THE EFFECTS OF PRICE AND DURABILITY ON INDIVIDUAL DISCOUNTING
FUNCTIONS WHEN PURCHASING HYPOTHETICAL GOODS
IN A SIMULATED INTERNET STORE

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Online shopping has rapidly expanded in the last decade. Online shopping necessarily imposes delays on all transactions. Behavior analysis has long studied the effects of delay on choice. Additionally, a number of researchers are beginning to study consumer behavior using a behavior-analytic approach. The current study attempted to extend research focusing on consumer behavior in online contexts. The experimenters attempted to evaluate whether goods acquire functional properties and whether these properties influence consumer choice. The researchers were specifically interested in studying acquisition costs and durability and in simulating a natural online shopping environment. Results from the current study extend the findings showing that delay and price influence choice. The data from the current study provide mixed evidence for control by item durability.
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INTRODUCTION

The online consumer market has dramatically expanded in the last decade. In today’s online environment, consumers can purchase a vast range of goods. This range includes, but is certainly not limited to: books, movies, clothing, cameras, phones, televisions, sporting equipment, furniture, and even vehicles. Some of the companies that have built their business around online shopping services are among the most profitable in the world (Amazon). Similarly, companies that were less able to adapt to the growing online marketplace suffered large losses or even experienced bankruptcy (Blockbuster, Border’s). The world of online selling is extremely competitive, and profit margins can be enormous. An interesting dynamic produced with the advent of online shopping is that consumers now have to wait before receiving their purchases. Delay between purchasing a good and having access to it largely did not exist in more traditional shopping contexts, and this new dynamic may significantly alter how consumers choose.

Attempts to understand choice and decision-making have formed a core concern of psychology since nearly the beginning of the discipline. Over the last 80 years, behavior analysis has contributed greatly to the study of choice and decision-making. A large jump in the understanding of choice came with Herrnstein’s (1961, 1970) description of a method in which choice and its determinants could be characterized in quantitative terms. His research found that under many circumstances, the allocation of responses across two available alternatives could be predicted by the rates of reinforcement programmed for each alternative. A linear correspondence between rates of programmed reinforcement (as a proportion of all reinforcement) and response allocation (measure as a proportion of total responses across both alternatives) was called “matching.” Matching was obtained under a number of conditions.
including various kinds of reinforcers such as food (Herrnstein, 1961) and electronic brain
stimulation (Shull & Pliskoff, 1967). Researchers also produced matching under various types of
responses including lever pressing (Shull & Pliskoff, 1967), key pecking (Catania, 1963;
Herrnstein, 1961; Reynolds, 1963), and standing location (Baum & Rachlin, 1969).

Over the next 15 years, limitations of matching and extensions of the basic preparation
led Baum (1973) to propose a generalized version of the matching law, which explicitly
attempted to account for variables known to influence response allocation, such as biases for
stimuli and sensitivity to reinforcement. The generalized matching law (Baum, 1973) has been
extremely useful in making sense of a wide variety of situations in which behavior can be said
to involve choice such as conditional discrimination learning. Despite the wide applicability of the
generalized matching law, the notion was useful in describing only those situations in which the
reinforcers differed only in terms of their programmed distribution across available alternatives.
The generalized matching law, for example, fails to provide a useful description for situations
involving choices between functionally different reinforcers produced by making functionally
different responses (Hursh, 1980 and McDowell, 1989).

These limitations, among other concerns, led behavior analysts to argue that the field
should adapt some concepts from economics to allow a better characterization of behavior-
environment interactions in general and choice in particular. Green and Rachlin (1975), for
example, found that economic factors such as increased rates of “free” food played distinctly
identifiable role in pigeons’ response allocations between concurrently available schedules.
Hursh (1980) published a paper that was an explicit argument for adopting a behavioral
economic approach. In it he made four key points: 1) all experiments are economies and the
characteristics of those economies will influence the results; 2) reinforcers can be distinguished
by a functional property called elasticity of demand; 3) reinforcers can be substitutes or complements for one another; 4) due to points two and three, no single choice rule cannot adequately account for all choice behavior (Hursh, 1980). This point of view has generally come to be called behavioral economics.

Behavioral-economic formulations are well suited for understanding behavior-environment interactions and have been used to reevaluate how to define and identify reinforcers (Tustin, 1995), how to view experimental arrangements, and why organisms increase responding as a function of increased response requirements in some situations and decrease responding in others (Hursh, 1980; Hursh, 1984). However, the largest contribution of behavioral-economic formulations has been in the area of choice. This has proved especially true for choices between different types of items and choices between receiving something now or receiving something better later (Tustin, 1994).

Research has shown that individuals are less likely to choose items when access to those items is delayed. Scientists typically refer to this effect as temporal discounting. Research has demonstrated this effect even when the delayed item is significantly larger or more valuable than the item that can be immediately accessed. Researchers have replicated these findings extensively. For reviews of the research, see Critchfield and Kollins (2001), Green and Myerson (2004), and Rachlin (2006).

Researchers typically study temporal discounting by providing a choice between one option to be accessed immediately or a second option (usually larger/more valuable) to be accessed after some delay. The researchers then manipulate either the value of one option or the delay to the larger option and present the choice again. After several such choices, researchers
can identify patterns in how individuals choose. These patterns prove useful when talking about how price and delay affect choice.

**Temporal Discounting and Consumer Behavior**

While research has shown the broad applicability of temporal discounting, the variables affecting choices that consumers make on a daily basis are still relatively unknown. A small number of scientists have contributed to what is known about consumer behavior, and they have shown the utility of applying the methods used in studying temporal discounting (Foxall, 2001; DiClemente & Hantula, 2003).

Foxall (2001, 2010) has advocated for increased work focusing on consumer choice. Foxall (2001) even proposed a specific framework for studying and conceptualizing consumer behavior. Oliveira-Castro, Foxall, and Schrezenmaier (2006) found that price primarily determined brand choice when individuals were grocery shopping. The researchers showed that this held across a wide range of goods including biscuits, margarine, and coffee. Another study found that increasing the price of a good will increase the amount of time individuals spend looking for less expensive brands (Oliveira-Castro, 2003).

To date, Hantula and his colleagues have conducted most of the behavior-analytic research regarding online consumer choice (DiClemente & Hantula, 2003; Hantula & Bryant, 2005; Rajala & Hantula, 2000; Smith & Hantula, 2003; Smith & Hantula, 2008). Their efforts have shown that price is a primary determinant of choice in online contexts (Smith & Hantula, 2003), that some individuals show sensitivity to delays of a few seconds for an “in stock” or “out of stock” message (Rajala & Hantula, 2000), and that temporal-discounting extends to online contexts (Hantula & Bryant, 2005). Hantula and Bryant (2005) specifically evaluated how participants bargained for shipping options when hypothetically purchasing CDs from a
simulated online music store. They found that participants increased how much they were willing to pay for next day delivery when the delay to free delivery increased. However, the researchers only focused on one good, CDs, and this may have limited the generality of their findings (Hantula & Bryant, 2005).

A couple studies have focused on identifying whether consumers choose differently for goods, especially when access to those goods is delayed (Raineri & Rachlin, 1993; Estle, Green, Myerson, & Holt, 2007). One of those studies specifically asked whether the type of good influenced choice (Estle, Green, Myerson, & Holt, 2007). The researchers studied choices about money, beer, candy, and soda. They asked participants to choose between immediate access to one quantity of a good and delayed access to a larger quantity of that good. They repeated this process for all goods and then compared the choice patterns from each. Estle et al. (2007) found no significant differences between how each good affected choice. The researchers divided the goods in a couple ways. They thought that money might differ from the actual goods, and the data supported this notion. They also hypothesized that beer might affect choice differently than candy and soda since beer is a substance that has often been associated with abuse and dependency. However, if the goods used in the Estle et al. (2007) study are evaluated differently, then it might make sense that they failed to influence choice in different ways. Beer, candy and soda all cost relatively little, and the three goods tend to be consumed quickly once opened. Evaluating goods in this manner may prove useful when trying to understand how consumer goods affect choice.

Specific dimensions of a good might affect how that good is discounted. The costs involved in producing and obtaining a good could be one such dimension. We may refer to these as acquisition costs. A second dimension might involve how long a specific good lasts before it
is consumed and needs to be replaced, which we may call its durability. For example, a candy bar or a soda would be said to possess low durability as they are quickly consumed. However, a digital camera or a pair of hiking boots typically take longer before their utility is exhausted; thus, they may be said to possess higher durability. Goods that require different acquisition costs and possess different levels of durability may produce choices that differ significantly from one another. If so, many consumer choices may be controlled by the dimensions of the goods being sought. Consumers and businesses could both benefit from any additional knowledge about this interplay. If consumer choice is driven primarily by the dimensions of the target goods, then choice could vary widely across goods.

In the current study, the researchers wanted to assess whether consumable goods, grouped along the proposed dimensions of acquisition costs and durability would produce systematically different choices when participants bargained between next-day delivery of the items for a fee, or a delayed delivery time for free. The current study evaluated these effects in a simulated online shopping context. The study sought to extend the research in behavior analysis regarding consumer behavior in Internet-shopping contexts. The experimenters wanted to learn if it was useful to evaluate goods differentially along the broad dimensions of acquisition costs and durability. Businesses and marketing agencies may benefit from work in this area.

Specifically, participants made non-choice purchases and then could negotiate how much they wanted to pay to get the item the next day. The experimenters asked if the ‘fee’ the subject was willing to pay changed as a function of the price of the commodity or the implied duration of the commodity’s use. A control condition specified the implied values and assessed choices under those conditions.
METHOD

Participants and Setting

Experimenters recruited 10 adults, either university students or individuals from the community, for the study. They were recruited via word of mouth. The only requirements for participation were that they had at least some experience purchasing items online. Participants received a gift certificate after their participation in the experiment. The study took place in each participant’s home via a screen-sharing program on a computer.

Overall Design

Experimenters told participants that they would be doing some online shopping for a variety of products to help test a new online shopping format. The experimenters also informed the participants they would negotiate between paying a fee to receive the purchase the next day or wait multiple days for free delivery. The procedure assessed what participants were willing to pay to receive their purchase the next day. The experiment consisted of 1 session for each participant. Session durations ranged from 1 hour and 10 minutes to 3 hours. The experimenters provided break opportunities to the participants.

Apparatus

The participants interacted with a program on a personal computer. The participants and the experimenters shared screens via a video-chat program. The experimenter directed the participant to interact with the program. The program ran all aspects of the procedure and collected all data from participants’ choices. The participants interacted with the program by using the mouse to click buttons displayed on the monitor.
Experimental Design

The study used a psychophysical titration procedure adapted from Hantula and Bryant’s (2005) study. The experiment asked participants to choose between two virtually-identical items. There were two identical images of an item with the single difference that one option was negligibly more expensive than the other. This was included to increase the likelihood that the participant actively engaged with and attended to the item and price of the item as well as to increase the realism of the shopping experience. The participant selected an item by clicking a "Buy" button underneath the chosen item. Clicking “Buy” took the subject to a shipping page where a titration procedure was used to "haggle" for either next-day delivery fees or a delayed delivery for free. Specifically, the participant chose between the options of receiving the purchased item tomorrow for an additional fee or waiting for a specified delay to have the item delivered for free.

In all conditions, the next-day delivery fee began at 100% of the selected item’s initial price. Each time the subject selected the free delivery option, the fee for next-day delivery decreased by a fixed value (described below). Conversely, the next-day delivery fee increased if the subject chose to pay the next-day delivery fee to receive the item quickly. The delivery fees were titrated as a percentage of the selected option’s initial price and were arranged as 100, 95, 90, 85, 80, 75, 70, 65, 60, 55, 50, 45, 40, 35, 30, 25, 20, 15, 10, 5, 1, 0.05, and 0.01%. The delays to free delivery consisted of 3, 5, 7, 14, and 21 days. Participants purchased each good at each delay value. The program presented each combination of delay value and good once per session, and the order in which goods and delays were presented was randomized. The program also randomly alternated the position of the free-shipping option and the next-day option.
Independent Variables - Categories of goods

The current study grouped specific consumer goods into categories along the suspected dimensions of acquisition costs and duration of consumption. In the experiment, acquisition costs included both the price of the item as well as the effort required in everyday shopping to acquire that item. For example, while two cars may be similarly priced, one might only be located at a single, distant dealership. This car would have a higher acquisition cost than the other car, which may be found at multiple dealerships. The current study accounted for the general accessibility of items as part of the acquisition cost. Duration of consumption, or durability, describes the approximate amount of time an item lasts from acquisition to being fully consumed. A magazine is typically consumed in less than one month; however, a dress tie may have a usable “life” duration of several years. The analysis focused on whether these properties of consumer goods influenced the participants’ choices, producing shallower or steeper discounting functions as a result of each item’s acquisition costs and durability.

Dependent Variable

The dependent variable consisted of the points at which participants switched from one alternative to the other and then back again, typically called an indifference point. For example, the participant chose next-day delivery for $3 on one trial, chose a week delay to free delivery on the next trial (the price for next-day delivery increased), and then switched back to the $3 fee on the following trial. The values involved in switching were recorded, and their average was plotted as an indifference point. The indifference points across all delay values for a single item were plotted as a discounting function. Experimenters analyzed the discounting functions produced by each participant's switch points across good types. The experimenters also compared discounting functions for each good across participants.
Procedure

Condition 1

The experiment divided purchases into two groups of goods. One group of goods had a fixed price ($300) and a varied estimated durability for each good. The participants received no information regarding the estimated durability for each good. The experimenters withheld this information in part to evaluate whether the broadly shared reinforcement history of a culture would create a “universal” durability. In other words, the experimenters were interested in identifying whether the durability could be informally established or whether more explicit means were necessary. A smart phone, an HDTV, and a recreational bicycle made up the fixed-price category. The second group consisted of goods with varying prices and a fixed estimated durability. The experimenters selected a screen t-shirt at $15, a bottle of perfume/cologne at $45, and running shoes at $100. The average durability of these goods was estimated at approximately one year. Each purchase included two identical images of the item with negligibly different prices listed under each picture. The images for the purchases were all generic images and effort was made to eliminate any obvious brand names and logos.

Orientation to apparatus

Experimenters told participants that they would be doing some online shopping for a variety of products to help test a new online shopping format. The experimenters asked the participants to sit down at the computer. The experimenter asked the participant to read the written instructions. The experimenter also read the instructions out loud.

“Welcome to SierraGoods You will be helping us test our new purchasing and shipping system. Today you will purchase several items. The items you need to buy will vary in type and price, and you will need to buy each item multiple times. Once you select which item you want to purchase, you will bargain for delivery times and fees. Be careful as the location of your shipping options will change often. Please shop as you normally would at home.”
The experimenter then informed the participant they could request a break if necessary. The experimenter instructed the participant to begin when ready.

Shopping

The program began by displaying a “welcome” page containing the instructions. Clicking a “start shopping” button, located at the bottom of the page, changed the display to a page with the name of a good, and two images of that good. The images of the good were identical. The page displayed a price under each image. There was a negligible difference in prices between the two images of the good. A "buy" button appeared below each price. The participant selected one of the images by clicking on the corresponding “buy” button which changed the display to a new page that displayed the text, “You bought (name of good).” The page showed an image of the good under the text. Next to the image more text read, “When would you like to receive your purchase?” There were two options for the participant to choose. One read “Next-day delivery for an additional ____” and the other read “Free delivery in ____ days.” Beside each message was a button. The program titrated the dollar amount displayed with the “next-day” option. Clicking either button caused the text and image to disappear and a “continue” button was displayed. Clicking this button caused the program to display the image and text with the new amount. The free-delivery button decreased the next-day price by the appropriate preset percentage. Clicking the next-day option increased the next-day price by the appropriate preset percentage. When a participant switched from one option to the other and then switched back to the original option, the prices of the next-day option were recorded. The program loaded a message informing the participant that their purchase had been confirmed. If the participant had not yet purchased each good at each delay value, the program displayed a “keep shopping” button. Clicking this button loaded the next item page.
Once the participant purchased each good at each delay value, the program displayed a page informing the participant that they had completed their shopping list. This page had a button that read, “End session.” Clicking this button saved collected data and closed the program.

Debriefing

The experimenter briefly described the purpose of the experiment and answered any questions. The experimenters also informed the participants when their gift certificates would be delivered.

Condition 2

The experimenters asked 4 participants from Condition 1 to complete a second condition. Condition 2 replicated Condition 1 with two modifications. The goods purchased in Condition 2 were displayed with only a description of the item’s cost and how long the good would last. For example the screen displayed, “You have purchased Item E. Item E costs $100, and it will last for 1 year. How would you like to receive you purchase?” Experimenters added this condition to evaluate how an explicitly stated durability for a good would influence choices about that good. Experimenters could then compare these choices with the Condition 1 purchases, which left durability uncontrolled. Each text-only purchase matched one of the with-pictures purchases in its estimated durability. The program randomly presented all the text-only purchases at all delays. These purchases omitted the “choice” between two versions of the same item. They began on the titration page, and the titration process was identical to that of the with-picture items. The prices of the 3 fixed-durability (1 year), text-only goods matched those of the fixed-durability goods from Condition 1. The experimenters set the prices of the text-only, fixed-price purchases at $113; whereas, the fixed-price items’ price in Condition 1 was $300. The
experimenters decreased the price of the fixed-price items in Experiment 2 to better control for the fact that smaller amounts are typically discounted more steeply than more expensive goods. Decreasing the price of the fixed-price goods in Condition 2 made their price more comparable to the fixed-durability items’ prices.
RESULTS

All subjects learned the task and completed the study in an average of 75 min (image-only condition) and 120 min (image and text conditions). In addition, the participants’ choices and behavior in the sessions suggest that they understood the task and that their behavior was controlled by task-relevant variables.

Figure 1 presents group averages – the average additional fee participants were willing to pay to get the item the next day. The group trends show that as delay increases, participants were willing to pay slightly more to receive their purchase the next day.

Figures 2 and 3 show, for all purchases, the amount of money participants were willing to pay to receive the item the next day as a function of the delay to free delivery of the product from the image-only condition. From top to bottom, Figure 2 presents the results for Participants 1-6, respectively and Figure 3 presents the results for Participants 7-10. Each panel shows the amount of money individual participants were willing to pay to receive a particular hypothetical commodity the next day as opposed to waiting a number of days for the item to be delivered free of charge. The data show that two participants, HP1 and HP3, never paid more than 25% in fees to have the product delivered earlier than the free-delivery date. The data also show that all other subjects did choose to pay a fee to receive some items early.

The participants that sometimes chose to pay fees to receive goods the next day produced relatively consistent data across goods and good types. HP1, HP3, HP4, and HP6 never spent more than 50% of the initial item price in fees to receive their purchase the next day. They all spent the most for the t-shirt and systematically less for every other good. HP2 always produced functions that showed increased spending as delay increased, and the overall level of these
functions decreased as price increased. HP5 generated extremely consistent discounting functions across goods, delays, and durability.

Figure 4 shows the average fee paid as a function of time to free delivery broken down for items that had the same price and items that had the same estimated durability. Figure 4 displays data from Condition 1 only. Participant data from the fixed-durability purchases show sensitivity to delay. The averaged data show a tendency to pay between 17% and 35% of the initial item price at a 3-day delay and between 23% and 50% at a 21-day delay. They also showed sensitivity to price in the respect that participants spent more to get the shirt via next-day delivery, and the shirt was the least expensive item. However, the data show no systematic differences between the shoes and the cologne/perfume, and the shoes were more than twice as expensive as the cologne/perfume.

Participant data from the fixed-price goods show no meaningful control by durability. The data show a slight sensitivity to delay with the 21-day delay producing slightly more spending (roughly 20%) than the 3-day delay points (approximately 12.5%). However, the indifference points for the TV and the bicycle both showed the highest levels of spending at delays shorter than 21 days.

Figures 5-14 show results from Condition 1 for each participant broken down by items with a fixed price or items with a fixed estimated durability. As previously mentioned, HP1 and HP3 tolerated delay very well and did not show meaningful control by price or durability.

HP2 produced the most “typical” discounting functions; however, two of the functions produced by HP2 were bitonic in nature. HP2 paid the most for the t-shirt and the least for the smart phone. HP2 paid 32.5% of the t-shirt’s initial item price in fees for next-day delivery at a 3-day delay and paid 97.5% at a 21-day delay. HP2 paid 22.5% of the phone’s initial item price
in fees at a 7-day delay. All other delay values for the phone produced lower indifference points. HP2 better tolerated delays with the fixed-price items. However, HP2’s discounting functions varied across the fixed-price purchases.

HP4 generated relatively consistent discounting functions across goods. HP4 rarely paid more than 22.5% of the initial item price in fees to receive the goods the next day. There were two exceptions; this participant paid 47.5% for the t-shirt at a 14-day delay and 32.5% of the initial item price for the bike at a 3-day delay. Within HP4’s spending range, HP4 typically paid more as delays increased.

HP5 produced very consistent discounting functions. HP5 never paid less than 87.5% in fees to receive the item the next day. This occurred regardless of good, price, or delay. Neither durability nor delay exerted systematic control over HP5’s choices.

HP6 generated consistent discounting functions across goods, prices, and durability. HP6 spent the most for the t-shirt. HP6 paid 2.5% in fees at a 3-day delay, and he paid 27.5% at a 14-day delay. HP6 paid more as delay increased for the fixed-durability goods, but this effect was small. HP6’s choices in the fixed-price condition did not show control by delay or durability; however, HP6 was willing to pay less for the fixed-price goods than the fixed-durability goods.

T1’s data were relatively stable within the with-picture condition. However, T1’s discounting functions did not follow any consistent trend or slope. T1 was rarely willing to pay more than 20% of the item’s initial price regardless of absolute price, delay to free delivery, or durability. T1 only deviated from this range twice. T1 paid 57.5% to receive next day shipping for the screen t-shirt when faced with a 3-day delay and paid 52.5% to receive the running shoes when presented with a 14-day delay. T1’s indifference points at the 21-day delay did not exceed 20% of the initial item price. T1 better tolerated delays for the fixed-price group of purchases;
however, there were no meaningful differences on the basis of item durability. The
cologne/perfume produced the steepest overall discounting function.

T2 produced highly variable data in the with-picture condition. Indifference points
generated by T2 ranged over 50% of the items’ initial prices across purchases. T2’s discounting
functions were organized along the dimension of price, and generally increased as a function of
delay. T2 paid the most to avoid waiting for the t-shirt and tolerated delays best when
purchasing the bicycle and the smart phone. T2 typically paid less than 10% of the item’s initial
price to receive next-day shipping at a 3-day delay. At a 21-day delay, T2 showed indifference
at anywhere from 12.5-52.5% of the initial item’s price. T2 paid 82.5% of the t-shirt’s initial
item price at a delay of 3 days, but this was an artifact created by the random-location choice
error.

T3 produced two errors in the with-picture condition. One was for the t-shirt at a 21-day
delay and the second was for the smart phone at a 5-day delay. T3’s indifference points varied
from .05% for the HDTV at 3 and 14-day delays to 52.5% of the initial item price for the shoes.
Irrespective of the errors, T3 paid most to avoid delays overall when shopping for the t-shirt. No
delay or durability exerted consistent control over T3’s choices.

T4’s choices in the with-picture condition were relatively consistent. T4 never spent
more than 38.5% for any item at any delay. T4 paid the most for the t-shirt at the 14-day delay.
The t-shirt produced the steepest discounting function and the highest level of spending for the
with-picture purchases. The fixed-price purchases were discounted less than the fixed-durability
items on the dimension of price, and durability appeared to exert no control. However, regarding
the fixed-durability items, T3 paid the least for the shoes. The shoes were the most expensive
fixed-durability item.
Figure 15 presents the same data as Figures 5-14 for the four participants who completed the text-only condition. T1 produced more variable choice patterns in the text-only condition. T1 also produced steeper discounting functions when purchasing completely generic items with explicitly described prices and durabilities, T1 was willing to pay more per item in the text-only condition to avoid delays. The range of percentages that T1 paid increased from roughly 20% in the with-picture condition to 25-30% in the text-only condition. T1 discounted Item A the most steeply followed by Item B. Item A cost $15 and had a stated durability of 1 year. The respective durability of each of the fixed-price items again exerted no meaningful control over T1’s choices.

T2 produced significantly more stable data in the text-only condition. All of T2’s indifference points in this condition fell within the bottom 30% of the items’ initial prices. T2 paid most for Item A at a delay of 5 days. Price exerted relatively little control over T2’s choices regarding the fixed-durability items. Durability also exerted little control over the fixed-price items. The text-only condition increased T2’s ability to withstand increasing delays.

T3’s choices became much more stable in the text-only condition as compared to the with-picture condition. T3 made an error in this condition when purchasing Item F at a 7-day delay. T3 never paid more for 17.5% of the initial item price for any item in the text-only condition. T3’s indifference points often decreased as the delay to free shipping increased. T3 paid the most to avoid delays when purchasing Item A, but indifference points for Item A never exceeded 17.5% of the initial item price.

T4’s data became more stable in the text-only condition. While there was no clear trend for the fixed-durability items in the with-picture condition, there was an increasing trend for the corresponding items in the text-only condition. T4 showed more sensitivity to delay in the text-
only condition. This held true for both fixed-price and fixed-durability items. T4’s lowest indifference points were at 2.5% of the items’ initial prices, and T4’s highest indifference point was 42.5% for Item A at a 21-day delay. T4 paid most for Item A at all delay values in this condition.
DISCUSSION

Participants chose between paying additional money to receive an item quickly or wait for free shipping. The researchers wanted to learn if participants were significantly more or less likely to pay extra to access goods quickly as a function of the explicit price and implied durability of each good.

In the current study, the researchers defined acquisition costs as a broad class consisting of any costs an organism may incur while working to obtain a good. This class likely includes the price of a good and how much work must be done to actually produce the good. Acquisition costs may also include physical effort expended in locating the good, time spent searching for the good, probability of actually obtaining the good, additional time spent waiting for the good after it has been located and purchased, and effort exerted to decrease wait times. Each of these “costs” might influence choice. Using a behavioral-economic approach, any specific variable that increases the effort required to produce a good can be conceptualized as an additional cost or tax.

The current study attempted to control several variables that were suspected of being acquisition costs. The researchers manipulated 2 additional variables that may fall under the class of acquisition costs. First, the researchers attempted to minimize physical effort expended locating the good by automatically presenting each good and making only one good available at a time. The current study also minimized time spent searching for the good as the apparatus displayed each new good immediately after the participant purchased the previous good. Third, the study consisted of engaging in hypothetical shopping, and the probability of obtaining the good was 1.0 for each purchase. Fourth, the study held each item’s price constant across participants. However, price varied significantly across items. The researchers systematically
varied time spent waiting for the good after purchase and costs associated with decreasing wait
time for the good.

Price consistently exerted the most control over choice, but the control was typically weak to moderate. Two participants showed significant sensitivity to price. This was evidenced by the fact that they never paid more than 23% of the initial items’ prices to get the good quickly, regardless of delay of estimated durability. Most participants showed moderate sensitivity to price. The data show this in two ways. First, these participants made more choices that are described as “self-controlled” for the more expensive goods. For example, most participants paid more to receive the shirt, the lowest-priced item, quickly than any of the $300 items. Participants also showed sensitivity to price in the sense that they consistently drove the shipping fee down to under 40% of the initial item price before selecting the next-day option. Price failed to exert control for one participant. Participant HP5 always paid at least 80% of the initial item price to receive the good quickly. Additional evidence for price as a controlling variable can be seen in Figure 4. Overall, participants spent more to access the fixed-durability goods, which all had lower prices, than the fixed-price goods. With the exception of T3, Figure 15 also shows this effect.

The experimenters defined durability as the amount of time it takes between accessing a good and exhausting the good’s utility, so that the good needs to be replaced. Condition 1 did not define the durability of each item for the participants. Instead, the experimenters wanted to see if it was possible to estimate the durability for each good. Condition 2 explicitly defined the durability for each good. This occurred to control for the lack of defined durability in Condition 1 and to evaluate whether the experimenters’ estimations were accurate.
Figures 1-3 show that participants better tolerated delay for the items that were estimated to have higher durability. However, there were also significant price differences between the fixed-durability and fixed-price goods. This price disparity precludes any strong inferences about durability from Condition 1. Condition 2 better controlled for price by making the fixed-price items only $13 more expensive than the most expensive fixed-durability item. The data from Condition 2 show more evidence of control by durability. Figure 15 shows that for 3 of the 4 participants in Condition 2, the fixed-price goods were discounted less steeply than the fixed-durability goods. This suggests that the explicitly stated durability of each good, 1, 3, and 5 years respectively, increased the participants’ ability to tolerate delays.

Overall, the data from the current study failed to show meaningful or systematic control by durability. This suggests there may not be an “absolute durability” for an item across consumers. As such, durability may not be a very useful dimension when accounting for temporal discounting. Conversely, experimenters selected items based on estimated durability. For example, the experimenters estimated the smart phone to have a durability of 1-2 years, and the bicycle to have a durability of at least 5 years. The data showed that a shared cultural history was insufficient to allow for predictions of item durability. Future research may show that durability does exert control over choice; however, researchers will need to find better methods for predicting item durability. Future research could also focus on using a similar text-only condition to identify the functional durability of an item for an individual. Other studies that have focused on choices regarding goods have explicitly defined how long those goods would last. Under those conditions, participants produced stable choice patterns across goods (Raineri & Rachlin, 1993). Data from those studies and the current experiment suggest that using text to
explicitly generate rules about item consumption may influence consumer choices in ways that alter them significantly from uncontrolled shopping environments.

The experimenters added a second condition as a control comparison for Condition 1. The text-only condition typically produced more “self-controlled” choices and produced more consistent choice patterns overall. This condition also provided some evidence of control via durability. The researchers could not determine if this was a result of explicitly stating price and durability, the lack of a specific item and a picture of that item, or a combination of variables. How these stimuli interact with each other and the consumer’s repertoire needs to be researched further.

Most of the participants showed sensitivity to delay. However, the control exerted by delay was not always consistent. Figure 4 shows that, overall, participants paid more for the next-day option as the delay to free delivery increased. In contrast, delay appeared to exert no control over HP3, HP5, and T1’s choices. They paid roughly equal amounts for the next-day option at the 3-day delay and the 21-day delay. This suggests that even delay may largely gain control through the individual’s history of reinforcement.

The data from the current experiment suggests that substantially more research needs to occur in this area. Researchers need to identify the variables that make up a realistic purchasing environment. Future studies should isolate and systematically manipulate each variable, and the effects on consumer behavior need to be recorded and analyzed. By following a systematic line of research in this direction, science can learn what the critical variables are when dealing with consumer behavior. Findings from that research will then inform the greater choice literature. Future research should also address the inconsistencies between the data from the current study and the studies in which participant choices showed more stability.
The current study differed from other studies in two major ways: 1) the current study asked participants to make choices about price and delay regarding specific consumer goods, and 2) it forced participants to spend hypothetical money versus receiving hypothetical goods or money. Most existing research has focused on money and is structured so that the participants are receiving, not spending, hypothetical money. More research in this area will better inform the field on the applicability of spending versus receiving preparations when studying consumer behavior. Additionally, more research is needed to determine whether participant choices in the current study were the result of extra-experimental reinforcement histories or if they were driven by the fact that the participants were only hypothetically purchasing goods. The participants did not actually spend any money, nor were they ever going to receive any goods. How this influences consumer choice needs further study.

The current study was exploratory in nature and possessed a number of limitations. Several of the participants made errors when bargaining for shipping options. This occurred as a direct result of randomly alternating where the shipping options were located on the display. The experimenters programmed the random rotation to increase the probability that participants would attend to each choice. However, there were clearly times when this proved insufficient, resulting in outliers that interfered with data analysis. Participants almost always gave a spontaneous verbal report of the error immediately after it occurred. Future researchers will want to remedy this issue. One possible solution would involve randomly alternating the location of the shipping options between purchases instead of within the titration.

The items with fixed-prices in Condition 1, selected for their wider ranges of durability, were made significantly more expensive than the fixed-durability items. Future research should better control for price-durability interactions. The experimenters began to address this in the
text-only condition by greatly reducing the price of the fixed-price items. However, the text-only condition also possessed a lower degree of realism than the with-picture condition.

Future research should find more systematic and empirical ways to select items. Researchers could collaborate with those in business in marketing as one option. Those fields have substantial data on how consumers interact with goods, and behavior analysts could utilize those data when formulating future experiments. An especially promising domain may involve working to identify whether a particular good has a normalized or absolute durability. If so, then researchers can better evaluate the effects of item durability on choice. Future research could also ask consumers to give their own estimation for the durability for each of a set of goods. The researcher could then use the current study’s methods to evaluate whether the verbally reported durability for each good corresponds with the discounting functions produced by the participant.

The psychophysical titration procedure has proved very useful in discounting research. Future studies on the current topic should use the titration procedure at different points within the interactions that make up a purchase and more generally, shopping. The current study asked participants to bargain for shipping options, as has past research (Hantula & Bryant, 2005). However, consumers make several choices leading up to the primary purchase. These choice points need further research using realistic preparations.

Despite the shortcomings, the current study proved useful in a number of ways. The current study extended behavior-economic research into situations that attempted to resemble the natural environment. The results also indicate that individuals show a surprising amount of consistency across goods, prices, and delays. This suggests that consumers likely bring repertoires to shopping situations that attenuate the affects of the variables in the immediate shopping context. If the class of responses that constitute a consumer’s “shopping” remains
relatively consistent regardless of the good or price, then marketing departments may benefit from streamlining their approach. Such an approach could focus on the few key variables that will affect consumer choice. Identifying what key variables control consumer choice will benefit both science and business.

The findings from the current study suggested that durability, or how long an item typically lasts before being fully consumed, exerted little control over how much consumers were willing to pay to decrease wait times. The findings also suggest that the control durability exerted varied significantly across goods. Third, the current study showed that durability was specific to the individual and could not be estimated from supposed norms. Under conditions that item durability did appear to exert control, it seemed that the longer a good would last, the less sensitive the individual was to delay. Future research should attempt to replicate the current findings and continue to evaluate what role if any durability plays in consumer choice. Similarly, future research should evaluate whether durability acquires influence over individual goods or classes of goods. If influence is exerted over the latter, then how are these classes organized? Businesses will likely benefit from research that better informs how durability influences choice.

The current study was unable to isolate durability as a controlling property of the target goods. However, the findings did lend support to the notion that there are multiple properties of any good, and that these dimensions can influence how individuals interact with a good. Future research should focus on identifying what these controlling dimensions are. The more science understands about complex consumer behavior, the better informed it will be about choice as a whole.
An account of consumer choice in which immediate environmental variables interact with an individual’s repertoire and history to determine which option is selected should prove useful and thoroughgoing. Such an account is conceptually systematic and lends itself well to a behavioral-economic approach. Similarly, most of the current research seems content to focus on money-only preparations in explicitly defined scenarios. However, an account that focuses on the immediate environment and individual repertoires and that can systematically ask questions about choice in complex environments should eventually lead to the ability to not only describe and predict how an individual will choose, but actually influence individual choices.
Figure 1. With-picture purchases averaged across all participants. The points show the obtained indifference points averaged across participants.
**Figure 2.** Discounting functions plotted across goods for participants 1-6. The upper graphs show data from the fixed-durability goods. The lower graphs display data from the fixed-price goods.
Figure 3. Discounting functions plotted across goods for participants 7-10. The upper graphs show data from the fixed-durability goods. The lower graphs display data from the fixed-price goods.
Figure 4. With-picture purchases averaged across all participants. The points show the obtained indifference points averaged across participants. The left graph shows averaged indifference points for the fixed-durability goods. The right graph displays averaged indifference points for the fixed-price goods.
Figure 5. Indifference points from HP1 plotted on logarithmically-scaled y-axis.
Figure 6. Indifference points from HP2 plotted on logarithmically-scaled y-axis.
Figure 7. Indifference points from HP3 plotted on logarithmically-scaled y-axis.
Figure 8. Indifference points from HP4 plotted on logarithmically-scaled y-axis.
Figure 9. Indifference points from HP5 plotted on logarithmically-scaled y-axis.
Figure 10. Indifference points from HP6 plotted on logarithmically-scaled y-axis.
Figure 11. Indifference points from T1 plotted on logarithmically-scaled y-axis.
Figure 12. Indifference points from T2 plotted on logarithmically-scaled y-axis.
Figure 13. Indifference points from T3 plotted on logarithmically-scaled y-axis.
Figure 14. Indifference points from T4 plotted on logarithmically-scaled y-axis.
Figure 15. Indifferences points from text-only condition. Each row shows the data from one participant. The first row shows T1’s data, and the following rows show the data from the corresponding participants.
REFERENCES


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