

Bundling and Simultaneity Effects on Variety Seeking for Consumable and Digital Goods

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Abstract

A preference for greater variety when selecting consumable goods as bundles in simultaneous choice rather than as a sequential series of individual decisions is a consistent result in prior literature. However, digital goods (e.g., music) have a number of important differences from consumable goods (e.g., candy). We address two general research questions. First, we disentangle the role of selecting bundles from the role of simultaneity vs. sequential choice as factors in variety seeking with consumable goods. Second, we discuss the differences between digital and consumable goods and investigate whether variety seeking diminishes for choices of digital goods as hypothesized. Results both clarify the conditions for variety seeking for consumable goods and identify reductions in the behavior with digital goods.

Keywords: variety seeking; digital goods; bundled goods; simultaneous choice

Introduction

Although decision research has usually focused on preferences over individual options, in many situations consumers purchase products (goods or services) as a single group or bundle that they customize. One consistent result is a consumer preference for greater variety when selecting multiple items at once, as opposed to when making a series of related decisions about individual items. For example, when buying multiple packages of yogurt at the grocery store, consumers may purchase more different flavors, as opposed to purchasing yogurt daily at a retail store on separate days, where less variety in the item selection occurs (cf. Simonson & Winer, 1992).

Most of the research, including the yogurt example, involves consumable goods often being consumed within the study session, e.g., selecting candy bars (Fox, Ratner, & Lieb, 2005; Ratner & Kahn, 2002; Read & Loewenstein, 1995). There is good reason to believe that the preference for variety does not necessarily extend to digital goods like music. A digital good is a product or service that centrally utilizes information that can be encoded as a stream of bits (Shapiro & Varian, 1999). Such goods have unique characteristics compared to physical goods that impact economic performance and consumer behavior. Music is not purchased and consumed in the same way as food. In particular, unlike physical goods, digital goods have negligible marginal costs of reproduction. As a consequence, once purchased singly or in a bundle, a song can be rearranged multiple times with other songs in any combination with no loss in quality. Thus, the bundle itself is flexible and not a static entity. Anticipation of this may well have behavioral impacts not present with other goods. Our research examines the bundling of digital goods as an extension to prior work with bundling physical, consumable goods, e.g.,

snacks and other food products. Specifically, this paper analyzes consumer behavior with respect to choosing music bundles.

In light of the past research with consumable goods and their differences with digital goods, our research is aimed primarily at examining consumers' behavior in the creation of customized bundles of digital goods. While doing so, we also aim to untangle a distinction, even with consumable goods, that has been confounded in the discussion of variety-seeking research. The two factors that need to be disentangled are the simultaneity of the choice (vs. sequential choice) and the bundling (or not) of the choice goods. For example, with music, a consumer may buy several songs at once, or buy single songs individually in succession (simultaneous vs. sequential choice). As a second dimension, the consumer can buy songs as a bundle (e.g., to be burned to a CD that comprises a physical unit) or in non-bundled fashion (as digital files added to one's music collection with no enduring connection among them). Past research with consumable goods has largely focused on simultaneous vs. sequential choice while sometimes being loose about whether bundling was involved or being held fixed. Our study purposefully separates these two factors both for choices of digital and, for comparison, consumable goods.

Specifically, in this study we address the following general research questions: *(1) For consumable goods, how do simultaneity and bundling co-contribute to variety seeking? (2) Does variety-seeking behavior extend to the selection of digital goods?* We conducted this research using songs as the digital products and candy as the consumable goods to be bundled, and measures of variety in the custom bundles were the primary dependent variables. For example, a bundle of ten songs all from the same artist would be considered less variable than a bundle with different artists. The specific measures are detailed in the Methods section.

The remainder of the paper proceeds as follows. In the next section we provide the background for the current research, including research on variety seeking, reasons for the behavior, and differences between digital and other goods that suggest potentially different behavior for digital goods. The research hypotheses arising from this background are then presented. The next two sections describe the study methodology and the results, respectively. Finally, we conclude with a general discussion, identifying the study's contributions and implications.

Background

In the post-war 1950s, music found its way to the cultural and technological forefront with the advent of mass-producible vinyl records. These became commonly available in formats offering non-bundled songs (45s) and bundled songs (long-playing record). The later introduction of quality audio cassette tapes offered another option to the general public: an easy and affordable home-recording capability that introduced to the consumer the ability to create customized bundles of songs for their own use. With the advent of digital technology, new possibilities of production and distribution have arisen, offering new avenues for single songs, pre-packaged music bundles, and customized music bundles, along with bundles of music with other digital products, e.g., packaging music with digital photos or video. With audio cassettes, the consumer could repackage songs that already had been purchased into different bundles of songs, at home. Digital technology also creates the ability to do custom bundling of music at the retail level.

In this context, unique features of digital goods raise some interesting issues and situations for the study of product bundling. In general we follow Stremersch and Tellis (2002) in defining *bundling*, or equivalently for our purposes *product bundling*, as the sale of separate

products (goods or services) as a single package. More specifically, we can differentiate between seller-driven and buyer-driven bundling. In seller-driven bundling, the seller creates the bundle. From the seller's economic perspective, the value of bundling has been studied extensively showing the benefits of bundling in a variety of conditions (e.g., Eppen, 1991; McAfee, McMillan, & Whinston, 1989; Salinger, 1995; Schmalensee, 1984; Stigler, 1963). Stremersch and Tellis provide a recent review including economic analyses to identify conditions under which bundling is an optimal strategy. Our interest is upon buyer-driven bundling, i.e., customization. The situation is one where the consumer is able to put together multiple items at a single point and time of sale.

More to the point, we recognize that digital information goods have unique features (Shapiro & Varian, 1999) that may impact the effects of customized bundling. For example, digital goods can be distributed with no physical product involved. This in turn leads to their having low or no marginal cost of production, which changes the economics of bundling as has been recognized. For example on the seller-bundling side, Bakos and Brynjolfsson (1999) showed that low marginal costs allow digital goods producers to achieve greater profits by taking advantage of the “predictive value of bundling,” and Hitt and Chen (2005) modeled pricing strategies for customized bundles of digital goods. However, the economic analyses, by focusing on the seller's perspective, leave open the need for better understanding of the buyers' psychology in creating bundles. Our research is directed generally at understanding buyers' behavior in the bundling of digital goods, specifically music as a digital information good. How does behavior that has been identified with physical goods translate to the bundling of music as a digital good? As a foundation, we frame the proposed research within the general area of consumer behavior with product bundles, drawing upon the marketing and decision literatures.

Variety Seeking with Consumable Goods

Most choice research has addressed the single choice situation: Pick 1 of n possible alternatives. In choice, ideally the consumer is trying to identify the most preferred, or optimal, selection. However, many situations exist in which the consumer is instead choosing a subset of items: Pick k of n , where $k < n$. In that the consumer sees a relationship among the items within a subset, the decision situation becomes more of a design task, in which the decision maker has a goal of putting together the best combination, in contrast to the more-studied choice task, in which the goal is identifying the best single item (Yates, 2003).

In the situation of choosing a bundle of items, Farquhar and Rao (1976) modeled choice by including a factor that is sensitive to the heterogeneity among the k elements in the subset. This general idea, i.e., that consumers are sensitive to the variety among elements in a product bundle while forming the choice set, has generally been verified in a number of situations (see reviews by McAlister & Pessemier, 1982, and Kahn, 1995), including real-world settings: Simonson and Winer (1992) found this very pattern using scanner data of consumers' purchases of yogurt items of various flavors.

This behavior of variety seeking has been a defining feature of the research on buyers' product bundling decisions. Although not extensive, the behavioral literature on product bundling has explored variety seeking in several different contexts, effectively applying different definitions of what comprises "product bundling." To place the current research within this landscape, the approaches are differentiated by the primary dimension over which bundling is defined, as discussed below.

One class of studies looks at choosing among alternatives that are defined by multiple attributes, framing multidimensional options as bundled products. Hsee, Blount, Loewenstein,

and Bazerman (1999) and Johnson, Herrmann, and Bauer (1999) exemplify this approach. They conceptualized a product, like an automobile, as a bundle of attributes, e.g., various extras that can be packaged with the car. Taking this view, they demonstrated preference reversals depending on whether the multi-attribute options were evaluated together or singly.

A second type of product bundling involves multiple products. The products may be complementary (e.g., a VCR and tapes) or unrelated (e.g., a typewriter and calculator). Gaeth, Levin, Chakraborty, and Levin (1990) found that the pricing of bundles, relative to the individual items, might be subadditive or superadditive depending on the quality of the bundled items. Yadav (1994) found similar results, tying these to a processing explanation involving a strategy of anchoring the evaluation on one of the products and adjusting the evaluation based on the other products in the bundle.

A third type of bundling study looks at consumption of products within a single category over a specified time period (e.g., choices of snacks to eat over successive days). Two key aspects of these studies are the temporal component and the actual consumption of the products within the period of the study's design. Ratner, Kahn, and Kahneman (1999) employed an interesting design in which real-time evaluations were made during consumption. For example, one of their studies used 45-second music clips. Participants evaluated either the same favored clip while repeating it 15 times, or a mixed block containing 11 repetitions of the favored clip intermixed with 4 repetitions of the least favored clip. Despite the inclusion of the least favored music, they found that evaluations declined more slowly with the mixed bundle. Read, Loewenstein, and Kalyanaraman (1999) found a similar effect of preferring variation over time with students selecting and watching movies, as did Read and Loewenstein (1995) using snacks consumed over successive days.

Also noteworthy are two other studies in this category involving choices of music.

Brickman and D'Amato (1975) offered participants a simple jukebox of 8 initially novel musical selections that they could hear in a single session over 40 trials. Participants initially showed a lot of variety in their choices. They were sampling all the songs to see which they liked, choosing variety for information gathering. Later, stimulus repetitions were more frequent, but only those repetitions in which other stimuli were allowed to intervene rather than immediate repetitions, e.g. listening to two favored songs in alternation (ABAB), rather than grouped (AABB), and rather than four different songs (ABCD). Thus, in this setting the consumers exhibited variety seeking with two separate motivations: first for information gathering, and second for other purposes. Similarly, Read, Antonides, van den Ouden and Trienekens (2001) compared preferences between simultaneous and sequential choice of two songs for immediate listening, finding greater variety in the sequential choice condition.

These first three forms of defining bundles are mainly included here as contrast. The fourth definition is that which corresponds to the bundling of the current research. In this fourth setup, product bundles consist of multiple items from within a single category; however, unlike the third case, the consumption does not occur wholly within the study period. Still, the observation of variety seeking does appear in the fourth approach. One consequence of this variety seeking behavior is a systematic difference between sequential and simultaneous choice, which also has been studied in the third case where there is immediate consumption (e.g., Read et al. 2001). The contrast between sequential and simultaneous choice has been an active area of research on bundling. A clever naturalistic study demonstrating the effect was conducted by Read and Loewenstein (1995) on Halloween night. Some children who were trick-or-treating were offered two candy bars that they selected at a single house (simultaneous choice), while

others were offered one candy bar from each of two adjacent houses (sequential choice). Of interest was how often the children selected two instances of the same candy bars. Children in the simultaneous choice condition were more likely to choose two different candy bars than those in the sequential choice condition, showing more variety in simultaneous choice.

Simonson (1990) found similar results with adults making sequential and simultaneous choices, both hypothetical and real, within other consumable product categories.

Why Seek Variety?

In addition to identifying variety seeking, researchers have also considered explanations for it (cf. Ratner & Kahn, 2002, for a general review of these motivations). We exclude variety that is driven by external forces from changes in the choice situation leading to different preferences/behavior (e.g., preferences changing as the result of parenthood with its new accompanying perspectives). Internally, several explanations have been advanced and are likely to be operative depending on the situation. McAlister and Pessemier (1982) distinguished between intrapersonal and interpersonal motivations. The intrapersonal motivations include: desire for stimulation, protection against satiation, and acquisition of information. Thus, variety can be sought because consumers see value in having a variety of experiences; they just like to try different things. Or, the consumer recognizes from past experience that repeated consumption of the same product leads to reduced marginal pleasure over time. Listening to a favored song again and again and again eventually loses its appeal. To protect against this satiation, the consumer can purposefully reduce the opportunity for repetition by selecting variety. Finally, where uncertainty of preference about the products is present, variety can be used as an information-gathering strategy. If consumers are uncertain about what they will want tomorrow, choosing a variety now gives them options tomorrow. Simonson (1990) and Kahn

(1995) similarly targeted preference uncertainty as a factor that influences variety seeking. The uncertainty may be due to a lack of current information or from the belief that one's preferences may change over time. In the face of such uncertainty, having a variety of items, in addition to allowing information gathering, also lessens the possibility of having no preferred options in the future. Variety seeking thus provides safety against having all non-preferred items.

Relatedly, Simonson (1990) tied the intrapersonal motivation of uncertainty to occasions when time and effort are of concern. In this scenario, the consumer uses variety as a way of postponing the decision to save time and effort in the present. Again, this is only expected where preference uncertainty exists. Chernev (2006) provided support for this motivation by showing that consumers prefer to choose from larger assortments. For example, in one of their studies, a predominant preference was shown for choosing snacks from a vending machine containing 36 snacks rather than 6 snacks. Maintaining a larger choice set postpones the final decision until later.

The second set of motives identified by McAlister and Pessemier (1982) were interpersonal motivations. An aspect of interpersonal motives is their cultural dependency. Kim and Drolet (2003) found evidence for the application of two culturally-bound assumptions that would lead to variety seeking: that choice is a form of self-expression and that uniqueness is good. The first of these coincides with McAlister & Pessemier's proposal of a desire for social distinctiveness that can operate versus a counteracting desire to follow the behavior of peers. These assumptions are expected to be more prevalent in explicitly social settings. Ariely and Levav (2000) provide a verification of this in an analysis of lunch orders at a Chinese restaurant in the US. The data showed more variability within a table than would be expected by chance, supporting the operation of self-expression motives in a social setting. ("You're ordering the

shrimp? Ok, I'll get something else.”) They found a similar pattern for beer and wine choices in two additional studies. Since our research is focused on individual choice in a non-group setting, such dynamics are likely to be minimized.

Variety Seeking with Digital Goods

How does the behavior of variety seeking translate into the digital domain? Specifically, given these explanations, what is the expected behavior in terms of variety seeking for digital goods, such as music? The traditional music bundle is represented by a pre-packaged album, typically either a bundle of songs by a single artist—put together by the artist, producer, and/or record company—or a compilation organized around a given theme as put together by a record company.

Unlike the products used in prior work on variety seeking with bundles, music is not consumed in the same sense. Although several studies, cited earlier, used music as the focal product, in each case the selections were heard during the study and not for later use. Recall the distinction made earlier between bundle selection for immediate consumption and for potentially later use. The standard paradigm for selecting digital goods is the latter, and this is the focus of our study. In this, the selection of consumable goods (e.g., candy) that are not limited to immediate consumption form the most direct comparison (e.g., Read & Loewenstein's, 1995, Halloween study described earlier in which children would not generally be immediately eating the candy they select). Previous studies using music are ones in which the deciders are not so much selecting songs (as they would in the marketplace) as they are selecting among experiences of listening to songs. These experiences are actually more akin to consumable goods since the experiences of listening are “consumed” immediately. In real-world situations, however, music is often purchased for later use, not immediate use, and intended for multiple uses.

Also, with a digital product, use and reuse lead to no necessary degradation in the product. Consequently multiple versions of the same identical product generally need not be purchased as is the

case with consumable goods. A consumer might well buy two cans of the exact same brand, flavor and size of yogurt, even within a single bundle; but, the consumer is unlikely to buy two exact copies of the same song, especially within a single bundle. For music bundles, whether customized or prepackaged, non-identical songs are selected (contrast the studies described above by Brickman & D'Amato, 1975, and Read et al., 2001). Since the purchase of multiple instances of the identical product is not necessary with digital goods, the motivation of variety seeking as a desire for stimulation is expected to be reduced with music.

Another oft-mentioned characteristic, that has been shown to have an impact on bundling in economic analyses, is the negligible marginal costs of reproducing and transferring digital goods. One consequence is the flexibility in packaging and repackaging of the product that is facilitated. Once purchased singly or in a bundle, a song can be rearranged with other songs in any combination numerous times with no loss in quality. Thus, the bundle itself is not a static entity. Anticipation of this may well have behavioral impacts not present with other goods. Another consequence of negligible marginal costs is the viability of offering uncertainty-reducing strategies available at low cost. Music sampling is prevalent as an uncertainty-reducing measure that can be easily enabled for music as a digital good. We would expect consumers to take advantage of commonly available music sampling and that providing this information would impact music preferences. Consequently, seeking variability as a means of acquiring information is lessened as a motivation. The availability of sampling might also lessen the consumer's preference uncertainty, reducing this motivation for variety seeking.

Research Hypotheses

The current research is aimed at understanding consumers' behaviors in the creation of bundles of consumable and digital goods. Specifically, we are interested in answering the questions: *(1) For consumable goods, how do simultaneity and bundling co-contribute to variety seeking? (2) Does*

variety-seeking behavior extend to the selection of digital goods? We used music files (songs) as the digital products to be examined, and candy as the consumable good for comparison. We provide the specific hypotheses for the candy and music tasks below.

Candy Task

For the candy task, variety is measured using the number of different items selected within the choice set. A 2 x 2 between-subjects design is employed. The two factors are the timing of the choices (i.e., simultaneous or sequential) and the bundling of the chosen set (i.e., bundled or non-bundled). In the simultaneous conditions, the candy selections for a bundle are made from a single display screen, all at once. In the sequential conditions, candy is selected from the same display, but one at a time with a time lag between each choice. For the latter factor, for bundled choice, the participants received all of their choices at the end of the study. For non-bundled choice, the participants received one random item from among those selected. The primary goal here was to disentangle these two factors to observe their separate effects on variety seeking for consumable goods. Previous research has not framed these as separate dimensions and has often confounded them in discussions and studies. As hypotheses, we propose effects for each of the two factors:

H1: For consumable goods, greater variety will be selected when choice is simultaneous compared to when it is sequential.

H2: For consumable goods, greater variety will be selected when choice is bundled compared to unbundled.

Music Task

Measures of variety in the set of products chosen are the primary dependent variables. For music, we look at variety across the standard dimensions by which music is categorized. These include variability in the number of genres, artists, and albums included in the music set. For example, a bundle

of ten songs all from the same artist would be considered less variable than a bundle with four different artists. Additionally, consumers' music preferences can be used to measure variety. We obtain a partial ranking of the music from which the participants make their selections. The ranking creates a numerical measure of preference. With respect to the preference measure, variety in the music bundle is manifest as greater selection of less-preferred songs, i.e., a higher mean rank.

As to the experimental design, for the music task a third factor is added to the design of the candy task and a $2 \times 2 \times 2$ between-subjects design is employed. The first factor is the timing of the choices: simultaneous or sequential, manipulated similarly as in the candy study. As mentioned earlier, prior research has shown that simultaneous and sequential choice tasks result in different variety-seeking behaviors for consumable goods. This factor provides a test of the extent to which this effect extends to the digital goods setting.

The second factor is bundling of the chosen set, either bundled or non-bundled. Levels of this factor are selected to correspond with real-world analogs for greater fidelity of the experimental setup. In the bundled conditions, the participant selects songs that would be burned to a CD, thus being received as a combined set of songs as a physical bundle. In the non-bundled conditions, the songs would be received as digital files added to the person's music library, having no physical connection among them. As noted, prior research has been somewhat loose about this factor in studying preferences for consumable goods. We untangle this factor in the portion of our study dealing with consumable goods (H1 and H2), and include the factor to study the parallel behavior with digital goods. Due to the characteristics of digital goods outlined earlier and particularly for non-bundled choice, we expect there to be little or no difference between the song sets between simultaneous and sequential choice, in opposition to the usual finding of a difference for consumable goods. Whether a difference is observed for bundled choice depends upon the degree to which immediate consumption is the driver for variety-seeking differences between sequential and simultaneous selection tasks. At the minimum, we

would expect the difference between sequential and simultaneous choice to be no greater when choice is non-bundled than when bundled.

These predictions lead to the following hypotheses:

H3: For digital goods, greater or equal variety will be observed in the bundled tasks compared to the non-bundled choice tasks.

H4: For digital goods, in the bundled tasks, there will be greater or equal variety in the simultaneous tasks compared to the sequential choice tasks.

H5: For digital goods, in the non-bundled tasks, there will be little or no difference in variety between the sequential and simultaneous choice tasks.

The third factor we manipulate is the number of songs the participant selects: 5 or 10. A smaller set of songs (five) is much less than what would constitute a standard music bundle (i.e., an album). With a small number of songs, the consumer is more likely to see the task as selecting songs for later repackaging, and less likely to see this as a bundle for future use, even in the bundled conditions.

Specifically, this leads to the hypothesis:

H6: For digital goods, the differences in variety preference (from H3-H5) will be greater with the larger song set.

Methodology

Participants

Participants were primarily students who were recruited using solicitations made in classes, posted on campus, and advertised in an undergraduate weekly electronic newsletter. Participants responded individually in a computer lab setting using a computer-based experimental interface. A total of 219 participated in the study. Of these, 200 respondents provided useable data for the music study,

approximately evenly distributed across the 8 experimental groups (varying from 24 to 27 per group).¹

The sample size for the candy study was 159 with 39-40 participants per each of the four conditions of the study. The remaining 60 respondents participated in an alternate, pilot version of the candy study not pertaining to this paper.

Procedure

Following consent and initial instructions on starting and using the program, participants first engaged in the music study. The database for the music study, from which stimuli were selected for use in the study, consisted of all songs from 64 albums; albums were selected that contained at least ten songs. The albums were from 4 genres: Country, Rock, Rap/Hip Hop, and Pop. There were eight artists/bands available within each genre and 2 albums for each artist. The music study consisted of the following steps: (1) choice set determination, (2) rating task, (3) ranking task, and (4) choice task. Following the music study, participants completed a demographic questionnaire. The candy study followed, consisting of two tasks: (1) a ranking task and (2) a choice task. Finally, respondents received a fixed fee for participating plus one or four candy bars depending on their choices in the study and the condition of the study (bundled or non-bundled). Time was automatically recorded as the participant moved between tasks.

Music—Choice Set Determination. The first step was to identify a set of songs from the database that were not owned by the participant to be used for the next set of tasks. This filtering step was done to remove ownership as a factor on participants' subsequent choices. The goal was to identify, from the song database, a structured set containing 80 songs (2 genres x 2 artists x 2 albums x 10 songs) not owned by the participant. We began by showing the four genres to the participant from which one

¹ The responses of ten respondents were omitted due to programming errors leading to improper administration of the materials; three were omitted due to their owning too much of the music in our database to allow for comparable responses;

was selected. They were then shown all the songs from the database in that genre arranged by artist and album. They could check individual songs owned or albums owned. They then selected a second genre from the three remaining and repeated the task. They were to continue this until there were enough non-owned songs in the database to complete the structured set of 80 songs.² From the songs not owned and where possible, two artists and ten songs per album were selected at random to comprise the structured set for further data collection.

Music—Rating Task. Once the structured set of 80 songs was determined, the participants rated each of the 80 songs on a 5-point scale as to their like or dislike of the song: 1 = “I hate it”, 2 = “I don’t like it”, 3 = “It’s OK”, 4 = “I like it”, and 5 = “I love it”.³ The songs were presented to the participants in a single display organized by genre, artist, and album. By clicking on the song’s title, audio samples (30-second clips) were available for each song.

Music—Ranking Task. Once each song was rated, participants were asked to rank the songs with more positive ratings to obtain a partial ordering of the 80 songs in the structured set. If the participant rated 2 or more songs as “5,” these songs were placed in a list. The participant was able to manipulate songs in the list in preference order from most (top) to least (bottom) preferred. They repeated the ranking task for songs rated “4,” and then for songs rated “3.” (Songs rated “1” or “2” that were disliked were not ranked; thus, only a partial ranking of the 80 songs was obtained.) During the ranking task, the participant could again listen to audio samples of songs in the list.

Music—Choice Task. The first three steps above were common to all participant groups. The choice step varied for each of the eight groups of participants within the 2 x 2 x 2 factorial between-subjects design. In all cases, the participants were again presented the 80 songs in the structured set,

and six were omitted due to clearly not engaging the task based on their response time and ratings responses.

² For only one of the 200 participants in the music study was a third genre needed to be shown in the Choice Set Determination stage. For all others there were sufficient numbers of songs meeting the criteria in the first two genres selected by the participants.

³ The scale follows that used by Yahoo! at the time of the study, a familiar one for most participants.

using the same display format as used for the Rating Task, except a check box accompanied each song instead of the 1-5 rating scale. Thus, the songs were presented to the participants in a single display organized by genre, artist, and album. As with the Rating Task, songs could be sampled.

One of the factors in the design was manipulated by varying the number of songs to be selected, either five or ten. Another factor was bundling of the chosen set. For the Bundled Conditions, the participants received the following instructions. The number in brackets varied according to the first factor.

Suppose you are purchasing a customized CD as a special offer. You should put together a group of {5, 10} songs from the 80 songs that you have just rated and ranked to receive on this CD. These songs would then be burned to a CD for your use.

For the Non-Bundled Conditions, they saw:

Suppose you are buying songs for your mp3 player, My Music folder on your computer, or similar device where you store your digital music. You should select {5, 10} songs from the 80 songs that you have just rated and ranked to receive and add to your collection.

These instructions were shown prior to displaying the screen on which choices were made and were also repeated at the top of the choice display. The final factor was the timing of the choices. For the Simultaneous conditions, all choices were made at once from a single display. For the Sequential choices, the following instruction followed that above for the Bundled and Non-bundled conditions, respectively:

- *Over the next few screens, you will be putting together your customized CD, placing songs on the list one at a time.*
- *Over the next few screens, you will be adding the songs to your collection, choosing one song at a time.*

Participants made one selection from the choice display and submitted the selection. They then saw a

cartoon for 30 seconds, designed to separate the choices so that they were experienced as sequential, not simultaneous. Following the cartoon, they proceeded to the next choice, continuing in this fashion until all the selections were made.

Questionnaire. The music and candy studies were separated by a brief, single-page, on-screen questionnaire. Standard demographic information (e.g., gender, age) was collected. Additionally, information about music and digital goods consumption, as well as information about use and familiarity with related technologies was collected.

Candy—Ranking Task. Following the questionnaire, participants completed the candy study. There were ten brands of candy available from which the participant could choose.⁴ As with the music, the candy names were placed in a list. The participant was able to manipulate candy brands in the list to put them in preference order from most (top) to least (bottom) preferred.

Candy—Choice Task. This step varied for each of the four groups of participants within the 2 x 2 factorial between-subjects design. In all cases, the participant selected four candy bars. In the Bundled conditions, the participant was instructed that they would receive all four candy bars at the end of the study. In the Non-bundled conditions, the instructions were:

At the end of the study, you will receive 1 candy bar. The candy bar will be selected at random from the 4 candy bars that you select.

In the Simultaneous condition, all four selections were made from a single screen containing four lists, one for each selection. In the Sequential condition, the candy bars were selected one at a time from a single displayed list. After entering each choice, a cartoon was shown for 30 seconds, and then the next choice was requested.

In all choice conditions, participants were able to select the same candy bar type multiple times,

⁴ The brands from which selections were made were: Baby Ruth, Hershey's Milk Chocolate, Hershey's Milk Chocolate with Almonds, Kit Kat, Milky Way, Nestle Crunch, Reese's Peanut Butter Cups, Snickers, Take 5, and Twix.

if they so wished. Also note that the conditions in the two studies were matched (while recalling, as noted earlier, that those in the candy study were a subset of those participating in the music study). Those participating in the Sequential Bundled condition for the music study also did so for the candy study. Similarly, the other conditions in the two studies were matched by participant.

Results and Discussion

Table 1 contains demographic information on the sample. (The gender and age data are shown separately for those in the candy studies, a subsample of the music sample.) Also shown are the music experience data for those in the music study. As observed, the sample was evenly split across gender and generally comprised an advanced college population in terms of age. The sample is generally knowledgeable about digital music. In the sample, 82.5% owned a digital music player, with 74% owning most of their music in a digital format. Also, relevant to the bundling issue of the study, 2/3 of the participants had purchased individual songs, with just over half mostly acquiring their music in this way (as opposed to an album format). Analyses indicated no significant differences across the treatment groups in responses to these items.

*** Table 1 about here ***

Candy study

As a measure of variety seeking, we use the number of different candy bars among the four selected. The variable ranges from 1-4. Of interest are: (a) replicating previous results, which would validate our experimental setup, and (b) disentangling the effects of bundling and timing upon variety seeking with consumable goods.

Figure 1 shows variety (increasing along the y-axis) for each of the four conditions in the study. The pattern of results follows that of an equal-weight linear model. Planned contrasts were analyzed

using one-tailed t-tests, not assuming equal variances. The bundled conditions (upper line) supported, with marginal significance, greater variety seeking than the non-bundled conditions ($t(156) = 1.38, p = .085$). Similarly, the simultaneous choice conditions (at right) supported, with marginal significance, greater variety seeking than sequential choice ($t(152) = 1.38, p = .084$). And, combining the two factors (the contrast marked by asterisks), there was significantly greater variety seeking for simultaneous bundled choice than sequential unbundled choice ($t(73) = 1.91, p = .03$).

Thus, the results corroborate previous results of increased variety seeking with simultaneous choice and also show that both bundling and simultaneity contribute, and roughly equally, to an increase (consistent with Hypotheses H1 and H2).

**** Figures 1 and 2 about here *****

To further understand the effects observed, we analyze the mean ranking of the candy bars selected. Recall that the ten available candy bars were ranked in order of preference from 1 (most preferred) to 10 (least), prior to the selection of 4 candy bars. Figure 2 displays the mean rankings for each of the four conditions of the study. Note that higher means indicate more choices of less-preferred candies. This can be reflective of greater variety seeking and/or less use of preference in making choices. Since Figure 1 is taken as primarily reflecting variety seeking, any difference in the data pattern between Figures 1 and 2 is suggestive of the influence of preference upon choice.

There is a significant main effect of bundling, (one-tailed unequal variance $t(131) = 2.36, p = .01$). This effect is more marked in the sequential case ($t(58) = 2.34, p = .01$) than in the simultaneous case ($t(71) = .89, p = .19$). Thus, there is a greater selection of less-preferred candy bars in the bundled conditions compared to the unbundled conditions, particularly with sequential choice. This is of course consistent with the increased variety seeking in the bundled compared to the non-bundled conditions. However, the data do not support a main effect of the timing of choice (sequential/simultaneous, $t(151) = 0.38, p = .35$). Thus, the increased variety seeking observed with simultaneous choice (Figure 1) did

not translate to increased choice of less-preferred candy (Figure 2). A possibility is that preference-based explanations, e.g., choosing variety to gather information, to anticipate changing preferences, or to delay decision making, may be less operative in explaining the effect of the timing factor upon variety seeking in choice. At minimum, the finding suggests potentially different mechanisms underlying the bundling and simultaneity effects upon choice.

Music study

Figure 3 shows the results of a set of analyses directly addressing the variety in music choice, by participant condition. The analyses use three levels along which songs are traditionally stratified: genre, artist, and album. Since variety can be affected by the number of songs selected by the participant, making comparability between selecting subsets of size five or ten a possible issue, the data are analyzed and shown separately for the two selection sizes. For genre, we count the number of selected songs in the genre with the higher number. So, this ranges from 5-10 for the large subset conditions and from 3-5 for the small conditions. This is then converted to a proportion, dividing by 10 or 5 respectively, to make the measures more comparable before graphing and analysis. For 10-song conditions the proportion ranges from 0.5 to 1 and from 0.6 to 1 for the 5-song conditions. For artist, we counted the number of different artists represented in the selected set. This value ranges from 1 to 4, the number of artists in the 80 song set from which selections were made. For album, we similarly counted the number of different albums represented in the selected set. For the large subset conditions, this measure ranges from 1-8, the number of albums in the 80 song set. For small conditions, the range is 1-5, the number of selections made. The y-axis and grid in each graph in Figure 3 show the range and the possible participant responses, respectively, for each measure.

**** Figure 3 about here *****

Before proceeding to the main hypothesis tests, we checked the questionnaire responses (Table 1) for any relationships with these measures of variety seeking. The only factor that had an impact was

the way that respondents indicated that they usually acquired music. In general, those who most often acquire music as individual songs showed greater variety seeking than those who acquire music as complete albums. This was indicated both in terms of a greater number of different artists selected ($t(191) = 2.50, p = .013$) and a greater number of different albums selected ($t(194) = 3.3, p = .001$). When used as a covariate, none of the other analyses summarized below were affected, and so the analyses are reported without this questionnaire item as a factor. The result does indicate individual differences in variety seeking that are tied to experience.

Turning to the research hypotheses, the main result, observed from the figures, is the consistency of variety seeking across conditions. Comparing simultaneous to sequential choice, within selection size and bundling condition (i.e., testing the slopes of all the line segments in the graphs), no significant differences obtained (two-tailed, unequal variance t (df ranges from 43 to 50), all $p > .10$). Similarly, no significant differences arise in comparisons between bundled and non-bundled choice. There is a general lack of significant effect for bundling and for simultaneous/sequential choice with music.

Since we hypothesized the possibility of null effects, we follow up the traditional tests of significance with statistical equivalence tests as a secondary analysis. We employ the two one-sided test (TOST) procedure (e.g., see Wellek, 2003). The procedure has been primarily used in clinical settings to provide evidence for the medical equivalence of treatments (e.g., Barker, Luman, McCauley, & Chu, 2002) and has also been recommended for social science applications (Rogers, Howard, & Vessey, 1993). The procedure, applied to testing the equivalence of two means, operates by setting an interval, usually symmetric $(-\delta, \delta)$, such that a difference within this interval is judged to be equivalent to 0. One then performs two one-sided tests using as alternative hypotheses (a) that the mean difference is above the lower bound $-\delta$, and (b) that the mean difference is below the upper bound δ . If both are accepted, equivalence is concluded as statistically supported, using the greater p-value of the two tests as the overall significance level of the TOST. A key aspect of the procedure is setting δ . Several guidelines

have been proposed with no standard in place. Here we base our selection of δ based on the power analyses simulated by Phillips (1990). We set $\delta = 10\%$ of the reference mean for each test, providing an expected power of at least 80%. Given the results of the candy study, in which both simultaneity and bundling impact variety seeking, we perform contrasts in each case where both of these factors are present compared to their absence, i.e., we compare the bundled, simultaneous condition in each case to the non-bundled sequential condition. Any effect should be maximal with this contrast. We then use the sample mean of the non-bundled sequential condition as the reference mean for determining δ for each test.

Asterisks in Figure 3 identify the points of the contrast for each test. The t statistic and p-value for the TOST procedure is shown within the graphs for each contrast. As observed, all of the tests have a p-value below .25, with most within the .10 and .20 range, just shy of what is usually considered marginal significance. One of the tests is significant at the .05 level, supporting equivalence in variety seeking for this measure. Thus, overall the results are consistent with the Hypotheses 3-5, with a possibility that variety seeking effects are not just reduced with digital goods, but may be eliminated completely. Hypothesis 6 (of a choice set size effect) was not supported due to no effect being observed across all the conditions. This result also holds for the Large, Bundled conditions (the solid lines in the left-column graphs). This condition is the one we hypothesized would be most likely to still show an effect between simultaneous and sequential choice. As expected for the other conditions, but also for this condition, the variety seeking effect is not supported with music.

As with the candy data, we calculated the mean preference ranking of the songs selected. The 80 songs from which a participant selected were rated using a five point scale. Those rated positively—either as 3, 4, or 5—were then ranked, separately within each rating category. This provided a partial ranking of the 80 songs from 1 (most preferred) on up to 80 at maximum (least preferred), prior to the song selection task. All songs rated as 1 or 2 were given the same rank of the highest ranking, among

those rated 3 to 5, plus 1.⁵ Figure 4 displays the participants' mean rankings for each of the conditions of the study. Higher means indicate more choices of less-preferred songs. As with the candy choices, this can be reflective of greater variety seeking and/or less an effect of preference upon the choices.

**** Figure 4 about here *****

For music, a limited bundling effect was obtained. For the large selection sets (10 songs selected), no statistically significant differences across timing or bundling were obtained. For the small selection sets (5 songs selected) however, there is a significant effect of bundling (one-tailed unequal variance $t(76) = 1.80, p = .04$). There is a greater selection of less-preferred songs in the bundled conditions compared to the unbundled conditions. As with the candy data, the effect differs for the bundling factor compared to the timing factor, again suggesting that the underlying dynamics of these two factors may differ. Further study is clearly advisable to understand the effect, possibly tying to the different explanations offered for variety seeking.

General Discussion

Digital technology has opened new avenues for product bundling, and we need to better understand consumer behavior in this expanding area. The current research provides insight into bundling effects within a choice task for goods that differ from the physical, consumable goods studied in most bundling research. With the ongoing evolution of the music industry generally, in reaction to the introduction of digital technology, the practical importance of the proposed research is also apparent. Also, although this study is directed at music preferences, the research is viewed as the beginning of a broader stream relevant to consumer behavior and decision making in the bundling of digital goods. Consequently, there is strong future potential for continuing research.

⁵ Note that all participants in the analyses had at least 9 songs that were rated 3 to 5. Thus, the minimum mean ranking is 5.5 for all participants selecting 10 songs and 3 for all participants selecting 5 songs (used as the baselines for the y-axes in

The explanations for variety seeking with consumable goods have included intrapersonal factors of a desire for stimulation and protection against satiation, as well as information gathering motives. Variety can protect one against the uncertainty of future preferences (less likely to have all bad outcomes), provide for learning about the options, and postpone the decision to a later point in time when preferences may be more certain. In addition, the interpersonal motive of portraying oneself as socially distinctive may be aided by choice variety.

As we move from consideration of consumable goods to digital goods, several of these motivations are believed to be lessened. As a consequence, we proposed and tested the diminishment of the influences of bundling and timing of choices upon variety seeking with digital goods. The hypotheses were generally substantiated. The effects which have been widely shown and proven robust with various consumable goods were not obtained with purchasing music, a digital good.

One potential limitation of the finding are the results as null conclusions, i.e., in the failure to reject the null hypotheses. As has been noted for some time, e.g., the argument is made in detail by Greenwald (1975), null findings can be at least as important as those rejecting the null hypotheses. The validity of the null results is substantiated by the rejection of the null hypothesis in our sample with candy as the choice good, in replication of prior findings. Thus, the study supports the negative findings for digital goods as a contrast to the consistent effect for consumable goods. In addition, statistical equivalence analyses provide some limited support for the stronger conclusion of a non-effect with music.

Also of note is the additional aspect of our study pertaining to consumable goods. In the past, the effect upon variety seeking has been considered as a bundling effect and as an effect of choice being simultaneous, as opposed to sequential. These factors have not been differentiated experimentally; our study, with candy as a consumable good, separates these two aspects of the choice situation. We

observe that both factors seem to contribute to differences in variety seeking behavior, and in roughly an equivalent and additive fashion.

A difference does arise between the factors, however, in their effect on the role of preference in the selection of variety. For both candy and music, there is some tendency for choosing less-preferred options in bundled choice compared to non-bundled choice. This trend is limited in each case: For candy, it is stronger when choice is sequential; and for music, it is substantiated only when the choice set size is small (5, rather than 10). The trends must also be understood relative to the variety seeking results, since variety seeking can lead to the choice of more less-preferred items. This variety seeking occurs with candy, but does not occur with music. Of further interest is that the effect is not observed with simultaneous choice, even with candy, as compared to sequential choice. At minimum, a suggestion is of a difference between the dynamics of bundling and timing in their impacts on variety seeking, a difference that requires further investigation.

Both of the primary results, i.e., the dual influences on variety seeking with consumable goods and the diminishment of the effects with digital goods, offer paths to further insight into the underlying dynamics of variety-seeking behavior. Detailing the roles of the different proposed explanations upon variety seeking should be aided by this finer knowledge of the conditions under which the behavior does and does not occur.

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Table 1.

Study Participants: Demographics and Music Use Data.

Participant Attributes	Percentages (n = 200, except where indicated)
Gender (% Female) – Music study	53.0%
Gender (% Female) – Candy study (n = 159)	52.2%
Age (Mean years [SD]) – Music study	22.7 [7.66]
Age (Mean years [SD]) – Candy study (n = 159)	23.3 [8.47]
Paid Subscription	
Have you ever had, or do you currently have, a paid subscription to an online music service (e.g., Rhapsody, Yahoo Music, ...)? (% Yes)	7.0%
Pay Per Download	
Have you ever used an online pay per download service (e.g., Amazon mp3s, iTunes,...)? (% Yes)	66.0%
Digital Music player	
Do you own an iPod or other portable digital music device? (% Yes)	82.5%
Downloaded	
Have you ever downloaded a song or album using the Internet? (% Yes)	92.0%
Purchased Single	
Have you ever purchased a music single (as opposed to a music album)? (% Yes)	66.0%
Frequency: On average how often do you currently acquire new music?	
Never have or less than once per year	2.0%
Once per year	11.5%
Once per month (about 12 per year)	40.0%
Once per week (about 50 per year)	26.5%
More than once per week	20.0%
Mode: Most often I acquire music as –	
Complete albums	47.0%
Individual songs	52.0%
Don't acquire	1.0%
Own: Most of the music I own –	
Is in digital format (e.g., mp3)	74.0%
Is on physical media (e.g., tapes, CDs)	25.5%
I don't own any music	0.5%

Figure 1. Candy Study: Mean Number of Different Candy Bars Selected (Maximum of 4)
Across Conditions (*conditions differ, one-tailed t, $p = .03$)

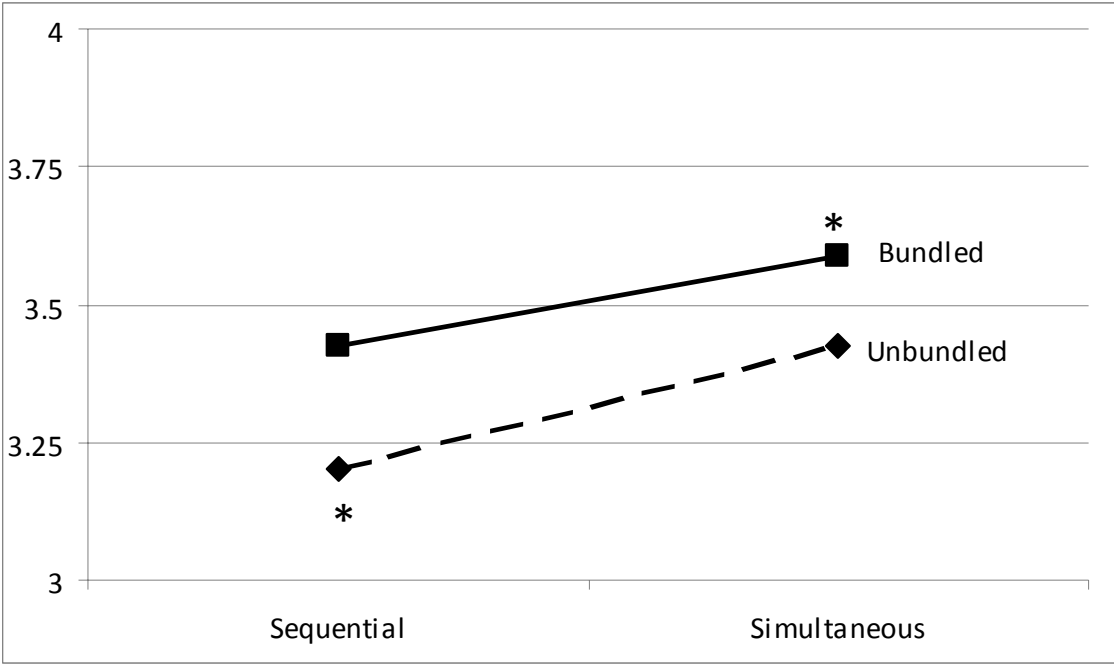


Figure 2. Candy Study: Mean Ranking of the Candy Bars Selected (Range: 1-10) Across Conditions

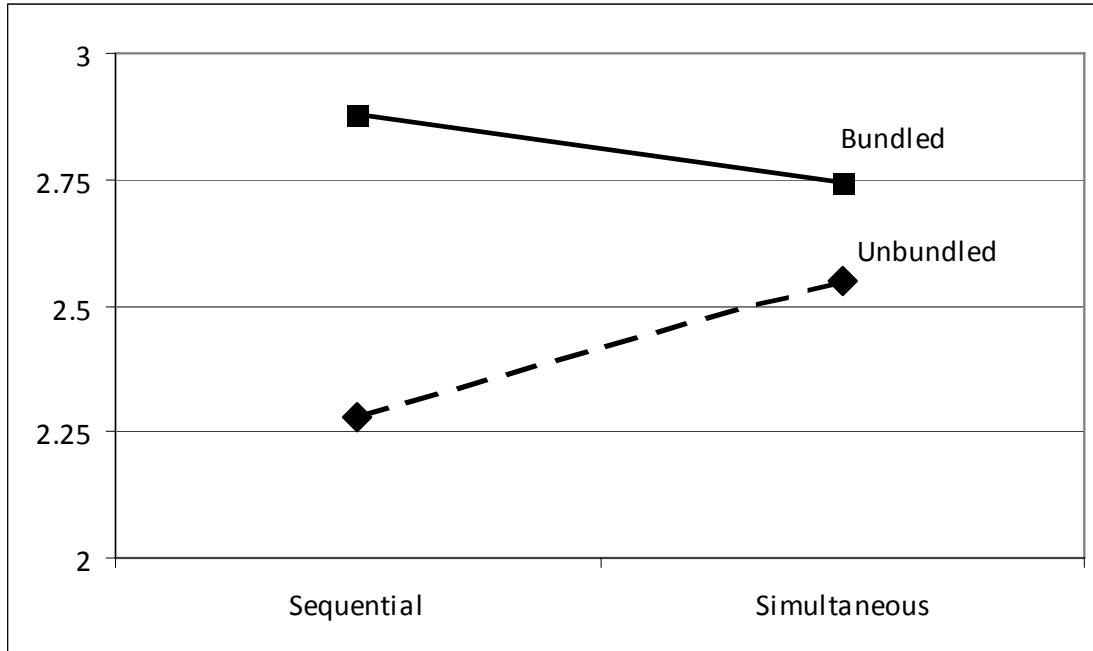
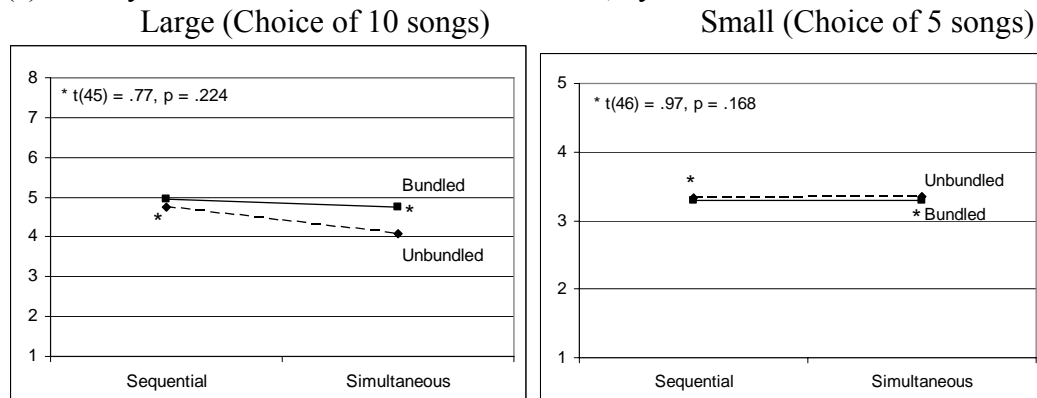
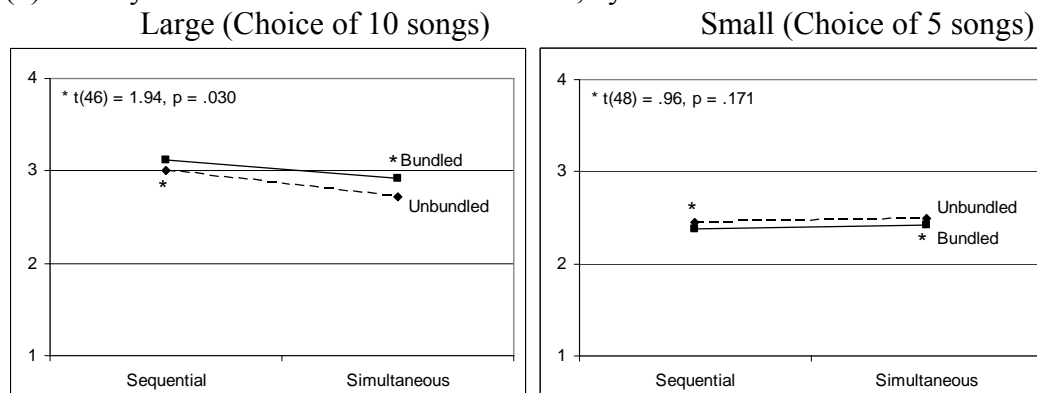


Figure 3. Music Study: Variety Measures—By Album, Artist, and Genre—Across Conditions
(The t-test in each graph is for the TOST of equivalence contrasting the two groups indicated by asterisks in each figure.)

(a) Variety across Albums: Number of Albums, by Condition



(b) Variety across Artists: Number of Artists, by Condition



(c) Variety across Genres: Percentage of Songs in the Genre with the Higher Number of Songs, by Condition

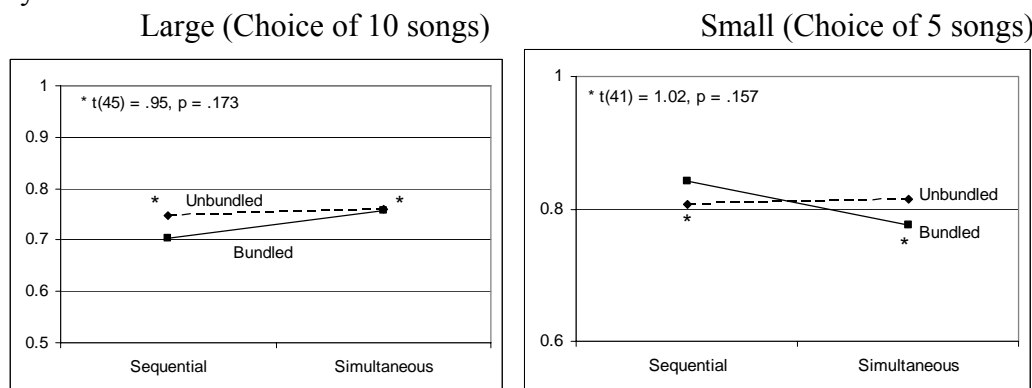


Figure 4. Music Study: Mean Ranking of the Songs Selected Across Conditions

