

When Less is More: Consumer Aversion to Waste

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The present research investigates consumer aversion to waste. We propose that the anticipation of unused product utility (1) causes consumers to forfeit desired utility, (2) exerts unequal influence on consumers depending on whether the purchase involves a good or a service, and (3) has important implications for value-based pricing, inter-firm competition, and risk-seeking behavior.

One day Beatrice entered their stateroom to find Marconi consigning his dirty socks to the sea through a porthole. Stunned, she asked him why. His explanation: It was more efficient to get new ones than wait for them to be laundered. (Larson 2006, p. 286)

We might surmise that Beatrice's reaction was driven not by rational considerations of net utility but rather by aversion to the loss of unused utility—or, more commonly, aversion to waste. If so, this anecdote represents another instance in which people forego utility maximization in the service of some other objective. Perhaps the most recognized manifestation of such behavior occurs when consumer assessment of a vendor's price is driven by transaction utility rather than acquisition utility (Bolton, Warlop, and Alba 2003; Kahneman, Knetsch, and Thaler 1986; Thaler 1985). In the present research we examine waste aversion as a constraint on consumers' pursuit of utility. We contend that waste aversion—a phenomenon that is largely independent of vendor behavior—exerts a significant, seductive, but largely obscure influence on consumer decision making.

Aversion to waste is a matter of common, perhaps universal, experience. “Waste not, want not” is an intuitively appealing heuristic that serves us well when resources are constrained. However, as with many useful rules, aversion to waste can be overgeneralized (Arkes 1996). Thus, it is unfortunate that waste aversion has been virtually ignored as a subject of scientific inquiry. The primary exception has been the work of Arkes, who first broached waste as an explanation for the sunk-cost bias (Arkes and Blumer 1985; see also Arkes 1996). According to this formulation, people persist in a losing endeavor because abandonment would imply that prior investments in the endeavor have been wasted.

To our knowledge, extension of Arkes's insightful observation has been rare and narrow in scope, taking place almost entirely within the context of product-replacement decisions. Cripps and Meyer (1994) characterized product replacement as an optimization problem that trades off the cost of replacing an old product with a newer version against the opportunity costs of not switching to an improved version. Their investigation revealed sensitivity to this tradeoff but also an irrational sensitivity to the age of the incumbent version, such that consumers feel a need to amortize the prior purchase prior to replacement. Okada (2001; see also 2006) focused on the amortization component, arguing that replacement is resisted until the "mental book value" of the old purchase has been written off, that is, until one's "money's worth" has been received.

Although compelling in its own right, we argue that prior research understates the biasing influence of waste aversion on consumer behavior. The present research departs from the replacement paradigm in several ways that speak to broader application. First, unlike the inherently retrospective effects of sunk costs, we argue that consumers forego future utility because they anticipate waste in their purchase, consumption, duplication, and disposal of potential purchases. Second, by not constraining the investigation to replacement, we are able to investigate choice among competing options. Finally, and perhaps most important, we examine different determinants of waste, showing how alternatives that are comparable in utility can evoke very different purchase intentions.

We begin with two demonstration studies that convey both the intuition behind our reasoning and its potential relevance to everyday consumer behavior.

TOWARD AN APPRECIATION OF WASTE AVERSION

The following two demonstration studies offer an initial test of waste aversion in a non-replacement context. A primary objective is to provide a perspective on waste that has not been captured by prior research and, we believe, routinely eludes consumers.

Method

Subjects and Design. Participants were staff and students of two universities and a hospital who received financial remuneration for their participation. Two contexts were examined. Each context involved a 2-group (waste vs. no waste) between-subjects design, with each context accompanied by its own within-subject version. A total of 234 participants completed the task. Each participant was exposed to only a single context.

Demonstration 1. The first demonstration examined a purchase context in which two offerings provide equivalent levels of utility at an equivalent price but differentially cue waste. In the between-subjects version, participants were asked to read one of the following scenarios:

Anne has a dinner party for some friends. She buys a fondue set and ingredients for a fondue dinner. The dinner party costs her \$250. Her friends enjoy the meal and have a good time. She never uses the fondue set again. [waste condition]

Jane has a dinner party for some friends. She reserves dinner at a fondue restaurant. The dinner party costs her \$250. Her friends enjoy the meal and have a good time. [no-waste condition]

Note that waste in these scenarios arises naturally from the inherent nature of the products (a tangible good versus a less tangible service). In the waste condition, the tangible good (fondue set) has additional unused utility that represents waste; in the no-waste condition, the intangible service (restaurant) does not.

After reading one of the scenarios, participants were then asked “What is your impression of Jane/Anne?” They responded by rating Jane or Anne on the following five-point scales (anchored by disagree/agree): “intelligent”, “foolish”, and “sensible.” After an open-ended thought-listing task, participants further rated Jane or Anne as wasteful, generous, and creative, and the dinner party as good quality, fun, and delicious (also on five-point scales).

In the within-subject design, participants in a third group read both descriptions and provided categorical responses (“Jane,” “Anne,” and “No difference”) to questions about which individual was more intelligent, foolish, and sensible. After an open-ended thought-listing task, participants then identified which individual was more wasteful, generous, and creative, and whose dinner party was more good quality, fun, and delicious.

Demonstration 2. The second demonstration involved purchase of one of two entertainment-related services that were designed to provide equivalent levels of utility at an equivalent price but to differentially cue waste. In the between-subjects version, participants were asked to read one of the following scenarios:

Chris is traveling on business and unexpectedly detained overnight for one night in a strange city. He enjoys working out so, to entertain himself, he goes to a nice fitness club. It costs him \$75 for a one-month membership. The club is members-only, and one month is the shortest membership period allowed. [waste condition]

Chris is traveling on business and unexpectedly detained overnight for one night in a strange city. He enjoys professional sports so, to entertain himself, he goes out to see a game at the stadium. The ticket costs \$75. [no-waste condition]

Note that, in contrast to the fondue scenarios, the tangibility of the purchase is low in both conditions and that neither purchase provides a post-purchase residual. Also note that seller constraints (i.e., minimum purchase requirements), rather than deliberate action on the part of the consumer, give rise to unused utility in the waste condition.

After reading one of the scenarios, participants were asked for their impressions of Chris on the following five-point scales (anchored by disagree/agree): “intelligent”, “foolish”, and “sensible.” After an open-ended thought-listing task, participants then indicated their agreement (on four five-point scales) with the following: “Chris is wasteful”, “Chris enjoyed himself”, “Chris’ evening was low quality”, and “Chris did not get his money’s worth”.

In the within-subject version, participants in a third group read that Chris was considering both of the options. They then provided categorical responses (“Option 1”, “Option 2”, and “No difference”) to questions about which option was more intelligent, foolish, and sensible. After an open-ended thought-listing task, participants then identified which option was more wasteful, enjoyable, low quality, and worth the money.

Results

Demonstration 1. In the between-subjects design, an intelligence index for Jane/Anne was created by averaging the items assessing intelligence, foolishness (reverse-coded), and sensibleness (coefficient $\alpha = 0.73$). As expected, an ANOVA of the intelligence index revealed significantly lower ratings in the waste (vs. no-waste) condition ($F(1, 73) = 18.90, p < .01$). Correspondingly, waste perceptions were also higher in the waste (vs. no-waste) condition ($F(1, 73) = 12.33, p < .01$); other differences were non-significant (with one marginal exception).¹ When waste perceptions were added to the model predicting the intelligence index, the covariate was significant ($F(1, 71) = 9.18, p < .01$), and it rendered the waste manipulation non-significant ($F(1, 71) = 1.33, p = .25$). These results satisfy the criteria for mediation.

In the within-subject design, the purchaser of the more wasteful offering was perceived as less intelligent, less sensible, and more foolish (see table 1). These results are consistent with the between-subjects findings.

Thus, it seems perfectly reasonable to consumers to spend a considerable amount of money for a service that is ephemeral (restaurant-prepared fondue experience) than to spend the same amount on a good (fondue set) that is not ultimately reused. Interestingly, a significant proportion of respondents in the within-subject design perceived no difference across purchase offerings for intelligence, foolishness and sensibleness. This result is striking because it suggests these participants perceived waste aversion as

¹ Perceptions of generosity were marginally higher in the no-waste group ($F(1, 73) = 3.81, p = .06$). A mediational analysis supports waste and generosity together as mediators.

“irrational” (i.e., waste “should not matter”) when the equivalent utility offered by the two options was made transparent.

 Insert table 1 here.

Demonstration 2. Although both options in the present case were intangible (athletic experiences), an ANOVA of the intelligence index (coefficient $\alpha = 0.77$) again revealed significantly lower ratings in the waste (vs. no-waste) condition ($F(1, 59) = 73.19, p < .01$). Correspondingly, waste perceptions were higher in the waste (vs. no-waste) condition (waste: $F(1, 59) = 70.01, p < .01$; money’s worth: $F(1, 59) = 54.68, p < .01$); other differences were non-significant. When waste perceptions were added to the model predicting the intelligence index, the covariate was significant ($F(1, 57) = 14.72, p < .01$), and it rendered the waste manipulation non-significant ($F < 1$). These results satisfy the criteria for mediation.

In the within-subject design, purchase of the option that entailed unused utility was perceived as less intelligent, less sensible, and more foolish. In addition, the majority of respondents also judged that option to be more wasteful, but perceived the options to be equivalent on enjoyment and quality. These results are consistent with the between-subjects findings (see table 1).

Thus, in both designs, consumers found it less intelligent to purchase a month-long club membership to attain a single day of utility than to make an equivalent outlay for an equivalent amount of utility when the purchase situation did not entail waste. Such preferences may be viewed as irrational inasmuch as they demonstrate a constraint on the pursuit of utility.

Discussion

Taken together, these results demonstrate waste aversion in routine purchase behavior. We argue that such preferences are irrational inasmuch as they demonstrate a constraint on the pursuit of utility; that is, although both offerings provide equivalent utility, the wisdom of purchasing the offering with additional unused utility seems questionable. The primary objective of these demonstrations was to illustrate the powerful influence of waste aversion in ecologically plausible situations. If the two options within each scenario do not seem ecologically frequent, the reason may be that consumers rarely consider them as comparable alternatives, not because they lack comparability.

We acknowledge that pursuit of our primary objective involved a tradeoff against experimental control, inasmuch as the competing options within each demonstration context may have differed on dimensions other than implied waste. Although we are sensitive to the problem, we also make the following observations: (1) Waste perceptions differed significantly across conditions and were shown to mediate the observed differences in both demonstration contexts. (2) In our choice of stimuli, a deliberate attempt was made to minimize differences other than waste. For example, much of the labor for a fondue meal is performed by the consumer regardless of whether consumption takes place in a restaurant or a home. Similarly, a mental-budgeting explanation seems unlikely given that the expense should have been deducted from a common entertainment or food budget. (3) Differences other than waste were also measured and could not

account for the findings. In particular, it is important to note that perceptions pertaining to the quality and enjoyment of the options were equivalent across the waste and no-waste conditions in both demonstration studies. (4) The present results are entirely consistent with the more tightly controlled experiments that follow.

It is also important to note that these scenarios were constructed in ways that can be construed as offering a conservative test of our basic contention. In demonstration 1, waste arising from purchase of the good was unforeseen; that is, it would have been even more irresponsible and wasteful if Anne had known she would never use the fondue set again. Moreover, nothing in the scenario ruled out the possibility that she could re-sell the good and thereby recoup some of her initial investment. In demonstration 2, waste arising from purchase of the club membership was outside Chris's control, resulting instead from the vendor's pricing policy. Insofar as controllability and foreseeability affect attributions of responsibility and wastefulness, the results may understate the influence of waste as it is encountered in everyday life. Indeed, demonstration 1 arises from two naturally occurring choice options (a good versus a service) that are beyond both consumer and vendor control but instead are inherent in the products' natures. As such, the potential ubiquity of our effect is illustrated. Many competing avenues to utility may never be perceived by consumers to be substitutes because the perceived waste associated with some of the options may preclude their consideration.

STUDY 1: WASTE AVERSION AND TANGIBILITY

The first and foremost objective of the present study is to test our waste-aversion hypothesis with a more tightly controlled design. Whereas the previous studies demonstrated waste aversion by making comparisons across product offerings, the present experiment accounts for differences in experienced utility through the use of no-waste control groups. Specifically, waste was manipulated by omitting or presenting a prior purchase cue. To enhance generalizability and provide a stricter test of rationality, the present study requires consumers to assess their own behavior about a future purchase rather than the described purchase behavior of other consumers. Thus, rather than focusing on social impressions, participants were asked to make a purchase decision about a product or service that provided much desired utility.

A second important objective of the present study is to investigate consumer response as a function of purchase tangibility. Our original but tentative hypothesis was that the waste effect is driven by tangibility, because waste commonly refers to “throwing away” something that is still usable. Results from the first demonstration were consistent with this hypothesis. Purchase of a once-used fondue set was deemed more wasteful than purchase of a restaurant-prepared fondue meal. However, the second demonstration produced analogous results when two intangibles were compared, indicating that waste perceptions are driven not by tangibility, *per se*, but by the existence of unused utility. In retrospect, this finding is intuitively appealing because money is the common denominator behind all purchases—regardless of their tangibility—and most consumers are averse to wasting money.

Nonetheless, the issue may be more complex than it first appears. If consumer response is driven solely by the waste of money, tangibility should exert no effect. Consumers who pay an equivalent amount of money to obtain an equivalent amount of utility should be indifferent to in/tangibility of the offerings. This view is consistent with value-based pricing, as well as with Okada's (2001) assertion that consumers create a "mental book value" and seek to get their money's worth from any purchase. Hence, the appropriate prediction is that consumers should be indifferent to waste as long as they receive an acceptable amount of value (or get their money's worth) from a purchase. However, if consumer response is driven by unused utility, tangibility may play a role—inasmuch as tangible goods may afford a greater opportunity for waste.

Although we recognize that goods and services may differ on dimensions other than tangibility (Zeithaml, Parasuraman, and Berry 1985), tangibility is a natural correlate of unused utility because tangible goods "live on" after consumption whereas services leave no residual trace. Accordingly, we suggest that consumer response to otherwise equivalent good and service offerings will differ in systematic ways that are driven by an aversion to "throwing away" unused utility that endures even after consumers have achieved their purchase objective. Moreover, we argue that one critical difference in consumer response involves self-denial of utility that could be obtained from a prospective purchase.

The present study tests this tangibility hypothesis by comparing re-purchase of a good to re-purchase of a service.² Consistent with our waste-aversion hypothesis—and in fulfillment of our first objective—we predict waste aversion in consumers' own

² Although we recognize a lack of precision, we refer to goods and services for ease of exposition. Our underlying hypothesis pertains to the tangibility of previous or future purchases. To enhance robustness, tangibility is operationalized in different ways across studies.

judgments for re-purchase of the tangible good versus a no-prior purchase control. The service conditions, lacking unused utility, may be viewed as control groups representing utility-maximizing behavior. Consistent with the tangibility hypothesis—and in fulfillment of our other primary objective—we predict greater waste aversion arising from re-purchase of a good than re-purchase of a service. Moreover, we argue that waste aversion arising from unused utility in the tangible good is irrational inasmuch as it represents a rejection of an otherwise acceptable level of utility (as reflected in the service conditions).

Method

Subjects and Design. Participants were staff and students of two universities and a hospital who received either financial remuneration or extra credit for their participation. The design was a 2 (good vs. service) x 2 (past purchase vs. none) between-subjects design. A total of 128 participants were randomly assigned to one of four conditions.

Materials and Procedure. All participants read the following scenario, which was intended to convey a nontrivial consumer need:

Imagine that you are a parent on vacation with your two children. You are returning home and learn that your flight has been delayed for several hours. You need to find a way to entertain the children during this time.

In the good condition, the scenario continued as follows (with the past purchase manipulation shown in brackets):

Now imagine that the airport has a store selling board games. In the store, you find a game: it is a popular one that entertains children well, and the children are very enthusiastic to play it. [It is a game that you have already purchased for the children to play with at home.] The total price will be \$20 to purchase the board game for your children to play.

In the service condition, the scenario instead continued as follows (with the past purchase manipulation again shown in brackets):

Now imagine that the airport has a cinema showing movies. The cinema has a children's movie: it is a popular one that entertains children well, and the children are very enthusiastic to see it. [It is a movie that you have already paid for the children to see at the cinema at home.] The total price will be \$20 to purchase the tickets for your children to see the movie.

Participants then rated “How likely are you to purchase the [game / movie tickets]?” on a seven-point scale (anchored by “very unlikely/very likely”). Participants were then asked “How would you rate the item that you purchased?” and rated it as wasteful, enjoyable and good quality on three five-point scales (anchored by “disagree/agree”).

Results

An ANOVA of purchase likelihood revealed a significant effect of past purchase cue ($F(1, 124) = 14.54, p < .05$), qualified by its interaction with good/service ($F(1, 124) = 4.43, p < .05$). The pattern of means in table 2 and figure 1 is supportive. Purchase of a good declined after past purchase of a good ($F(1, 124) = 17.10, p < .05$); re-purchase of a service did not decline ($F(1, 124) = 1.45, p = .22$).

Waste ratings produced a similar pattern of results. An ANOVA revealed a significant effect of past purchase cue ($F(1, 124) = 4.86, p < .05$), qualified by its interaction with good/service ($F(1, 124) = 5.94, p < .05$). For a good, re-purchase increased waste ratings ($F(1, 124) = 10.52, p < .05$); for a service, re-purchase did not affect waste ratings ($F < 1$).

A mediational analysis was conducted to examine the role played by waste perceptions. As reported previously, both purchase likelihood and waste ratings were a function of the two-way interaction of good/service and past purchase/none. When waste ratings were added to the model for purchase likelihood, waste was a significant predictor ($F(1, 123) = 25.89, p < .01$) and the two-way interaction was rendered non-significant ($F(1, 123) = 1.36, p = .25$). These results support mediation.

Alternative explanations based on the quality or enjoyment of the offerings received little support. Substituting these measures for perceived waste, the two-way interaction was non-significant for enjoyment ($F(1, 124) = 1.04, p = .31$) although, unexpectedly, significant for quality ($F(1, 124) = 4.67, p < .05$). However, the pattern of means for quality cannot account for likelihood ratings, and a mediational analysis was wholly non-supportive. Moreover, an analysis that controls for quality also supported the mediating role played by waste perceptions.

 Insert table 2 and figure 1 about here.

We interpret the results in terms of waste aversion, to wit, tangible goods “live on” and therefore present consumers with the dilemma of being wasteful—even when the purchase has provided a desired amount of needed utility. Purchase avoidance, as a

response to anticipated waste, seems irrational, especially in comparison to the service conditions and consumers' willingness to pay an equal sum for comparable utility.

The next two experiments were designed to provide additional tests of the tangibility hypothesis while extending its application context and further strengthening the experimental design.

STUDY 2: BUYING VERSUS RENTING

An interesting consumer context that invokes tangibility is the buy-versus-rent decision. Consumers often face this choice, and rental markets have been receiving increasing attention from researchers (Pocheptsova, Kivetz, and Dhar 2007). We use the buy-rent distinction to provide converging evidence of the effects of tangibility and to illustrate the broader influence of waste aversion.

We examine the situation in which consumers engage in purchase or rental of a good, following prior purchase, prior rental, or mere prior trial. (The latter condition was included as an additional control group.) Our reasoning regarding waste aversion and tangibility leads to the predictions that consumers should be (a) averse to re-purchase of a good and (b) more averse to re-purchase of a good than to re-purchase of a rental or purchase of a good following prior rental or prior trial. Tangible goods endure and contain unused utility that is aversive; rental purchases leave no residual trace (akin to the service argument in study 1) and are less susceptible to waste aversion. As in the preceding studies, we argue that perceived waste is embodied in unused utility but that tangibility of the purchase illuminates the potential for waste to the consumer. In the

present context, tangibility is a natural correlate of unused utility in the buy/rent comparison.

Method

Subjects and Design. Participants were staff and students of two universities and a hospital who received financial remuneration for their participation. They were randomly assigned to one of six cells in a 3 (past purchase: good purchase vs. rental vs. trial) x 2 (present purchase: good purchase vs. rental) between-subjects design. A total of 172 participants completed the task. An additional 20 participants were eliminated for failure to follow instructions.³

Materials and Procedure. Participants read the following scenario (with past and present purchase manipulations shown in square brackets).

Imagine that you are traveling on business. Unexpectedly, you have several days off and decide to go to a local resort. It turns out that, among other things, the resort offers snowshoeing as a sporting activity. [Back home last season, you rented snowshoes several times and really enjoyed it. / Back home last season, you bought snowshoes and used them several times and really enjoyed it. / Back home last season, you tried snowshoeing several times and really enjoyed it.] It will cost you \$100 to [buy/rent] snowshoes to use during your visit to the resort.

Participants were then asked “How likely are you to [buy/rent] the snowshoes?” and responded on a seven-point scale (with endpoints “very unlikely/very likely”). After an

³ These participants completed the study in an unrealistically short amount of time (less than 1 minute). An alternative analysis based on participants who correctly answered manipulation-check items was also supportive.

open-ended thought-listing task, participants responded to several additional background items.

Results and Discussion

We hypothesized that consumer aversion to re-purchase of an offering would vary as a function of tangibility. The descriptive data in figure 2 are supportive, indicating a particular unwillingness to purchase currently desired utility when in the form of a good that had been purchased on a previous occasion.

Planned interaction contrasts indicated that purchase ratings for the goods purchase versus rental did not differ as a function of past trial or rental ($F < 1$) but did differ when contrasted to past purchase ($F(1,166) = 4.92, p < .05$). When past purchase entailed a good, current purchase declined for purchase versus rental of the good ($F(1,166) = 11.18, p < .05$). When past purchase entailed rental or trial, current purchase did not differ for purchase or rental of the good ($F's < 1$).

Participants' responses were coded by two independent judges to identify explicit consideration of waste. (Judges were blind to experimental condition, and inter-coder agreement was 81%.) Categorical analysis of waste versus non-waste rationales revealed a non-significant interaction contrast for goods purchase versus rental as a function of past trial or rental ($\chi^2 = 0.00$) but a significant interaction contrast when past trial and rental were contrasted against past purchase ($\chi^2 = 5.90, p < .05$). When past purchase entailed a good, mentions of waste increased for purchase versus rental of the good ($\chi^2 = 7.44, p < .01$); when past purchase entailed rental or trial, mentions of waste did not differ

for purchase or rental of the good (p 's > .80). When conditionalized on rationale, purchase ratings were lower for participants who provided waste-related rationales than participants who provided non-waste rationales ($M_{waste} = 3.42$ (1.58) vs. $M_{no-waste} = 5.24$ (1.30); $F(1,167) = 66.73, p < .01$).

A mediational analysis was conducted to examine the role played by waste rationales. As reported previously, the planned interaction contrast of focal interest affected both purchase ratings and rationales. When waste rationales were added to the model for purchase ratings, waste was a significant predictor ($F(1,164) = 55.34, p < .01$) and rendered the planned interaction contrast non-significant ($F < 1$). These results satisfy the criteria for mediation.

 Insert figure 2 about here.

Thus, tangibility of the current purchase was irrelevant when it followed past rental or trial; that is, consumers were equally willing to rent or purchase the good. In contrast, tangibility did matter when the current purchase followed past purchase of a good; that is, consumers were more willing to rent than re-purchase the good. In this case, the tangible good “lived on” and contained additional utility that could not be enjoyed; rental of the good did not. Although both rental and purchase provided equivalent utility at the same price in the consumption setting, consumers nonetheless preferred to rent to avoid waste inherent in duplicate purchase of the good. Such behavior may be deemed irrational in the sense that it represents rejection of an otherwise acceptable level of utility for an equivalent outlay (as reflected in the rental and trial conditions).

Finally, we note an element of conservatism in the results. Rental arguably offered lower value to the consumer, inasmuch as nothing in the scenario prohibited post-purchase re-sale or further use of the good to recoup a portion of the original investment.

STUDY 3: RISK AVERSION AND WASTE AVERSION

Evidence thus far suggests that consumers will exhibit waste aversion in the face of unused utility and that unused utility may be a particular problem in the case of goods. If waste is truly aversive, we should expect consumers to be willing to incur costs—such as assuming more risk—to avoid waste. In the present study, consumers were asked to choose among two product offerings, where preference for the first option was known and favorable but preference for the second option was unknown. We argue that consumers will increasingly prefer the unknown option (i.e., risk-seeking behavior) in order to avoid waste arising from unused utility. Waste was manipulated via duplicate purchase of the good and was contrasted to duplicate purchase of a service which, based on the preceding logic and results, may be viewed as akin to a control group.

Method

Subjects and Design. Participants were undergraduate students who received extra credit in an introductory marketing class. They were randomly assigned to one of four cells in a 2 (good vs. service) x 2 (past purchase vs. none) between-subjects design. A total of 138 participants completed the task.

Materials and Procedure. In the good condition, participants read the following scenario (with the past purchase cue shown in brackets):

Imagine that you are a parent on vacation with your children. You are returning home and you learn that your flight has been delayed for several hours. You need to find a way to entertain the children during this time. The airport store has 2 games that are suitable for children. The first game is one that the children have already played so you know they will enjoy it. (It is a game that you have already purchased for your children at home.) You don't know much about the second game so you are not sure whether the children will enjoy it.

In the service condition, participants read a similar scenario that substituted a service for the good (with the past purchase cue again shown in brackets):

Imagine that you are a parent on vacation with your children. You are returning home and you learn that your flight has been delayed for several hours. You need to find a way to entertain the children during this time. The airport has a cinema that is playing 2 children's movies. The first movie is a film that the children have seen so you know they will enjoy it. (It is a film that you have already purchased for your children on video at home.) You don't know much about the second movie so you are not sure whether the children will enjoy it.

Participants were then asked to indicate "Which movie/game would you buy at the airport?" on a seven-point scale (with endpoints indicating "option 1" and "option 2"). Option 2 represented the uncertain option. Afterward, participants provided reasons for their judgments.

Results

We hypothesized that consumers would prefer an unknown option when the alternative entailed waste (arising from duplicate purchase of a good). As shown in figure

3, purchase ratings of the previously purchased product varied as a function of the interaction of good/service and the past purchase cue ($F(1,134) = 8.46, p < .01$). In the good conditions, purchase of the known option declined when the past purchase cue was present ($F(1,66) = 10.43, p < .01$). In the service conditions, the past purchase cue had no effect ($F(1,68) = 1.00, p = .32$). Viewed another way, the good was preferred to the service when past purchase was not cued ($F(1,68) = 7.52, p < .01$) but not when past purchase was cued ($F(1,66) = 2.16, p = .15$).

Participants' responses were coded by two independent judges to identify explicit consideration of waste. (Judges were again blind to experimental condition and attained an 85% level of agreement). Categorical analysis of waste versus non-waste rationales revealed a significant interaction of good/service and past purchase cue ($\chi^2(1) = 22.24, p < .01$) such that more reasons reflected waste consideration for goods than services when past purchase was cued versus not cued. When conditionalized on rationale, purchase ratings were lower for participants who provided waste-related rationales than participants who provided non-waste rationales ($F(1,135) = 55.21, p < .01$).

An analysis was conducted to test whether waste rationales play a mediating role. As reported previously, the interaction of good/service and past purchase cue affected both purchase ratings and rationales. When waste rationales were added to the model for purchase ratings, waste was a significant predictor ($F(1,132) = 47.56, p < .01$) and rendered the interaction non-significant ($F(1,132) = 2.66, p = .11$). These results satisfy the criteria for mediation.

Insert figure 3 about here.

Discussion

The present study suggests that consumers will prefer options of unknown utility to avoid waste. In the absence of a previous purchase, consumers show a sensible willingness to purchase a good that ensures utility over a good of unknown appeal. However, this tendency is reduced when utility is obtained from re-purchase of a good. That is, risk-seeking behavior ensues as consumer preference for the option of unknown utility increases—suggesting that consumers look ahead to the final disposition of goods when making choices.⁴ In the service conditions (acting as control groups), consumers are unaffected by past purchase of the good—suggesting that it is the unused utility in the current offering that makes waste salient and leads to preference for the unknown option. The tangible good “lives on” and contains additional utility that will not be enjoyed; the service does not. As before, waste aversion in the case of goods seems irrational, inasmuch as it represents a rejection of an otherwise acceptable and known level of utility (as reflected in the corresponding service conditions). As a result, goods providers may be more susceptible than service providers to waste aversion that arises from past purchase and therefore less able to charge a price commensurate with an offering’s present utility.

⁴ In the reported experiment, we manipulated waste via past purchase of the product. However, participants may have avoided repurchase of the good due to a desire to avoid the unnecessary inventory costs associated with possessing two identical versions. In a follow-up study, we examined the case of reusable goods when circumstances prevent storage and re-use; that is, waste derived solely from making duplicate purchases. Participants responded to a similar scenario in which waste of the good was cued via past purchase or via luggage limits that prevented taking the good home. Participants were less likely to purchase the good when either waste cue was provided.

GENERAL DISCUSSION

We find that consideration of waste affects consumer response in a variety of ways that go beyond the pedestrian desire to avoid the wasting of money or the quite important desire to avoid ecological damage. We first demonstrate consumer aversion to waste when judging the purchase behavior of others. Purchases that involve waste lead to more negative evaluations than do purchases devoid of waste—even when the purchase options are equivalent in terms of utility and price. We further show that consumers are averse to the prospect of unused utility in their own forward-looking purchase intentions and, moreover, that the likelihood of foregoing desired utility in order to avoid waste may be greater when the prospective purchase involves more tangible goods than less intangible services (study 1). The latter effect is then shown to influence buy-versus-rent decisions (study 2) and willingness to make riskier choices (study 3). Taken together, the results indicate a shortage of rationality in decision making in the sense that consumers shun utility that is desirable, adequate for the need context, and priced at a level deemed acceptable for an equivalent purchase that lacks waste.

Despite ample precedents in the literature, the usual caveats apply to scenario-based laboratory research. However, we do note the use of multiple operationalizations of tangibility (e.g., good vs. service, buy vs. rent), multiple measures of waste (e.g., self-reported perceptions, coding of cognitive responses), and consistently supportive mediational analyses. The converging evidence supports our fundamental assertion of a broad influence of waste aversion on consumer response—an influence that has gone

largely unrecognized, has implications for other consumption phenomena, and is ripe for future research.

Implications and Future Research

A better understanding of the role played by waste in consumer response to product offerings is important to firms for several reasons. Fundamentally, waste aversion is another example of the limitations of value-based pricing: consumer preference for a higher-value option is reduced when the option entails unused utility. Moreover, waste can shift preference among goods and services. For example, consumers may prefer a service over a good when the good entails unused utility, even when both offer equivalent utility. As a result, service providers may be less vulnerable to waste aversion and therefore more able to charge a price commensurate with an offering's utility. These findings offer further evidence that goods and service providers (including renters) have differential competitive (dis)advantage in the marketplace (cf. Bolton et al. 2003; Bolton and Alba 2006).

In addition to the implications for value-based pricing and competition, there are many other potential implications of waste aversion. We focus on three areas that merit further investigation: bundling, purchase versus consumption, and waste mitigation.

Bundling. Prior research finds that purchase of a core product declines when the add-on is unattractive because consumers infer that the core purchase is lower quality (Simonson, Carmon, and O'Curry 1994). However, prospective considerations of waste

could also reduce the attractiveness of a bundle. An obvious example consists of the case in which the bundle contains multiple copies of the same product and the size of the bundle exceeds the consumer's ability or opportunity to consume it (see, e.g., Venkatesh and Mahajan 1993). Another example is the situation in which new features are added to a product, thereby increasing its utility. Intuition and past research suggest that the addition of utility will increase the attractiveness of an offering (Nowlis and Simonson 1996). However, consumer welfare is not always enhanced. Consumers may overestimate the utility of extra features prior to purchase (Zhao, Meyer, and Han 2006), and the presence of unnecessary features may reduce post-purchase utility via "feature fatigue" (Thompson, Hamilton, and Rust 2005).

To examine an alternative perspective, we conducted a study to determine if waste aversion arising from unused utility in a feature bundle can arise *prior* to purchase and thereby *decrease* the attractiveness of an offering. Specifically, we presented participants with the following scenario (with the waste manipulation in square brackets):

You read about a new money management software program. (Assume that you do not own such software but are interested in buying it.) The software program allows you to track expenses and budget your finances, and manage credit cards and bank accounts and loans. It will also manage your investments, handle your taxes, and has extensive other features aimed at personal money management. (For example, it also contains software to manage medical expenses and health insurance, to manage expenses of dependents, and so on.) The price seems reasonable and the software more than fits all of your current needs. [(Indeed, you doubt you will use a number of its features.) / omit]

Results showed a significantly lower purchase likelihood when the product was portrayed as providing features that would go unused ($p < .05$). Further, perceived waste arising from unused features ($p < .05$) mediated the effects on purchase likelihood. Consumers may have inferred that they were wasting money on unnecessary features,

even though there was no mention of a simpler, lower priced version or of the costs associated with producing the fully loaded offering. Thus, consumers may forego purchase of desired utility (at a “reasonable” price) when it is packaged with undesired utility. This result adds a dimension to the study of consumer preference for bundles that merits further research.

Purchase versus Consumption. The present research has focused on how waste aversion affects purchase intentions rather than consumption. Interestingly, Soman and Gourville (2001) find that consumers are more likely to forego post-purchase consumption of a benefit when its purchase was part of a larger bundle (e.g., 4-day ski pass vs. 4 individual day-tickets). From our perspective, foregoing consumption of a portion of a bundle (where the majority of the bundle has been consumed) is less wasteful than foregoing an equivalent amount of freestanding utility (that is otherwise desirable). Using a very different paradigm, however, Wansink (e.g., Wansink, Painter, and North 2005; Wansink 1996) finds that bundling via larger portion size and package size increases consumption. From our perspective, aversion to waste may be one reason (among several) why people consume beyond satiation. More generally, differential salience of waste during purchase versus consumption may have detrimental effects on consumer satisfaction and welfare. Consumers may reject utility due to the salience of waste prior to purchase (as demonstrated herein) or suffer a decline in post-purchase satisfaction (or overconsumption) if waste becomes salient after the fact. To our knowledge, models of consumer preference and satisfaction have not considered these potential dynamics of waste.

Mitigating Waste. Prior research suggests that sunk-cost and product-replacement biases can be mitigated when decision makers can recoup a portion of a past investment (Arkes 1996; Okada 2001). A similar result may occur in prospect; that is, waste aversion may be mitigated when buyers know they can recoup a portion of the unused utility inherent in their purchase. For example, our own preliminary research suggests that consumers prefer renting to buying when a purchase entails waste but prefer buying to renting when the good can be donated or re-sold. One implication is that the unused utility inherent in a tangible good provides a competitive advantage to sellers when a secondary market for such goods exists. More generally, secondary markets can be effective at reducing waste perceptions and “undoing” the unused utility of a product purchase. Witness, for example, the popularity of the “unconsumption” website, Freecycle, that helps consumers to pass on items with unused utility (Walker 2007). Moreover, companies that can reduce unused utility in their product offerings, whether via customization or leveraging of new technologies, may achieve competitive advantage in the marketplace (Bulkeley 2006). Thus, finding ways to help consumers avoid waste can benefit both consumers and firms. Less is, indeed, more—when more entails waste.

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TABLE 1: DEMONSTRATIONS OF WASTE AVERSION

Demonstration 1	N	Intelligence index	Waste-fulness	Generosity	Creativity	Good quality	Fun	Delicious
Waste (Anne/fondue set)	38	2.70 (0.60)	3.66 (1.05)	3.58 (1.13)	3.11 (1.06)	3.95 (0.93)	4.13 (0.99)	4.03 (1.03)
No waste (Jane/restaurant)	37	3.30 (0.59)	2.78 (1.11)	4.05 (0.97)	3.16 (0.96)	3.84 (0.93)	3.95 (0.97)	3.78 (1.00)
Within-subject (% choice)	49	Jane-30% Anne-22% Nodiff-48%	Jane-16% Anne-67% Nodiff-16%	Jane-37% Anne-12% Nodiff-51%	Jane-8% Anne-73% Nodiff-18%	Jane-43% Anne-16% Nodiff-41%	Jane-16% Anne-37% Nodiff-47%	Jane-31% Anne-8% Nodiff-61%
Demonstration 2	N	Intelligence index	Waste-fulness	Enjoyment	Good quality	Did not get \$ worth	N/A	N/A
Waste (club)	27	3.10 (0.59)	4.04 (0.81)	4.19 (0.62)	2.15 (0.77)	4.26 (0.98)		
No waste (stadium)	34	4.37 (0.57)	2.18 (0.90)	4.35 (0.60)	1.85 (0.82)	2.41 (0.96)		
Within-subject (% choice)	49	Stadium-63% Club-10% Nodiff-27%	Stadium-9% Club-77% Nodiff-15%	Stadium-27% Club-10% Nodiff-64%	Stadium-32% Club-9% Nodiff-60%	Stadium-6% Club-74% Nodiff-19%		

Note: Categorical responses are based on collapsing across multiple measures. For example: intelligence categorical responses are based on frequency counts for intelligence, foolishness (reverse-coded), and sensibleness.

TABLE 2: WASTE AVERSION AND TANGIBILITY (STUDY 1)

Product	Waste cue	N	Purchase likelihood	Waste	Enjoyment	Quality
Good	None	32	5.59 (1.41)	2.06 (1.13)	4.22 (0.66)	3.59 (0.84)
Good	Past purchase	30	3.73 (1.91)	3.07 (1.46)	4.20 (0.76)	3.87 (0.78)
Service	None	37	5.05 (1.91)	2.57 (1.14)	3.84 (0.87)	3.54 (0.73)
Service	Past purchase	29	4.52 (1.79)	2.52 (1.12)	3.52 (1.02)	3.17 (1.00)

FIGURE 1: GOOD VERSUS SERVICE PURCHASE AND WASTE AVERSION (STUDY 1)

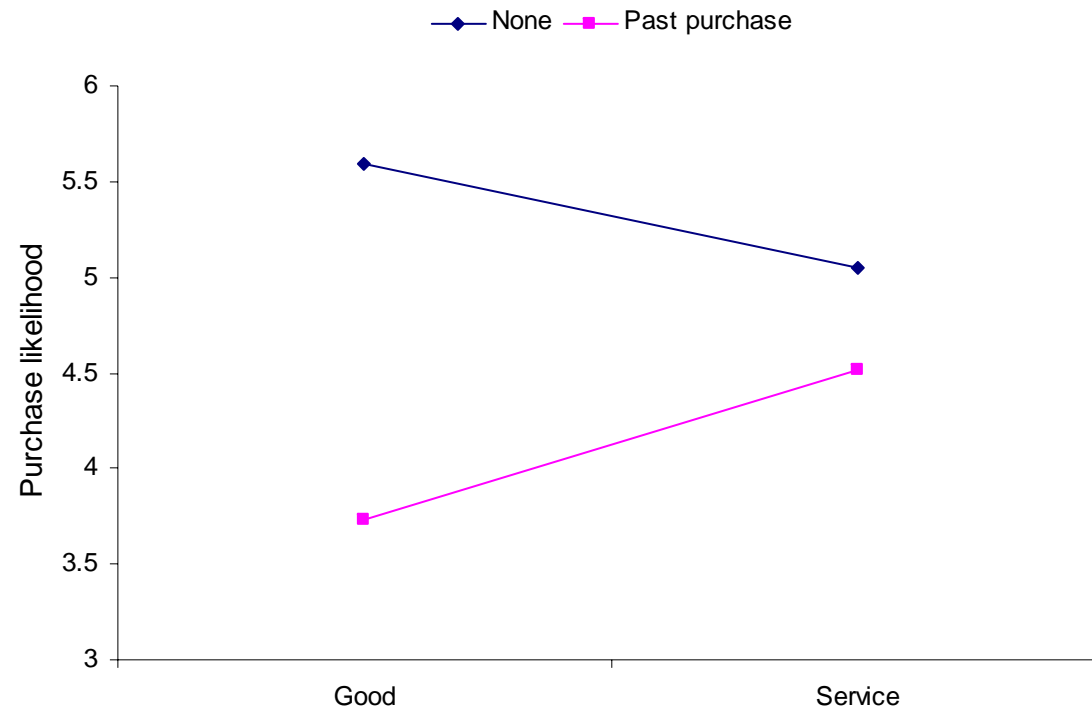


FIGURE 2: PURCHASE VERSUS RENTAL AND WASTE AVERSION (STUDY 2)

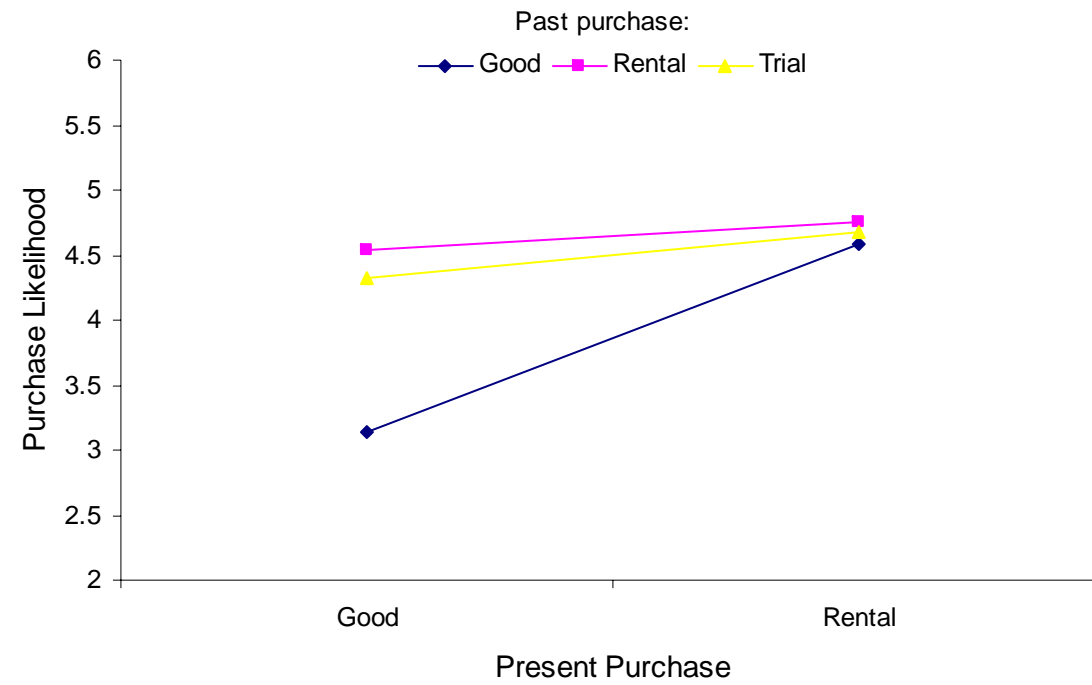
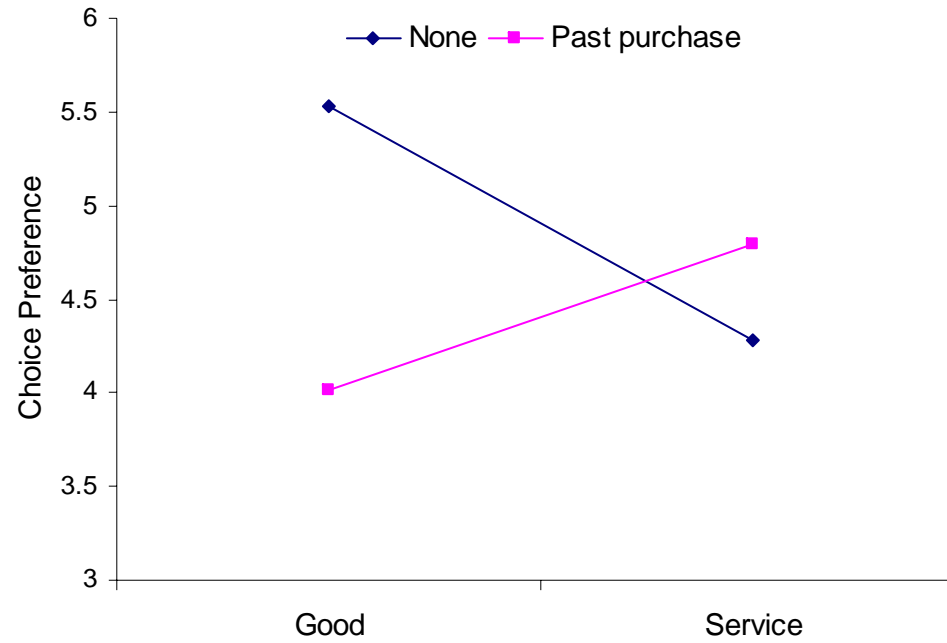


FIGURE 3: RISK AVERSION AND WASTE AVERSION (STUDY 3)



Note: higher numbers indicate greater preference for the previously purchased option (i.e., risk aversion; lower numbers indicate greater preference for the option of unknown utility (i.e., risk seeking).