A VARIETY OF EFFECTS:
HOW VARIETY ALTERS EXPERIENCE
BY INFLUENCING BOTH CHOICE AND HEDONIC VALUE

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Abstract

This paper makes a conceptual distinction between the effects of variety on choice and its effects on the hedonic value of chosen alternatives, to help explain consumers' persistent and seemingly perverse tendency to choose less-preferred items from a varied set. In particular, we show that although high-variety sets have an unfavorable effect on choice (in the sense that worse items are chosen), an item chosen from a large set is preferred to that same item chosen from a smaller set. Revisiting data previously analyzed in Ratner, Kahn, and Kahneman (1999, Experiment 5), using a model of the Heckman type (Heckman 1979), we find substantially stronger effects of variety on hedonic value than in the earlier analysis. Our re-analysis does not contradict RKK's earlier findings of a retrospective bias towards varied sequences, but suggests a specific mechanism that may underlie them: memory may favor varied sequences if it is driven by actual consumption experience, rather than choice context.

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Decision makers seem to persist in choosing less-preferred items from a set despite the apparently diminished enjoyment that results. This phenomenon, often described as variety-seeking, has been the focus of much research (Kahn and Lehmann 1991, Kahn, Ratner, and Kahneman 1997; Menon and Kahn 1995; Ratner, Kahn, and Kahneman 1999; Ratner, Novemsky, and Kahneman 1998; Read and Loewenstein 1995; Simonson 1990). Consumers often act as though they believed varied sequences are superior to repetitive ones. For example, Simonson (1990) found that subjects choosing three candy bars at once for consumption over three future occasions chose a wider variety than subjects choosing on three separate occasions for immediate consumption. Ratner, Kahn, and Kahneman (1999) investigated whether decision makers' occasional tendency to choose less-preferred items might be explained as a reaction to satiation (i.e., diminished hedonic value) on favorites due to overly-frequent consumption. Inconsistent with that explanation, they found that "more varied sequences result in *diminished* enjoyment during consumption," even though "participants did not become satiated with top-ranked songs" (p. 11). Despite this, consumers' memories were positively biased for varied sequences. Similarly, Ratner, Novemsky, and Kahneman (1998) showed a *prospective* bias in favor of varied sequences.

This paper makes a simple but telling conceptual distinction between the effects of variety on choice and its effects on judgment (i.e., assessment of the hedonic value of a choice), to help explain this paradoxical preference of consumers for variety.[1] We demonstrate that

[1] To be consistent with earlier researchers (specifically, Ratner, Kahn, and Kahneman 1999), we are concerned here with a particular form of variety, that created by a set in which each alternative appears only once. In this

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choosing from a larger (higher-variety) choice set decreases the probability that the consumer manages to choose an *a priori* favorite (as might be predicted by expected utility theory). Controlling for the effects of variety on choice, however, we find that an item chosen from a large set is preferred to that same item chosen from a smaller set. To distinguish between effects on choice and judgment, we apply a Heckman-type model to data previously collected by Ratner, Kahn, and Kahneman (1999, Experiment 5). The Heckman model accounts for the selection biases created by the effects of variety on choice by treating choice as *endogenous* (Heckman 1978, 1979; Maddala 1983), in a sense to be clarified later. RKK's experiment allowed subjects to freely choose from among either a 3-item or 6-item set of songs (manipulated within-subject) over 20 occasions, then recorded their overall liking for each song. Thus, these data allow us to investigate simultaneously the effects of variety on both choice and hedonic value, as well as how these effects change with repeated consumption.

The authors have kindly allowed us to re-analyze data from this experiment. We emphasize that our re-analysis does not conflict with these authors' earlier conclusion that subjects in their high-variety condition liked the songs they heard less than in the low-variety condition. Instead, our analysis provides a more complete explanation of why consumers might favor high-variety choice sets: although high-variety sets have an unfavorable effect on choice (in the sense that worse items are chosen), they improve the hedonic experience *given that an item has been chosen*. Thus, our model suggests one reason why consumer memory for and predictions about varied sequences might be especially positive: variety improves hedonic value even while it adversely impacts choice.

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type of set, the variety offered is equivalent to the number of items in the set. We do not address differences in variety created by multiple instantiations of the same items in a single set.

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EFFECTS OF CONTEXT ON CHOICE AND HEDONIC VALUE

A choice among alternatives implicitly references a set of predictions: in other words, a decision maker anticipates the likely utility of each alternative in an available set and chooses something that she predicts she will enjoy. Of course, she never gets a chance to fully test her predictions, because she actually *consumes* only the item that she has chosen. Thus, the value or utility of the product she chooses to consume is taken from a distribution that is "truncated"—i.e., there will be no observations below some cutoff point, because the consumer will not willfully choose a product that she believes is much worse than the rest. During the choice process, any feature of the choice set which distorts these predictions can affect the likelihood that the favorite will be chosen, by affecting the perceived position of alternatives relative to this (unobserved) cut-off point. However, these biases created by choice context may be transitory – may not endure beyond the context that created them (Brown and Carpenter 2000). Consumption, and thus the actual experience of hedonic value, happens only after one has committed to a specific choice, and may therefore be subject to a different set of biases.[2]

Thus, we discriminate here between effects of context on the processes preceding choice, which may induce a temporary perceptual bias affecting which alternative is chosen, and its effects on the hedonic value of what is finally consumed. Previous research has shown that the impact of *actual* experienced hedonic value is more enduring (in that it affects

[2] The present paper is concerned with making a conceptual and analytical distinction between context effects on choice and on judgment of hedonic value, but does not postulate a specific set of psychological processes involved. However, we offer one example of how such processes might work. If a less-preferred item is considered first, it may benefit from a focus-of-comparison effect (Dhar and Simonson 1992). Thus, a large number of alternatives should increase the chance that one begins the prediction process by considering a less-preferred item, biasing prediction of its hedonic value upward, increasing the chance that it will be chosen. During consumption, once a specific item has been committed to, the focus of comparison might switch to the consumed item.

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subsequent behavior), than mere predictions about value (Smith and Swinyard 1983). Thus, it is possible that high-variety choice sets are favored in memory because they have a positive impact on hedonic value, even though they may have a negative impact on choice.

Modeling These Effects

The statistical effects of including truncated variables in a general linear model setting are well known (Heckman 1978, 1979, Maddala 1983); coefficient estimates can be both biased and inefficient, relative to the same model calibrated on the 'full' data set (including those points excised by truncation). Since we believe that a consumer's predictions about what products will be most enjoyable (and thus her choices) are in some way systematic (rather than random), we must treat choice as *endogenous*; in other words, we must account for the fact that the prediction process underlying choice is also related to consumption ratings. If people randomly exposed themselves to products, without anticipating which they might like best beforehand, or were randomly assigned to particular products (as sometimes happens in product rating or taste-tests), choice would, by contrast, be *exogenous* — i.e., driven by something outside the consumer's control.

Consider two equations, presumed independent, one that estimates the effect of a variable on choice and another that estimates its effect on judgment of hedonic value. When both choice and judgment are driven by a common (but unobserved) prediction process, the error terms of the choice model and the judgment model may be correlated, contradicting the presumed independence of the two processes. Estimates of the effects of explanatory variables on judgment in such a case may be biased, sometimes substantially so (Puhani 2000).

To illustrate how such endogeneity can bias estimates and confound effects on choice with effects on judgment, consider an auto manufacturer assessing how adding a new option

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might affect brand attitudes. Since many features tend to increase the price of the vehicle as well, a feature which in fact has no effect on attitude — but which negatively impacts choice (through its price) — may appear to have a positive effect on attitude — *if only purchasers are surveyed* (i.e., if non-purchasers are not included in the sample). The manufacturer may then incorrectly conclude that consumers in general like the option, because only a self-selected subsample that found it most appealing was entered into the analysis.

The Heckman model simultaneously estimates both a choice and a judgment model, while correcting for endogeneity, thus allowing us to obtain de-biased estimates of the effects of variety on choice and hedonic value at the same time. We will formally state the model in the analysis section of the paper, but first address how the present data may be affected by this problem.

DATA AND EXPECTATIONS

Ratner, Kahn, and Kahneman (1999, Experiment 5) studied the effects of variety and frequency of consumption on ratings of real consumption experiences. The data consist of 20 consumption episodes for each of 59 subjects. Each subject provided real-time ratings on a 100-point scale for 12 popular songs that were presented to them through a computer program. The experiment was run in two blocks of 10 occasions each. For each occasion in the first block, subjects were presented with either a set of 3 items (ranked 1,3,6 or 2,4,7 according to subjects' prior ratings) or a set of 6 (those ranked 2,4,7,10,11,12 or 1,3,6,8,9,10), asked to choose a song, listened to the song, and then rated it on the same 100-point scale used earlier. Then, for an additional 10 occasions, subjects were presented with the other-sized choice set. Thus, each subject provided a sequence of 20 choices that varied, within subject, according to the variety available (3 or 6 different items), and (as the experiment evolved) according to the

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number of times each song had previously been heard. Table 1 provides a summary of their results for both choice frequency and hedonic value (i.e., judgment ratings) of the songs consumed.

Table 1 about here.

RKK's variety manipulation was carefully and cleverly designed: the 6-song choice sets simply extended the 3-song sets by adding in three songs that the subjects were known to dislike. The authors expected that these additional three songs would never be chosen and would not therefore affect the choice of the preferred songs; the authors included them solely to see whether they had a substantial impact on the hedonic value of the preferred songs. Despite this reasonable expectation, subjects in their experiment were considerably less likely to choose a favorite if six alternatives were available than if only three were available: while subjects choosing among three alternatives chose favorites 49.9% of the time, those choosing among six items did so only 35.3% of the time ($z = -5.202$, $p \# .001$).

This interesting and unexpected anomaly raises two issues in assessing whether variety (defined here as the number of different items available) has an impact on the hedonic value of the choice or on satiation over time. First, there is a selection bias, because the mean rating for items chosen from six vs. three was pulled down by the higher likelihood that a less-preferred item was chosen. Because of this selection bias, it will be important to model both the effects of variety on choice and its effects on judgment of hedonic value. Since both choice and judgment are driven by the consumer's unobserved prediction process, error terms for models of choice and judgment are likely to be correlated, thus providing biased estimates. Our

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analytical model, adapted from Heckman (1978, 1979; described below) will control for this bias.

Secondly, since subjects in the RKK experiment did unexpectedly choose from the bottom half of the expanded set, the variety manipulation directly affected the likelihood that subjects might over-consume, and thus satiate, on any given item. Logically, if a subject makes 10 choices with replacement from a set of three, the number of times the average item is consumed is twice as high as if the 10 choices were made from a set of six. Thus, opportunities for satiation will be greater in the low-variety condition than in the high-variety condition. (Again, this would not be a concern if subjects always chose the favorite item, but this was not the case with the RKK data.) Thus, our model will also include variables representing the frequency of previous consumption on both the likelihood of choice and current hedonic judgment.

To summarize, our objective is to demonstrate how variety affects hedonic value, while controlling for its effects on choice. Since variety (i.e., set size) will on average negatively affect the likelihood that any particular alternative will be chosen, we expect the coefficient of this variable for the choice equation to be negative and significant.[3] In contrast, we expect the effects of variety on judgment of hedonic value to be *positive* and significant, consistent with consumers' prospective and retrospective memory biases (Ratner et al 1998; Ratner et al. 1999; Zhang and Fitzsimons 1999).

Secondly, we will investigate whether the choice of less-preferred items can be attributed to the negative effects of repeated consumption on the hedonic experience favorites (i.e., satiation). Consistent with previous research on variety-seeking (Kahn, Ratner, and

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Kahneman, 1997; McAlister 1982), we anticipate satiation effects (i.e., negative effects of previous consumption) on hedonic judgment of the songs. If subjects choose less-preferred items *for the sake of variety*, there should also be a negative effect of previous consumption on the likelihood of *choice* (Kahn and Lehmann 1991). Thus, if subjects are attempting to stem satiation, the effects of previous consumption on both choice and judgment should be significant and negative. (If, instead, there is a tendency towards inertia, the effect of previous consumption choice will be positive, despite satiation effects on judgment.) Because these effects may not be constant over repeated consumption occasions, we will include both a linear and a squared term for past consumption frequency in some of our models.

ANALYSIS

Distinguishing between context effects on choice and context effects on judgment of hedonic value juxtaposes a binary choice-based criterion and an interval-scaled judgment-based one. The Heckman methodology (Heckman 1978, 1979), which provides a two-stage account of the data observation and modeling process, is particularly well-suited to this situation. The first stage accounts for item selection (i.e., choice) in the form of a binary probit model; the dependent variable, in our case, is whether or not an item is chosen. Conditional on being chosen – that is, surpassing an unobserved minimal level accounted for by the probit model – the second stage consists of an ordinary regression relating prior product ratings and contextual factors to ratings of the actual consumption experience (i.e., judgment).

More formally, the (second-stage) model for product *ratings* (i.e., quantitative assessment of hedonic value) is given by the standard linear specification:

[3] This would be true even if the assumption that the three lower-rated items were never chosen had been empirically confirmed; 3 items with 0% choice probability and 3 whose probability sum to 1 would still result in an average probability of 16.7% "per item" for the 6-item set but 33.3% for the 3-item set.

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$$\text{RATING}_i = \beta_1 \boldsymbol{X}_i + u_i \quad (1)$$

where $\boldsymbol{X}$ is a vector of explanatory variables, and the u_i are iid N[0, σ^2].

We would like to know the cutoff level below which ratings are not observed. This cutoff cannot be observed directly, though it may be estimated by distinguishing which items are chosen from those which are not. Thus, we define $\text{CHOICE}_i = 1$ if the item was chosen (and 0 otherwise), and RATING* as a subject's predicted (but unobserved) rating for an item, relative to other alternatives, created during the choice process. The (first-stage) selection model estimates the "cutoff" level required for choice, RATING_i*, through the probit specification:

$$\text{RATING}_i^* = \gamma' \boldsymbol{Z}_i + \varepsilon_i \quad (2)$$

$$\text{CHOICE}_i = 1 \text{ if } \text{RATING}_i^* > 0; \text{ 0 otherwise}$$

where $\boldsymbol{Z}_i$ is a vector of explanatory variables and $\varepsilon \sim N(0,1)$.[4].

We are searching for effects of variety and status as *a priori* favorite on the likelihood of an item being chosen, and (in parallel) on the hedonic experience of it *once it is chosen*. We expect that these relationships may change over the course of the experiment, as subjects have the opportunity to satiate on frequently-chosen items. Explanatory variables thus include "VARIETY" (defined as the number of items available—either 3 or 6); "FAVORITE" (a dummy variable indicating whether or not an item was the best available to the subject);

[4] Note that $\boldsymbol{Z}_i$, the vector of predictors of choice, is conceptually distinct from $\boldsymbol{X}_I$, the vector of predictors of ratings. In practice, the two sets of predictors may overlap. Note also that there may be unobservable characteristics that influence both choice and ratings but are not included in $\boldsymbol{X}_I$ or $\boldsymbol{Z}_i$. The correlation of the error terms of the two equations is given by corr(u, ε) = ρ. If $\rho = 0$, the selection and evaluation processes are statistically unrelated. In this case, there would be no evidence of choice endogeneity, and the Heckman approach would be unnecessary. Furthermore, to estimate equation (2) we must have observations on $\boldsymbol{Z}$ for unchosen as well as chosen items (i.e., even though we do not have the dependent variable "rating," we must have the independent variables in $\boldsymbol{Z}$ for all items). Strictly speaking, this means our model is not "truncated" but "dummy endogenous" in the terminology of Maddala (1983) or Heckman (1978).

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"FREQUENCY" (the number of times a particular item was previously consumed), and "FREQ2" (the square of the frequency variable). In addition, the prior rating of the song is included as a control variable in the judgment equation (2). Finally, because we have repeated observations per subject, the model is estimated with robust standard errors (Huber 1967), which allows for error terms to be correlated within subjects, but independent across subjects.

RESULTS

Table 2 shows results of three slightly different specifications, which we will refer to as Models A, B, and C.[5] The first, Model A, includes only the independent variables relating to the effects of prior preference and variety (in terms of set of available set) in both the choice and judgment equations. As expected, we found that status as the best available item has a positive impact on choice ($z = 3.486$, $p \# .001$), while a larger available variety (i.e., 6 versus 3) has a negative impact on choice ($z = -27.963$, $p \# .001$). Once these effects are accounted for, there is still a large positive effect of variety on hedonic value, such that a subject choosing a particular song (with a given prior rating) from a set of 6 rated it more than 12 points higher (on a 100-point scale) than if the same song was chosen from a set of only 3 (increased set size of 3 x coefficient of 4.02 = 12.06; $z = -5.153$, $p \# .001$).

Table 2 about here.

It is possible that prior consumption will mediate the effect of variety on hedonic value. That is, because the mean frequency for songs (averaged over all songs) under the high-variety

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condition was necessarily less than under the low-variety condition, songs in the high-variety condition might reach the satiation point (i.e., maximum hedonic value) more slowly, inflating their ratings. Thus, Model B includes the variable relating to prior consumption (FREQUENCY) to determine both the direct effects of past consumption and to test for mediation. Model C further includes the squared frequency term (FREQ2) to test for non-linear effects of previous consumption.

Results of Model B, which includes only the simple linear effects of frequency, show a positive effect of previous consumption on choice ($z = 6.111$, $p \# .001$), suggesting significant inertia over the course of the experiment. In contrast, the effects of previous consumption on judgment were negative ($z = -2.218$, $p \# .001$), consistent with satiation. The effects of variety on judgment were not mediated; they are still significantly positive ($z = 5.399$, $p \# .000$). Thus, the effect of variety on judgment is not mediated by the likelihood of satiating earlier in the experiment because there are fewer alternatives to choose from.

Model C includes the squared term for past consumption (FREQ2), allowing for the possibility of various U-shaped and 'accelerating' relationships. Results for this model suggest past consumption effects do not set in immediately; a single repetition does not significantly affect either choice or judgment, but further repetitions affect *both*. Model C shows an accelerating positive effect of previous consumption on choice (a non-significant effect of the frequency variable ($z = -0.974$. $p \# .330$) but a significant positive effect of its squared term ($z = 3.766$, $p \# .001$)). Thus, for these data, there was no evidence for variety-seeking at the level of choice, in the sense that subjects were at no point significantly less

[5] Note that the estimates for ρ are significant for all three models presented in Table 2, suggesting the presence of significant endogeneity and confirming the appropriateness of the Heckman model.

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likely to choose an item if they had chosen it before. Instead, subjects showed a tendency towards inertia as the experiment continued.

The judgment equation in Model C suggests that satiation sets in rather quickly: there is an adverse effect of previous consumption on choice beginning with the second hearing of each song (a non-significant positive effect of the frequency variable ($z = 1.645$, $p \# .100$) but a significant *negative* effect of its squared term ($z = -3.605$, $p \# .001$)). Ratings are maximized between the first and second repetition (at approximately 1.34 times heard previously; see Figure 1); thus, after hearing a song a second time (i.e., times previously consumed = 1), subjects' ratings for that song declined. The effects of prior consumption did not in fact mediate the effects of variety on judgment, which are still positive and significant ($z = 5.236$, $p \# .001$). Thus, even controlling for its effects on past consumption, people still report higher hedonic value for items chosen from a larger set.

Figure 1 illustrates the relationships estimated in Model B between consumption history, choice, and post-choice judgment, making it easy to see the paradoxical relationship between choice and judgment. Although judgment declines after the first hearing, the probability of choosing a song increases with repeated hearings throughout the experiment.[6]

Figure 1 about here.

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[6] A common problem for any bounded scale is that it is possible to predict out of range. We have also run more complex models to resolve this problem. Similar in form to the Heckman, our revised models combine a probit choice model to an ordered-probit judgment model (current authors, 2000). Results are consistent with what are shown here, and may be obtained from the authors.

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DISCUSSION

This paper's primary objective has been to distinguish between the impact of variety and repeated consumption on choice and their impact on judgment of hedonic value. This conceptual distinction suggested an underutilized analytical approach – a Heckman model – to allow choice to be treated as endogenous (Heckman 1979). Our results confirm Ratner, Kahn, and Kahneman's (1999) earlier finding that variety reduced the total utility experienced over the course of their experiment. Similarly, neither their analysis nor ours supports the notion that subjects sought variety in order to stem satiation on their favorite items.

However, our results suggest two conclusions not obtainable from the earlier published analysis: We show a significant positive impact of variety on the hedonic value of songs *while controlling for its effects on choice.* Decision makers selecting a song from a high-variety set report superior hedonic utility for that song versus choosing *that same song* from a low-variety set. Secondly, our analysis suggests there is very little variety "seeking" in the data at all — at least in the sense that subjects' choices suggest an attempt to avoid repeated consumption. Instead, our analysis indicates a pronounced degree of inertia in choice, *despite* satiation due to previous consumption: decision makers whose choice behavior became habitual eventually found their hedonic experience of these frequently-consumed items reduced through satiation. The essential positive effect of variety on judgment is not driven by the reduced likelihood of satiating early in the experiment; rather, there appears to be a *direct* effect of high variety, improving the hedonic value of items chosen from a larger set.

Our distinction between effects of context on choice and its direct effects on hedonic value suggests one reason why consumers might both remember and anticipate varied sequences fondly: variety improves hedonic value *despite its adverse effect on choice*. This in

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turn suggests a specific explanation for prospective and retrospective memory biases in favor of variety: context effects on choice may be largely transitory, whereas context effects on actual consumption experience may have a significant impact on memory. We may remember experiences more favorably if chosen from a varied set, and thus may seek them out in the future, without recognizing or acknowledging that the risks a varied set imposes on choice.

In sum, people achieved lower hedonic utility in the high-variety than in the low-variety condition because the former induced them to make much poorer choices. In fact, most subjects in the high-variety condition (38 out of 59, or 63%) chose the *worst* available item at some point. However, our results suggest a novel explanation for this finding. Subjects do not appear to be seeking variety in a misguided attempt to stem satiation. Instead, the mere presence of low-ranking alternatives seems to induce trial, as though the sheer clutter created by a high-variety set had drawn subjects' attention away from favorites. In other words, people do not seem to be so much "seeking" variety as being distracted by it.

Paradoxically, although low variety (in the sense of a set restricted to the highest-value alternatives) precludes the decision maker from making the worst choices, it appears to limit the hedonic value of those better choices. This suggests that there may be some "happy medium" for consumers, in which they chose from a high-variety set but avoid wading into the deep end of its distribution. For example, the average song rating for subjects in the high-variety condition who chose only from among the 1^{st}, 2^{nd}, 3^{rd}, or 4^{th} -best available songs (but never the 5^{th} or 6^{th}) was 74.6, whereas the average rating for subjects in the low-variety condition (who could only choose 1^{st}, 2^{nd}, or 3^{rd}) was 71.6. Although this difference is not statistically significant, it nevertheless suggests that consumers who can limit themselves to a

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modest amount of variety-seeking are able at least to make its salutary effects on judgment compensate for its adverse effects on choice.

Ironically, subjects seem happiest when choosing from a set with some weak items that are never, in fact, chosen. Perhaps some form of contrast to items concurrently presented but not chosen improves hedonic judgment of the chosen item. Or perhaps it is simply and directly more pleasant or more stimulating to choose from a moderately large set than a limited small one (Kahn and Lehman 1991; Menon and Kahn 1995). Additional research must be undertaken to determine which of these explanations is the more compelling, and under what circumstances.

The results described here involve only a modest manipulation of set size, from three to six items. It may be that these effects of variety on choice, judgment, and satiation do not extend to still larger sets. It seems likely that decision makers find extremely large choice sets taxing and perhaps distasteful (Iyengar and Lepper 2001; Payne, Bettman, and Johnson 1993). In any case, the effects of variety on hedonic utility, although complex, merit further attention from both a theoretical and empirical vantage point.

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TABLE 1
DESCRIPTIVE RESULTS FROM RATNER, KAHN, & KAHNEMAN 1999
Experiment 5

	Low Variety		High Variety	
Rank of Song	% Choices	Avg. Rating	% Choices	Avg. Rating
Song 1	49.9%	81.38	35.3%	82.18
Song 2	29.2%	63.85	25.8%	68.27
Song 3	20.9%	39.07	16.0%	41.67
Song 4			8.7%	29.33
Song 5			7.5%	19.49
Song 6			6.7%	19.46

NOTE.—Song numbers refer to the rank of the song within the choice set (i.e., song 1 = the top-ranked song available in the choice set, song 6 = the bottom-ranked song in the choice set.). A traditional ANOVA analysis of mean ratings for the high vs. low-variety conditions does not uncover any significant effect of variety on ratings.

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TABLE 2
SIMULTANEOUS MODELING OF SELECTION AND JUDGMENT EFFECTS

	Model 1			Model 2			Model 3		
	Coef. *(Std. Err.)*	Z-Score *(p#)*		Coef. *(Std. Err.)*	Z-Score *(p#)*		Coef. *(Std. Err.)*	Z-Score *(p#)*	
Judgment									
Prior Rating	.507	7.451	**	.514	7.940	**	.519	7.847	**
	(.068)	*(.000)*		*(.065)*	*(.000)*		*(.066)*	*(.000)*	
Variety	4.020	5.153	**	3.642	5.399	**	3.712	5.238	**
	(.780)	*(.000)*		*(.675)*	*(.000)*		*(.709)*	*(.000)*	
Past Frequency	---	---		-2.218	-2.218	*	2.713	1.645	
				(1.000)	*(.027)*		*(1.649)*	*(.100)*	
Freq. Squared	---	---		---	---		-1.006	*-3.605*	**
							(.279)	*(.000)*	
Constant	58.134	7.411	**	62.959	7.528		58.76	6.821	**
	(7.845)	*(.000)*		*(8.364)*	*(.000)*		(.279)	*(.000)*	
Choice									
Favorite	.301	3.486	**	.190	3.194	**	.211	*3.097*	**
	(.086)	*(.000)*		*(.059)*	*(.001)*		*(.068)*	*(.002)*	
Variety	-.160	-27.963	**	-.131	-14.967	**	-.135	-14.356	**
	(.006)	*(.000)*		*(.009)*	*(.000)*		*(.009)*	*(.000)*	
Past Frequency	---	---		.139	6.111	**	-.059	-.974	
				(.023)	*(.000)*		*(1.649)*	*(.330)*	
Freq. Squared	---	---		---	---		.046	3.766	**
							(.012)	*(.000)*	
Constant	-.063	1.421		-.334	-4.821	**	-.231	-2.844	**
	(.044)	*(.155)*		*(.069)*	*(.000)*		*(.081)*	*(.000)*	
rho		-.957			-.967			-.963	
Wald test (rho=0); χ^2		60.99	**		86.99	**		61.67	**
		(.000)			*(.000)*			*(.000)*	
Log likelihood of the model		-7775.093			-7723.352			-7704.152	

NOTE - ***** indicates significance at the .05 level; ** at the .01 level. Model 2 is significantly superior to Model 1 (χ^2 =85.482, p#.001); Model 3 is significantly superior to Model 2 (χ^2 = 38.40, p#001). Model 3 is also superior to models that omit the quadratic term from either the choice *or* selection model, but not both; these models are not reported here but are available from the authors.

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FIGURE 1
EFFECTS OF REPEATED CONSUMPTION ON CHOICE AND JUDGMENT