done in study 1. In order to test H1a, we examined the planned contrast between the size-flavor order and the flavor-size order. Consistent with H1a, this effect was significant ( $F(1, 240) = 4.51, p < .05$ ). We tested H2 with the planned contrast between the flavor-size decisions with or without the taste ratings. Consistent with H2, this effect was significant ( $F(1, 240) = 4.77, p < .05$ ).

Insert table 3 about here

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Consistent with H1b, more flavor variety was chosen in the flavor-size (0.38) than in the size-flavor condition (0.25). We tested this effect in the same manner that was done for H1a, except here the dependent measure was the Herfindahl index. The main effect of the manipulation was significant, ( $F(1, 240) = 4.10, p < .05$ ), and there were no significant differences across the two categories ( $F < 1$ ). In addition, there was no difference in size variety across the conditions. In particular, size variety was 0.07 averaged across the categories when the size decision was first, and 0.13 when the flavor decision was first. We tested this in the same manner as H1b, and found this difference was not significant ( $F(1, 240) = 1.94, ns$ ). Furthermore, as predicted, the amount of flavor variety was the same across the size-flavor and flavor-size conditions when flavor was replaced with taste ratings (0.25 in each case).

Study 2 also allows us to rule out an alternative explanation based on variety seeking. Such an account suggests that consumers choose more when the flavor decision precedes the size decision because consumers seek variety, and there is more variety available in flavors than in sizes. However, study 2 shows that the effect of decision order on quantity chosen is eliminated when information about taste ratings is added to the information about flavors. This information makes flavors more replaceable and makes the flavor decision easier, but it does not reduce the amount of variety that is available (since the exact same flavors are still available). Thus, study 2 shows that the results are more likely to be explained based on attribute replaceability rather than on differences in variety seeking.

The two prior studies used a certain procedure to test the hypotheses. In particular, respondents decided both what attributes they wanted, and how many of each attribute they wanted, in the first stage of the decision. In the second stage of the decision, they then chose which and how many they wanted of the second attribute, so that this matched up with the quantities they had chosen in the first stage. However, this procedure raises the possibility that the results are driven by an anchoring mechanism, rather than the hypothesized effect of the first decision stage on the second stage. In particular, if 10 total items were chosen in the first stage, the prior procedure would not allow the number of items to be different in the second stage. Thus, the prior test did not make it possible to determine if the decision process from the first stage affected the second stage in terms of the total number of units chosen, since the first stage locked in the total number of units.

In order to rule out this alternative account, the next study employs a different procedure. Specifically, the next study does not lock in the total number of units chosen in the first stage. Instead, it asks respondents to merely select the different attributes they want in the first stage (for instance, they might choose two flavors), without specifying a particular number of those attributes (for instance, two of one flavor, and three of the other flavor). This new procedure can thus serve as a better test to see if in fact the decision process from the first stage can have a systematic effect on the second stage. For example, with the procedure used in the first studies, if a respondent chooses 8 total yogurts in the first stage (after making the size decision), they then must stay with 8 total yogurts in the second round (after making the flavor decision). However, with the new procedure, if the respondent chooses 2 sizes in the first round, without needing to specify the total number of yogurts chosen, this allows for any total number to be

chosen in the second round. In particular, under this new procedure, the respondent can choose any total amount of yogurt they want (with the only restriction that two sizes must be chosen), so that the total amount of yogurt could be for instance only 2 or even 20 total. In sum, this new procedure offers more support for the proposed decision process – it is more about the number of first stage attributes chosen, and not about the total quantity chosen in the first stage.

Finally, study 3 further tests the idea of attribute replaceability. In particular, an attribute can become more replaceable as its values become more similar. For instance, in the prior studies we tested typical flavor tradeoffs, where a consumer might decide between a vanilla flavor and a strawberry flavor. However, sometimes flavor decisions can involve very similar attribute levels, such as would occur if a consumer is deciding between a regular vanilla flavor and a vanilla bean flavor. In such a situation, it is easier for the consumer to replace one level of the attribute for another level. Thus, as the levels of an attribute become more similar, we expect them to be more replaceable and hence easier to tradeoff, resulting in less of an effect on quantity purchased compared to the situation where the attributes were not as replaceable. This is consistent with Festinger (1957), who suggests that the degree of trade-off conflict in choice will increase with the size of the difference in attribute values, and with Chatterjee and Heath (1996) who find evidence of increased conflict as attribute value differences increase.

### **STUDY 3: TEST OF THE DECISION PROCESS AND ATTRIBUTE REPLACABILITY**

#### **Method**

Participants were 207 undergraduate marketing students fulfilling a course requirement. The experiment used a 2 (decision order: flavor before size, or size before flavor) X 2 (attribute similarity: very similar flavors, or less similar flavors) between-subjects design. Two product categories were tested: ice cream and yogurt. We manipulated attribute similarity by either presenting three very similar flavors, or by presenting three less similar flavors.<sup>3</sup> In the prior two studies, the flavors would have represented less similar flavors, so this study adds in a condition that looks at very similar flavors. For example, in the category of ice cream, the three dissimilar flavors were chocolate, strawberry, and vanilla (as in study 1). The three very similar flavors were regular chocolate, mild chocolate, and rich dark chocolate.

In addition, this study manipulated decision order in a way that was different from the prior two studies. In particular, when the size decision was first, subjects were asked to “circle the size or sizes you would buy below.” This differs from the prior studies, because those studies had subjects both circle the sizes that they wanted and specify the quantity for each size. In the present study, once they had circled the size/s they wanted in each category, they were then instructed to “now go back to the beginning of the survey, and write in how many you would buy of each flavor. In other words, for each size you chose, fill in below each size, on the lines, which flavor or flavors you would buy of each size (and then put the total on top).” The procedure for the other condition, where the flavor decision preceded the size decision, paralleled this procedure. The order of the two tested product categories was counterbalanced and we found no significant order effects.

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<sup>3</sup> This was pretested with 30 subjects, who were asked to rate the degree of similarity between various flavors, on scale of 1 to 7. We found that the “very similar” flavors were rated as significantly more similar than the “less similar flavors” ( $M = 6.1$  vs.  $M = 4.0$ ,  $t = 2.88$ ,  $p < 0.01$ ).

## Results

The results, which show the amount of product and flavor variety chosen, are reported in table 4. Consistent with H1a, more of the product was chosen in the flavor-size (4.48) than in the size-flavor condition (2.83). We tested this effect in the same manner we did for study 1, and found that it was statistically significant ( $F(1, 203) = 12.81, p < .01$ ). Consistent with H1b, more flavor variety was chosen in the flavor-size (0.28) than in the size-flavor condition (0.14). This difference was tested as was done in study 1, and was found to be significant, ( $F(1, 203) = 5.11, p < .05$ ). In addition, consistent with H2, the interaction between decision order and attribute similarity was significant ( $F(1, 203) = 7.46, p < .01$ ). In particular, when the flavors were very similar, there was no significant effect of decision order on either quantity chosen ( $M = 2.35$  vs.  $M = 2.36$ ) or on flavor variety chosen ( $M = 0.12$  vs.  $M = 0.12$ ). Finally, consistent with the prior studies, there were no significant differences in size variety across the conditions ( $F < 1$ ) for all comparisons.

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Insert table 4 about here

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The prior studies only looked at tradeoffs involving flavors and sizes. However, this raises a potential alternative explanation for our results. Namely, it is possible that the results are not due to differences in replacability, but due to specific characteristics inherent to flavor and size decisions. It may be that when flavor decisions are made first, the flavor decision primes a desire for indulgence which can then lead to a greater overall amount chosen. Furthermore, it

may be that when size decisions are made first, respondents are then primed to think more about frugality. In order to rule out this rival account, we needed to consider other types of attributes that consumers commonly encounter (see Figure 2 for an overview of the attributes we examined), and thus we decided to also look at brand names (e.g., Morton and Zettelmeyer 2004). We propose that brand names are less replaceable than size decisions, and we tested this in the same manner that was done in the Pilot Study.<sup>4</sup> As predicted, we found that respondents rated brand decisions as more difficult than size decisions ( $p < 0.05$ ).

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Insert figure 2 about here

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In addition, studies 2 and 3 manipulated attribute replaceability by focusing on the flavor decision. The degree of attribute replaceability for brand names can be altered by substituting the brand names with quality ratings (e.g., Nowlis and Simonson 1997). In particular, brand names are more difficult to compare than are quality ratings. As a result, we expect that when brand name decisions precede size decisions, consumers will choose more overall product and more brand variety (as per H1). However, when quality ratings are substituted for brand names, this makes the decision easier, which is then expected to eliminate the effect of decision order on quantity and variety chosen (as per H2). We tested these ideas in the next study.

#### **STUDY 4: GENERALIZING TO OTHER TYPES OF TRADEOFFS**

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<sup>4</sup> We also found that brand decisions are more replaceable than flavor decisions, as our framework predicts.

## Method

Participants were 223 undergraduate marketing students fulfilling a course requirement. The experiment used a 2 (decision order: brand before size, or size before brand) X 2 (attribute replacability: brand names or quality ratings) between-subjects design. Two product categories were tested: cookies and soda. We manipulated attribute replacability by either using brand names or quality ratings. For example, in the category of cookies, the three brand names that we used were Warehouse Store Brand, Nabisco, and Pepperidge Farm Gourmet. For the quality ratings manipulation, respondents were told to, “Assume that each of these products has been given a quality rating by *Consumer Reports*, which is an independent tester of consumer products.” For the cookies category, the quality ratings were listed as 81, 87, and 93 (with the prices corresponding to the condition in which we used brand names). We manipulated decision order in the same manner used in study 3.

## Results

The results, which show the amount of product and brand/quality variety chosen, are reported in table 5. Consistent with H1a, more of the product was chosen in the brand-size (4.89) than in the size-brand name condition (2.18). Using the same test as in study 1, we find that this difference is statistically significant ( $F(1, 219) = 17.60, p < .01$ ). Consistent with H1b, more brand variety was chosen in the brand-size (0.17) than in the size-brand condition (0.02). Using the same test as in study 1, the difference is statistically significant, ( $F(1, 219) = 6.05, p < .01$ ). In addition, consistent with H2, the interaction between decision order and attribute

replacability is significant ( $F(1, 203) = 6.24, p < .01$ ). In particular, when the brand names were replaced with quality ratings, there was no significant effect of decision order on either quantity chosen ( $M = 2.10$  vs.  $M = 2.34$ ) or on variety chosen ( $M = 0.04$  in both cases). Finally, consistent with the prior studies, there were no significant differences in size variety across the conditions ( $F < 1$ ) for all comparisons.

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Insert table 5 about here

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The studies up to this point have manipulated decision order by explicitly asking for one decision to be made before the other. These studies all found that decision order had a systematic effect on the amount and variety chosen. However, when consumers are making purchases in the actual marketplace, it is unlikely that they will need to explicitly make one type of tradeoff before the other. While a website can be organized such that this happens, such a strict order is not often followed. That is, consumers are usually given a choice as to how they want to order the decision process. For instance, if a consumer is in the store, this consumer can choose which type of decision to make before the other. Yet, marketers can encourage making one type of decision before the other by organizing the shelf displays in a particular manner. Thus, store shelves can be organized in ways that encourage a particular decision order (e.g., Simonson, Nowlis, and Lemon 1993; Simonson and Winer 1992). For instance, if a consumer is deciding between different flavors and sizes, the store shelf can be organized by flavors. When this occurs, the tradeoffs between the different sizes becomes more salient than the tradeoffs

between the different flavors, since the different sizes are next to each other on the shelves, whereas the flavors are separated. When size tradeoffs are more apparent, this would imply that consumers will choose less of an item than if the shelves are organized by sizes, where flavor tradeoffs become more apparent. This leads to H3, which we test in the next study.

**H3:** Consumers will choose more overall quantity, and more variety, when products are organized by more replaceable attributes (e.g., sizes) than when products are organized by less replaceable attributes (e.g., flavors).

### **STUDY 5: THE EFFECT OF SHELF DISPLAYS ON PURCHASE QUANTITY**

Subjects were 284 undergraduate marketing students fulfilling a course requirement. There were four between-subjects conditions. In two of the conditions, participants made either flavor decisions before size decisions or size decisions before flavor decisions. In the other two conditions, we told participants that they would see products organized on shelves, as they would in a store. In one condition, the products were organized by flavors, such that the tradeoffs between the sizes become more apparent (see figure 3). In the other condition, the products were organized by sizes, such that the tradeoffs between flavors became more apparent. Each participant made decisions for both soda and yogurt.

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Insert figure 3 about here

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We tested our predictions with an ANOVA model. The dependent variable was how much of the product was chosen, and was modeled as a function of the following independent variables: (1) the order of the decision, which tests H1a, (2) whether the products were organized by flavors or sizes, which tests H3, and (3) interactions between the main manipulations and the two categories, which tests whether the effects were different across the problems.

We first tested H1a, which predicts that a greater amount of product will be chosen when the flavor decision precedes the size decision. Consistent with this hypothesis, the main effect of variable (1) was statistically significant ( $F(1, 563) = 11.44, p < .01$ ). When participants made flavor decisions before size decisions, they chose 5.58 items, averaged across the two categories. When size decisions preceded brand decisions, the amount chosen dropped to 3.99 items. In addition, we found that the interaction between this main effect and the product categories was not significant ( $F < 1$ ), which suggests that the results were consistent across the two categories. We next tested H1b, which predicts that consumers will choose a greater variety of products when the flavor decision precedes the size decision. We tested this effect as was done in prior studies and found that it was significant ( $F(1, 563) = 5.34, p < .05$ ). In particular, flavor variety was 0.26, averaged across the categories, when the flavor decision was first, and 0.15 when the size decision was first. Also, consistent with earlier studies, there was not a significant difference in size variety across the two conditions.

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Insert table 6 about here

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We next tested H3, which predicts that consumers will choose more overall, and greater variety, when the products are organized by sizes, such that the flavor tradeoffs are more apparent, than if they are organized by flavors. We tested this hypothesis as we did for H1. Consistent with our hypothesis, the main effect of shelf organization was significant ( $F(1, 563) = 55.35, p < .01$ ). When the products were organized by sizes, participants chose 8.33 items, averaged across the two categories. When the products were organized by flavors, the amount chosen fell to 3.46 items. In addition, we found that the interaction between this main effect and the product categories was not significant ( $F < 1$ ), which suggests that the results were consistent across the two categories. We next tested our prediction that consumers will choose a greater variety of products when the products are organized by sizes, and found that it was significant ( $F(1, 563) = 4.91, p < .05$ ). In particular, flavor variety was 0.35, averaged across the categories, when products were organized by sizes, and 0.25 when products were organized by flavors. Also, there was not a significant difference in size variety across these two conditions.

The prior studies focused on tradeoffs involving flavors and sizes, or brands and sizes. However, to further broaden our framework, the next study examines tradeoffs involving brands and flavors. Based on our framework, we predict that consumers will choose a greater overall amount, and greater variety, when the less replaceable attribute decision precedes the more replaceable attribute decision. As mentioned earlier, we found that the flavor decision is less replaceable than the brand decision. Thus, we predict that a great overall amount, and greater variety, will be chosen when the flavor decision is made before the brand decision than when the reverse decision order occurs.<sup>5</sup> In addition, we argued earlier in the paper that the greater the

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<sup>5</sup> In addition to examining if our framework extends to tradeoffs involving brands and flavors, the next study serves another purpose. In particular, it is possible that the results from the first five studies can be explained through a

decision difficulty, the more likely that consumer will resolve this difficulty by choosing multiple options. As a result, felt decision conflict, which is an indicator of decision difficulty, should mediate the relationship between decision order and amount chosen. We follow other researchers to measure decision conflict as the degree of felt ambivalence about the decision (Nowlis, Kahn, and Dhar 2002; Priester and Petty 1996), and test this in the next study. Also, all the prior studies focused on hypothetical decisions. In order to build more confidence in our framework, we need to examine whether the results will also hold when actual decisions are made. In order to do this, the next study measures real purchases, with participants actually buying jelly beans.

### **STUDY 6: ACTUAL PURCHASE**

Subjects were 100 undergraduate marketing students fulfilling a course requirement. In this experiment, each participant was given 50 cents in order to actually purchase some jelly beans. Each jelly bean cost one cent, so that participants could buy up to 50 jelly beans. In addition, whatever money was not spent could be kept by the participants. There were two between-subjects conditions. In one condition, participants first decided which flavors of jelly beans they wanted to buy, and then decided which brands of those flavors to purchase. In the other condition, the brand decision was made before the flavor decision. The same flavors were available for each of the brands.

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different account; namely, that the driver is more a consideration of storage capacity than attribute tradeoff difficulty. Since participants chose less overall when the size decision was first, this could mean that they simply were more likely to think about how much their home could hold, whereas when the flavor or brand decision was first, this consideration may not have been as salient. In order to more carefully examine this possible explanation, we need to look at tradeoffs where capacity is not an issue.

We found that, consistent with our prediction, participants chose a greater quantity when the flavor decision preceded the brand decision, compared to the opposite order. In particular, participants chose 18.5 jelly beans when the flavor decision was first, and 12.2 jelly beans when the brand decision was first. We tested this result with an ANOVA model, and it was significant ( $F(1, 98) = 9.92, p < .01$ ). In addition, consistent with our prediction, subjects chose more flavor variety when the flavor decision was first (0.55) than when the brand decision was first (0.41). This difference was also significant ( $F(1, 98) = 4.47, p < .05$ ). Finally, there was no difference in brand variety across the conditions (0.35 when the brand decision was first, and 0.37 when the flavor decision was first).

In sum, this study shows that decision order has an effect on the amount purchased and variety chosen when consumers make actual purchase decisions. In a follow-up study, we explicitly measured decision difficulty (involving hypothetical decisions like the first five studies). Subjects were 81 undergraduate marketing students fulfilling a course requirement. Before making their decisions, subjects were asked three questions which measured the degree to which they felt ambivalent about their decisions (Priester and Petty 1996). These questions were asked to allow us to test whether greater feelings of ambivalence led to a greater amount purchased. In particular, subjects were asked: “How indecisive are you when evaluating these products; How conflicted do you feel when evaluating these products; and, How much mixed emotion do you feel when evaluating these products?” All responses were done on an 11-point scale (e.g., 0 = feel no indecision at all, 10 = feel very indecisive).

The results show that more of the product was chosen in the flavor-brand (5.81) than in the brand-flavor condition (4.05), and this effect was significant ( $F(1, 160) = 4.30, p < .05$ ).

We also found that more flavor variety was chosen in the flavor-brand (0.40) than in the size-flavor condition (0.28), and this effect was significant, ( $F(1, 160) = 4.29, p < .05$ ). Finally, we found that feelings of ambivalence ( $\alpha = 0.90$ ) were higher in the flavor-brand condition than in the brand-flavor condition ( $F(1, 160) = 3.99, p < .05$ ). We next tested whether felt ambivalence mediated the effect of the decision order on the amount chosen. In particular, to show mediation, we must demonstrate three relationships (Baron and Kenny 1986). First, we must show that the independent variable, decision order, significantly affects the mediator, the measure of felt ambivalence. As mentioned above, this relationship was indeed significant. Second, we must show that the processing measure significantly affects the dependent variable, amount chosen. This relationship was also significant ( $F(1, 160) = 4.50, p < .05$ ). Third, we must show that the effect of decision order on amount chosen is reduced or eliminated if the processing measure is also included. This was also supported, as the effect of decision order on amount purchased is no longer significant when the processing measure is included as a variable ( $F < 1$  vs.  $F(1, 160) = 4.29, p < .05$  as mentioned above).

In all of the prior studies, respondents were required to make a decision as to how much of a particular attribute they wanted. In these situations, respondents were found to consistently choose more when they first made decisions about the less replaceable attribute. However, in these prior studies, respondents did not explicitly consider the possibility of deferring their decisions. If such an option were available, it could have a systematic effect on the quantity chosen. In particular, prior work has shown that greater tradeoff difficulty can lead to a greater likelihood of choice deferral (e.g., Dhar and Nowlis 1999). Thus, we anticipate that when the deferral option is explicitly available, the effect of decision order on quantity chosen will be

reduced because consumers can resolve a decision involving a less replaceable attribute by choosing to defer rather than choosing more. This leads to the next hypothesis.

**H4:** The ability to defer a decision will moderate the effect of decision order on the amount chosen. When the deferral option is explicitly available, the effect of decision order on the amount chosen will be reduced.

### **STUDY 7: THE MODERATING EFFECT OF THE ABILITY TO DEFER THE DECISION**

Subjects were 396 undergraduate marketing students fulfilling a course requirement. The experiment was a 2 (decision order: flavor before size, or size before flavor) X 2 (the defer option was either explicitly available or not) between-subjects design. Four product categories were tested: bagels, fruit juice, potato chips, and soda. We manipulated decision order as was done in study 3. We manipulated the explicit availability of a deferral option by either telling respondents that they could “choose none and shop elsewhere” or by not giving this option (as was done in all prior studies).

Consistent with H1a, more of the product was chosen in the flavor-size (3.21) than in the size-flavor condition (2.18). We tested this effect in the same manner we did for prior studies, and found that it was statistically significant ( $F(1, 395) = 4.18, p < .05$ ). Consistent with H1b, more flavor variety was chosen in the flavor-size (0.30) than in the size-flavor condition (0.04). This difference was tested as was done in earlier studies, and was found to be significant, ( $F(1,$

395) = 6.96,  $p < .01$ ). Furthermore, consistent with H4, the interaction between decision order and the ability to defer was significant ( $F(1, 395) = 4.77, p < .05$ ). In particular, when the ability to defer was explicitly available, there was no significant effect of decision order on either quantity chosen ( $M = 2.64$  vs.  $M = 2.51$ ) or on flavor variety chosen ( $F < 1$ ). Also, consistent with the prior studies, there were no significant differences in size variety across the conditions ( $F < 1$  for all comparisons). Finally, consistent with our logic, there was more deferral in the flavor-size condition (20%) than in the size-flavor condition (13%) ( $t = 2.5, p < 0.01$ ).

## GENERAL DISCUSSION

This research examined the effect of decision order on the amount and variety of a product that is chosen. In particular, we looked at common consumer tradeoffs among attributes such as size, flavor, and brand name, and how making one attribute decision before the other would affect the amount that is chosen. For instance, consumers can first decide which flavors they want before deciding which sizes they want, or they can first choose which sizes they want before deciding which flavors are needed. While it might be expected that decision order would have no systematic effect on amount and variety chosen, we found a systematic, robust effect. We next review our findings in more detail and consider their theoretical and marketing implications.

### Review of Findings and Theoretical Implications

We proposed that consumers would choose a greater overall amount of product and greater attribute variety when a more difficult attribute trade-off was faced in the first stage of a decision, rather than in the second stage. Furthermore, we focused on a certain dimension of decision difficulty – attribute replaceability – as that is especially relevant to the types of tradeoffs we considered in this research. An attribute is more replaceable when one level of it can be directly substituted for another level. For instance, two 8 ounce sizes can replace one 16 ounce size. An attribute is not as replaceable when each of its levels offer unique advantages and disadvantages. For instance, a cherry flavor offers characteristics that are unique compared to a coffee flavor. We found that the flavor attribute was not as replaceable as sizes, and brand names were also not as replaceable as sizes. Given that the less replaceable attribute decision was more difficult to resolve than the more replaceable attribute decision, consumers made the former decision by choosing more of it.

When a more replaceable attribute tradeoff was faced in an earlier stage, this tended to make the decision process more discriminating in the second stage. For instance, when consumers chose sizes in the first stage, they resolved this decision by choosing fewer sizes, and this increased discrimination translated into fewer flavors chosen in the second stage, and thus less overall was chosen. On the other hand, when flavors were chosen first, this was resolved by choosing more flavors, and this translated into a greater overall amount chosen when the decision was completed.

We supported our analysis of the impact of the decision process on purchase quantity through a number of complementary tests. First, we found that increasing the replaceability of the attribute in the first stage made the decision easier, which then translated into fewer overall items

chosen. We did this by either adding taste ratings to flavor decisions, making flavors more similar, or using quality ratings instead of brand names. Second, we found that our results hold for a variety of attributes that differ in their replacability, including flavors, brand names, and sizes. This allows us to generalize our findings and to rule out an explanation for our results based on specific characteristics of certain attributes rather than their general replacability. Third, we found support for the proposed process when either the first stage of the decision process determined how much was chosen in the second stage, or when it did not explicitly do so. Fourth, we found that decision difficulty mediated the effect of decision order on quantity chosen, as we anticipated. Fifth, we anticipated that difficult attribute tradeoffs can be resolved not only by choosing more, but by deferring the choice. Thus, we found that when a deferral option was explicitly available, there was a reduction in the effect of decision order on quantity chosen.

We believe that our findings contribute to theory in a number of ways. In particular, this may be one of the first papers that shows how the decision task and tradeoff difficulty can influence the amount that consumers choose. Thus, our work contributes to other research showing that preference uncertainty can have an effect on important elements of consumer decision making, such as which option is chosen (e.g., Huber, Payne, and Puto 1982). We did this by showing that decision order had a systematic effect on the amount and variety that a consumer chooses, even though normatively decision order might be expected to have no such effect.

In addition, this is one of the first papers to explicitly consider tradeoffs between flavors, brands, and sizes, despite the fact that these are very commonly considered attributes in the

marketplace. In order to examine these tradeoffs, we needed to introduce the idea of attribute replacability. While this construct is similar in nature to other constructs, we have shown how this particular aspect of decision difficulty is a driving force in understanding purchase quantity decisions. Our work also adds to knowledge about how the decision process from one stage of a decision can affect the decision process in the second stage (e.g., Dhar, Nowlis, and Sherman 1999). In particular, we find that consumers have the tendency to become more discriminating across stages, and this tendency results in fewer options being chosen in the second stage of the decision than the first stage. It might be interesting if future research considered other ways in which resolving attribute tradeoffs in the first stage of a decision could affect choices in the second stage. For instance, it could be that consumers resolving any type of tradeoff in the first stage of a decision, such as deciding which store to visit, would then be likely to choose fewer items in the second stage of the decision. This idea could be contrasted with the shopping momentum effect (Dhar, Huber, and Khan 2007), which shows how the purchase of a product in an initial stage of shopping can then influence what is purchased in a later stage.

### **Marketing Implications**

Our findings have implications for the way in which products are organized, either on shelves in a store, or on the pages that are displayed when shopping for products on the Internet. For example, one of our studies found that consumers chose more overall product when shelves were organized by sizes than when they were organized by flavors. When the products were organized by sizes, this made the tradeoff among flavors more apparent, which resulted in a

greater number of flavors chosen and a greater overall amount of product chosen. In a retail setting, products are usually organized by brands and sizes. For instance, yogurts are typically separated into brands (i.e., Yoplait, store brand, Dannon), and also into sizes (smaller sizes are placed together, as are the larger sizes). If the typical tradeoff in yogurts is around brands and flavors, this would mean that such an approach makes sense. By organizing by brands, this makes the tradeoffs between flavors more apparent, which then results in a greater overall amount chosen than if the same yogurts were organized by flavors. If the tradeoff was between brands and sizes, on the other hand, then organizing by sizes would also make sense. Thus, retailers separate out the larger versus the small sizes. While the application of our understanding of the process underlying purchase quantity decisions may make sense for the current ways in which yogurts are displayed, there are of course many other categories in a store where our understanding may be at odds with current industry practice.

Our data and theory is consistent with prior research that decision difficulty in choice can be resolved by choosing the deferral option (Dhar and Simonson 2003). Accordingly, we find that when a deferral option is explicitly provided, the effect of decision order on quantity chosen is reduced as this provides another way to resolve choice difficulty. While the deferral option is often implicitly available in many shopping situations, the actual cost of deferral may be high and hence the deferral option is unlikely to be considered in categories such as milk, bread, and other necessities. More generally, when the cost of not making a purchase is high, such purchase decisions can be considered analogous to forced choice situations as the deferral option is rarely exercised (Dhar and Simonson 2003)

Another implication of our research is that tradeoffs involving flavors, sizes, and brands differ in terms of how easy they are for consumers to resolve, which may correspondingly call for different types of information and decision aids that marketers may offer. We found that the more replaceable the attribute, the easier it was to resolve that attribute tradeoff. As a result, making that attribute decision earlier in the decision process resulted in fewer products chosen, as consumers could more readily focus on fewer options. Thus, it seems as though retailers would want to make the attribute tradeoff more difficult, as this could encourage consumers to actually purchase more. This could be accomplished by making sure that the different levels of an attribute, such as flavors, are unique (thus making them less replaceable). For example, this might encourage the retailer to try newer, more unusual flavors. In addition, our research raises the question of what might be the “natural” tradeoff order that a consumer might use. We actually tested this idea in a different study. In this study, we looked at the brand-flavor decision, and included a condition where these decisions were made simultaneously. This simultaneous decision resulted in an amount chosen that was more similar to the brand-flavor sequence (meaning less chosen) than the flavor-brand sequence. This could mean that consumers are more likely to spontaneously resolve brand names before flavors. More research is needed to consider such tradeoffs, and the impact they would have on the ways in which retailers and manufacturers manage their product lines.

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**TABLE 1**

DEGREE OF DIFFICULTY IN MAKING DIFFERENT ATTRIBUTE TRADEOFFS

Product category	Size	Flavors
Ice cream	4.62	6.38
Juice	4.38	6.53
Cookies	4.11	6.13
<b>Totals</b>	<b>4.37</b>	<b>6.35</b>

**TABLE 2**

STUDY 1 RESULTS: THE EFFECT OF DECISION ORDER ON AMOUNT AND VARIETY  
CHOSEN

	Size-flavor decision*		Flavor-size decision**	
Product category	Overall amount chosen	Flavor variety chosen	Overall amount chosen	Flavor variety chosen
Bagels	1.90	0.17	3.90	0.32
Ice cream	1.93	0.24	2.85	0.38
<b>Totals</b>	<b>1.92</b>	<b>0.20</b>	<b>3.36</b>	<b>0.35</b>

\* The size decision is made before the flavor decision

\*\* The flavor decision is made before the size decision

**TABLE 3**

STUDY 2 RESULTS: DECISION ORDER EFFECTS ARE MODERATING BY THE WAY  
ATTRIBUTES ARE DESCRIBED

	Size-flavor decision		Flavor-size decision		Flavor-size decision with taste ratings	
	Overall amount chosen	Flavor variety chosen	Overall amount chosen	Flavor variety chosen	Overall amount chosen	Flavor variety chosen
Soda	4.27	0.26	5.27	0.35	3.80	0.21
Chips	2.80	0.24	4.35	0.40	2.75	0.29
<b>Totals</b>	<b>3.54</b>	<b>0.25</b>	<b>4.81</b>	<b>0.38</b>	<b>3.28</b>	<b>0.25</b>

**TABLE 4**

STUDY 3 RESULTS: DECISION ORDER EFFECTS ARE MODERATED BY THE  
SIMILARITY OF ATTRIBUTE LEVELS

	Dissimilar flavors				Similar flavors			
	Size-flavor decision		Flavor-size decision		Size-flavor decision		Flavor-size decision	
Product category	Overall amount chosen	Flavor variety chosen	Overall amount chosen	Flavor variety chosen	Overall amount chosen	Flavor variety chosen	Overall amount chosen	Flavor variety chosen
Ice cream	2.69	0.18	4.24	0.33	2.04	0.14	2.15	0.13
Yogurt	2.96	0.11	4.71	0.24	2.65	0.11	2.56	0.11
<b>Totals</b>	<b>2.83</b>	<b>0.14</b>	<b>4.48</b>	<b>0.28</b>	<b>2.35</b>	<b>0.12</b>	<b>2.36</b>	<b>0.12</b>

**TABLE 5**

STUDY 4 RESULTS: DECISION ORDER EFFECTS ARE MODERATED BY ATTRIBUTE DESCRIPTIONS

	Brand names				Quality ratings			
	Size-brand decision		Brand-size decision		Size-quality decision		Quality-size decision	
Product category	Overall amount chosen	Brand variety chosen	Overall amount chosen	Brand variety chosen	Overall amount chosen	Quality variety chosen	Overall amount chosen	Quality variety chosen
Cookies	1.59	0.02	3.58	0.23	1.49	0.02	1.61	0.02
Soda	2.76	0.02	6.19	0.12	2.71	0.06	3.07	0.06
<b>Totals</b>	<b>2.18</b>	<b>0.02</b>	<b>4.89</b>	<b>0.17</b>	<b>2.10</b>	<b>0.04</b>	<b>2.34</b>	<b>0.04</b>

**TABLE 6**

RESULTS FROM STUDY 5: DECISION ORDER EFFECTS GENERALIZE TO SHELF  
DISPLAYS

a. Size or flavor decision comes first

	Size-flavor decision		Flavor-size decision	
Product category	Overall amount chosen	Flavor variety chosen	Overall amount chosen	Flavor variety chosen
Soda	4.22	0.17	6.16	0.29
Yogurt	3.75	0.14	5.00	0.23
<b>Totals</b>	<b>3.99</b>	<b>0.15</b>	<b>5.58</b>	<b>0.26</b>

b. Shelf organized by size or flavor

	Organized by flavors		Organized by sizes	
Product category	Overall amount chosen	Flavor variety chosen	Overall amount chosen	Flavor variety chosen
Soda	2.91	0.18	9.36	0.26
Yogurt	4.01	0.33	7.30	0.45
<b>Totals</b>	<b>3.46</b>	<b>0.25</b>	<b>8.33</b>	<b>0.35</b>

**FIGURE 1**

**EXAMPLE CATEGORY FROM STUDY 1: SIZES CHOSEN BEFORE FLAVORS**

**ICE CREAM**

Imagine that you would like to buy some ice cream at the warehouse store. The store offers three sizes, with each size offered by different brands. Which of the sizes below would you buy at that warehouse store and **how many packages of each size** would you buy? (circle the size or sizes you would buy and write in the box the number you would buy of each one).

**Available Ice Cream Sizes**

<p><b>16 oz (small)</b> (Price: 19¢ per 4 oz)</p> <p>_____</p>	<p><b>32 oz (medium)</b> (Price: 19¢ per 4 oz)</p> <p>_____</p>	<p><b>48 oz (large)</b> (Price: 19¢ per 4 oz)</p> <p>_____</p>
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Available	___ Chocolate	___ Chocolate	___ Chocolate
Flavors:	___ Strawberry	___ Strawberry	___ Strawberry
	___ Vanilla	___ Vanilla	___ Vanilla

## FIGURE 2

### THE EFFECT OF ATTRIBUTE REPLACABILITY ON QUANTITY CHOSEN

#### **A1. Situations where one attribute is more replaceable than the other**

Less replaceable attribute	More replaceable attribute	Tested
Flavors	Sizes	Studies 1, 2, 3, 5, and 7
Brand	Sizes	Study 4
Flavors	Brands	Study 6

A2. Result: Consumers choose more of the product when a decision involving the less replaceable attribute is made before the decision involving the more replaceable attribute.

#### **B1. Situations where attributes are equally replaceable**

Flavor with quantitative ratings	Sizes	Study 2
Very similar flavors	Sizes	Study 3
Quality ratings	Sizes	Study 4

B2. Result: Quantity chosen is not influenced by decision order since there are no differences in ease of replacement across attributes.

**FIGURE 3**

**EXAMPLE CATEGORY FROM STUDY 5: SHELF DISPLAYS**

**YOGURT**

Imagine that you would like to buy some yogurt at the warehouse store. The store offers three flavors and sizes, which are organized on shelves as you can see below. Which of the items below would you buy at that warehouse store and how many containers of each would you buy? (circle the item or items you would buy and write in the box the number you would buy of each one).

**Coffee**

<b>8 ounce (small)</b> (Price: 35¢/serving)  _____	<b>16 ounce (medium)</b> (Price: 35¢/serving)  _____	<b>32 ounce (large)</b> (Price: 35¢/serving)  _____
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**Mixed berries**

<b>8 ounce (small)</b> (Price: 35¢/serving)  _____	<b>16 ounce (medium)</b> (Price: 35¢/serving)  _____	<b>32 ounce (large)</b> (Price: 35¢/serving)  _____
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**Vanilla**

<b>8 ounce (small)</b> (Price: 35¢/serving)  _____	<b>16 ounce (medium)</b> (Price: 35¢/serving)  _____	<b>32 ounce (large)</b> (Price: 35¢/serving)  _____
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