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Payment Depreciation: The Behavioral Effects of Temporally Separating Payments from Consumption

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Research suggests that individuals mentally track the costs and benefits of a consumer transaction for the purpose of reconciling those costs and benefits on completion of the transaction (Prelec and Loewenstein 1998; Thaler 1980, 1985). In transactions where costs precede benefits, this can lead to a systematic and economically irrational attention to sunk costs (Arkes and Blumer 1985; Thaler 1980). In this article, we consider economic exchanges in which costs significantly precede benefits, as with many prepayment types of consumer transactions. We predict a consumer will gradually adapt to a historic cost with the passage of time, thereby decreasing its sunk-cost impact on the consumption of a pending benefit. We label this process of gradual adaptation to costs "payment depreciation." In a series of experiments, we find evidence of payment depreciation across a range of consumer transactions and offer insight into the behavioral implications of temporally separating costs from benefits.

Consumer research has made significant progress in understanding the processes that govern decision making at the time a consumer enters an economic transaction, such as how a consumer chooses from among alternatives when purchasing in a product category (Bettman, Johnson, and Payne 1991; Simonson 1993). An aspect of consumer research that has received much less attention relates to the completion of such a transaction; that is, the decision making that surrounds the subsequent consumption of the purchased product, such as when and whether to consume (but see Folkes, Martin, and Gupta 1993; Wansink 1996).

For some transactions, this distinction may be meaningless, with the transaction costs and benefits encountered at or about the same time, as with the purchase of a sandwich for lunch. In such cases, we would expect one's judgment and choice to be more or less the same at the moment of consumption as at the moment of purchase. Often, however, the costs of a transaction precede part or all of the benefits to be consumed by a significant period of time. When purchasing a durable good, for instance, one typically incurs an up-front cost for benefits that extend long into the future. Or when advance purchasing tickets to a popular theater event, one may incur costs months before any benefits are to be consumed. How might such a temporal separation between the costs and benefits of a transaction impact an individual's consumption behavior? In particular, how might such a separation influence that person's likelihood of consuming the pending benefits?

Consider the following scenario:[1]

> One year ago, Mr. A paid $40 cash for a ticket to a basketball game to be played later this week. Yesterday, Mr. B paid $40 cash for a ticket to the same game. Both men have equally anticipated this game. On the day of the game, there is a snowstorm. Who is more likely to brave the storm and attend the game, Mr. A who paid for his ticket long ago or Mr. B who just recently incurred the $40 expense?

From an economic perspective, the timing of Mr. A's and Mr. B's ticket purchases should have no impact on their decision to attend the basketball game. Each should accept that the $40 already spent is a nonrecoverable or sunk

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[1]This scenario is adapted from Thaler (1980).

cost and base his decision to go to the game solely on the perceived incremental costs and benefits of going. Facing the same incremental costs and benefits, A's and B's likelihood of attending the game should be equal.

However, existing behavioral research suggests that Mr. A and Mr. B *will* consider their sunk costs and perceive not attending the game as a $40 loss (Arkes and Blumer 1985; Thaler 1980). For each man, this irrational attention to sunk costs will generate added pressure to attend the game, increasing each man's likelihood of attendance relative to the economic perspective. However, given that both face the same $40 loss, and therefore the same pressure, their likelihoods of attending the game should again be equal.[2]

In contrast to these two perspectives, we propose that Mr. A and Mr. B will behave differently because of the relative timing of their ticket purchases. First, in keeping with existing research, both Mr. A and Mr. B will each be prone to the sunk-cost effect on purchasing their respective tickets. However, Mr. A will gradually adapt to his upstream ticket cost with the passage of time, thereby diminishing the sunk-cost impact on his decision to attend the game. We refer to this gradual adaptation to an upstream transaction cost as ''payment depreciation.''[3] We further note that Mr. B, having had little time to adapt to his ticket cost before the game, will perceive the full sunk-cost impact of his $40 payment when deciding whether to attend. Consequently, we predict Mr. B will perceive a significantly greater sunk cost than will Mr. A and will be more likely to attend the basketball game.[4]

The remainder of this article is organized as follows. First, we review the extant literature on the sunk-cost effect. Second, we propose a theoretical framework for payment depreciation and highlight its primary implication for consumption behavior—the attenuation of the sunk-cost effect. Third, we present a series of four studies designed to test for this prediction and to eliminate an alternative explanation for our results. Finally, we discuss the theoretical and managerial implications of our findings.

MENTAL ACCOUNTING AND THE SUNK-COST EFFECT

It has been shown repeatedly that individuals routinely consider historic, nonrecoverable transaction costs when making decisions about future behavior related to that transaction (e.g., Arkes and Blumer 1985; Garland and Newport 1991; Staw 1976; Thaler 1980). For instance, Staw (1976) finds that subjects' future investment decisions in an industrial funding scenario are significantly influenced by their past funding decisions. And Thaler (1980) notes that a family is more likely to drive through a snowstorm to attend a basketball game if they have purchased $40 tickets to the game than if they have been given the same tickets for free. Finally, Arkes and Blumer (1985) show that a person, having mistakenly purchased both a $100 and a $50 vacation for the same weekend, is more likely to go on the $100 vacation in spite of anticipating greater enjoyment from the $50 vacation.

Such behavior has been labeled the ''sunk-cost effect'' by Thaler (1980) and has been defined as the ''greater tendency to continue an endeavor once an investment in money, time or effort has been made'' (Arkes and Blumer 1985, p. 124).[5] According to economic theory, such behavior is irrational. When deciding whether to continue any endeavor, nonrecoverable or sunk costs should be ignored and only incremental, future costs should be considered (e.g., see Nagle and Holden 1995). In the case of Arkes and Blumer's ski vacations, for example, the amounts already spent on the two vacations should be irrelevant to a person's decision on which vacation to choose. Rather, one should base his decision solely on the future costs and benefits of the two vacations and, presuming those cost and benefits favor the $50 vacation over the $100 vacation, choose the $50 vacation. However, research indicates that individuals frequently violate this fundamental economic principle.

Mental Accounting for Consumer Transactions

There are a variety of potential explanations for the sunk-cost effect. These include the need to justify a prior course of action (Brockner 1992; Staw 1976, 1980; Teger 1980), the desire to not appear wasteful (Arkes and Blumer 1985), and the tendency to be risk seeking in light of previous losses (Garland and Newport 1991; Kahneman and Tversky 1979; Thaler 1980; Whyte 1986).

Although each of these explanations is driven by a different psychological process, they each share one important characteristic for the purposes of the current research: they each require an individual to be aware of or to track the costs and benefits associated with a particular transaction. In the case of a significant industrial business

[2]Note that on a net present value basis, one could argue that Mr. A paid a greater price than Mr. B.

[3]In a recent paper, Heath and Fennema (1996) used the term ''mental depreciation'' to refer to the allocation of expenses over a series of items or over several periods of time. We feel the phenomenon they identify is better labeled ''mental cost allocation.'' We use the term ''payment depreciation'' to refer to the reduction in the hedonic impact of an upstream payment over time, following its definition as ''a decrease or loss in value due to age'' (*American Heritage Dictionary,* 1st ed.).

[4]Note that payment depreciation may influence consumption behavior in a variety of ways. The research reported in this article investigates the impact of payment depreciation on the likelihood of downstream benefit consumption. However, payment depreciation also may affect one's enjoyment from the benefit consumption as well as one's willingness to repurchase the chosen product. We elaborate on these effects in the future research section of this article. We thank the associate editor for raising this issue.

[5]This effect is referred to as ''escalation of commitment'' in the organizational behavior and social psychology literature, where it is similarly recognized as a violation of rational decision making.

endeavor (e.g., the development of an airplane), this tracking is likely to be quite explicit, taking the form of cost accounting, quarterly progress reports, and financial income statements. Conversely, in the case of a simple consumer transaction (e.g., the purchase of a television), this tracking is likely to be much less formal and much more psychological.

In his seminal work on ''mental accounting,'' Thaler (1980, 1985) provides a compelling framework for the tracking of costs and benefits associated with a routine consumer transaction. He proposes that an individual opens a mental account on entering a transaction (e.g., making payment) and closes that account on completing the transaction (e.g., consuming the product), creating a psychological link between the costs and benefits of that particular transaction. Prelec and Loewenstein (1998) refer to this psychological linking of costs and benefits as ''coupling.'' They claim that consumption and payment are tightly coupled when it is clear what consumption is financed by a particular payment and what payment is financing each act of consumption.

It is important to note that, according to Thaler's theory of mental accounting, no loss or pain is felt at the time a payment is made. Rather, the upstream cost of the transaction is held in the appropriate mental account until the transaction is completed. If the transaction is completed with the benefit being consumed, that cost is canceled against the (presumably larger) benefit and the account is closed with a net gain.[6] However, if the transaction is completed without the benefit being consumed (i.e., the benefit is foregone), there is no offsetting benefit and one is forced to close the account and recognize the payment as a loss.

Explaining the Sunk-Cost Effect

To explain the sunk-cost effect, consider Thaler's (1980) assertion that a family is more likely to drive through a snowstorm if they have purchased tickets to a basketball game than if they have received those same tickets free. In the case of the paid-for tickets, the family opened a mental account on making payment for those tickets, with the expectation of closing that account on seeing the game. If they do not attend the game, and the tickets cannot be resold or exchanged, the family is forced to close their account with no offsetting benefit, resulting in a perceived loss of $40 (i.e., V[−$40], were V[x] is the psychological value or hedonic impact of a gain or loss of x).

In contrast, had the tickets been free, the family can forgo the game and close their mental account without the prospect of a loss (i.e., V[$0]). Contrasting these two outcomes, all else being equal, there is greater pressure on the family to attend the game in the case of the paid-for tickets (to avoid the perceived loss of $40) than in the case of the free tickets (where there is no loss to avoid).

This reasoning can be easily extended to show that the psychological impact of any past payment on future consumption should increase monotonically with the size of that payment (Arkes and Blumer 1985). As a result, while Thaler's hypothetical family will be more likely to go to the game having spent $40 as opposed to $0 on their tickets, they also should be more likely to go having spent $40 as opposed to $20.

PAYMENT DEPRECIATION

Thaler's (1985) explanation for the sunk-cost effect relates the magnitude of that effect only to the dollar amount of the upstream payment. In his framework, a person opens a mental account on making payment for a product with the expectation of closing that account on consumption. In the interim, the consumer holds the payment in her mental account at its full negative hedonic value. As a result, under Thaler's framework, the potential sunk-cost impact of that payment remains constant over the life of the transaction.

Some limited research suggests this may not be the case. In a real-money study, Arkes and Blumer (1985) offered an unexpected discount to some, but not all, of the people wishing to purchase season tickets to a university play series. They predicted that those individuals who paid a greater price for their season tickets would attend to their greater sunk cost and go to more plays than those who paid a lesser amount. For the first half of the season, their prediction held. For the second half of the season, however, the sunk-cost effect vanished, and there was no significant difference in the number of plays attended across subjects, suggesting that the observed sunk-cost effect may have been attenuated by time.

In another study, Henderson and Peterson (1992) added a temporal delay to Tversky and Kahneman's (1981) famous ''theater ticket'' problem. They presented subjects with a scenario in which the subjects had decided to see a play where admission was $10. They manipulated (1) whether the subject had lost a $10 admission ticket or a $10 bill and (2) whether that loss was realized several days before or only moments before entering the play. For subjects in the lost ticket conditions, they found that those who had lost their tickets several days before the play were significantly more likely to purchase a new ticket than those who had lost their ticket just before the play. To explain their finding, Henderson and Peterson claim that the temporally removed lost ticket gets credited to a different mental account (or category) than the temporally proximate lost ticket. In contrast, we argue that while the lost ticket stays credited to the same mental account, the delay between losing the ticket and attending

[6]Using the prospect theory paradigm (Kahneman and Tversky 1979), Thaler (1985) offers a model of ''hedonic editing'' in which the costs and benefits of a normal consumer transaction should be integrated, as opposed to segregated. This issue of whether transaction costs and benefits are integrated or segregated is not crucial to the current research, however. Provided costs and benefits are tracked through to transaction completion, payment depreciation should have a comparable effect across either an integrated or a segregated transaction.

the play will decrease the sunk-cost impact of that loss, thereby increasing the likelihood of ticket repurchase.

To further test this intuition, in the early stages of our research we asked subjects to imagine that six months ago they had noticed an ad for a concert they wanted to attend. Half the subjects were told they had ordered and paid for their ticket at the time they noticed the ad. The other half were told they had ordered their ticket on noticing the ad but had paid for and picked up their ticket one day before the concert. All subjects were then told that on the morning of the concert they woke up with the flu and were asked to indicate whether they would go to the concert. Results showed that subjects who paid for their tickets one day in advance were significantly more likely to attend to their sunk costs and go to the concert than were those who paid six months in advance (53 percent vs. 31 percent; $\chi^2[1] = 7.33$; $p < .01$).

Taken together, these three studies suggest that the sunk-cost effect is impacted by a second important variable, the temporal separation between the transaction cost and benefit. The questions that now need to be addressed are why and how.

The Hedonic Depreciation of Upstream Payments

Individuals are known to incorporate both positive and negative events into their status quo with the passage of time (Helson 1964; Kahneman and Tversky 1979; Kahneman and Varey 1991; Thaler 1985). For instance, research indicates that although a newly obtained asset (e.g., a coffee mug, a salary increase) might initially be viewed as a gain, it will gradually be incorporated into one's current wealth and be viewed as part of the status quo, as clearly evidenced by the ''endowment effect'' (Kahneman, Knetsch, and Thaler 1990; Thaler 1980). Similarly, while a recently incurred expense (e.g., a rent increase) might initially be viewed as a loss, it should gradually get incorporated into one's wealth and also be considered part of the status quo.

In the case of a consumer transaction with temporally separated costs and benefits, we believe that the same sort of adaptation takes place. We propose a consumer opens a mental account on making a payment for a product, but gradually adapts to that payment with the passage of time, as reflected in Figure 1. We refer to this as payment depreciation, the gradual discounting of an upstream transaction payment with the passage of time.

For instance, consider a person who pays \$40 for a bottle of wine at time $t = 0$ with the intent of consuming that wine at some later point in time. Immediately on making payment for the wine, she opens a mental account specific to this transaction and records into that account the full perceived value of the payment (i.e., Fig. 1, *A*). Therefore, the potential hedonic impact of that payment at time $t = 0$ is $V_{t=0}(\text{Payment}) = V(-\$40)$.[7]

However, as the temporal delay between the \$40 payment and the pending consumption increases, this person adapts to the payment and gradually incorporates it into her status quo. As such, the potential hedonic impact of that payment decreases. At some intermediate point in time, say $t = t'$ (Fig. 1, *B*), the hedonic impact of the \$40 payment has been reduced from $V(-\$40)$ to something significantly less, say $V_{t=t'}(\text{Payment}) = V(-\$15)$.

Finally, as the temporal delay between the payment and benefit consumption becomes extreme, this person fully adapts to the upstream payment. At time $t = t''$ (Fig. 1, *C*), the \$40 payment has been fully depreciated and its hedonic impact has become negligible ($V_{t=t''}[\text{Payment}] \approx V[\$0]$), as if the wine had been obtained for free.

A Model of Payment Depreciation

In an attempt to formalize this process, we have chosen to model payment depreciation as an exponential decay function of the form $V_t(x) = V_0(x) * e^{-dt}$, where $V_0(x)$ is the potential hedonic impact of a payment x measured at the time the payment was made (i.e., time $t = 0$), t is the time elapsed since payment was made, d reflects the rate of payment depreciation, and $V_t(x)$ is the potential hedonic impact of the payment x at time t.

Admittedly, our choice of an exponential decay function is somewhat arbitrary, but this operationalization captures aspects of the underlying process of payment depreciation that we feel are essential. First, the hedonic impact of a payment tends toward 0 (or equivalently, $V[\$0]$) as t becomes large. And second, the hedonic impact of a payment is monotonically and continuously decreasing in time t. We will specifically test for these aspects of payment depreciation in studies 3 and 4 of this article.

Consequences of Payment Depreciation

As the perceived value of an upstream payment gradually decreases over time because of payment depreciation, the sunk-cost impact of that payment on downstream consumption should decrease accordingly. In doing so, a downstream benefit should increasingly take on the characteristics of a free good or a pure gain. This should influence the likelihood of consumption of that benefit in one of two ways, based on whether the benefit can be inventoried.

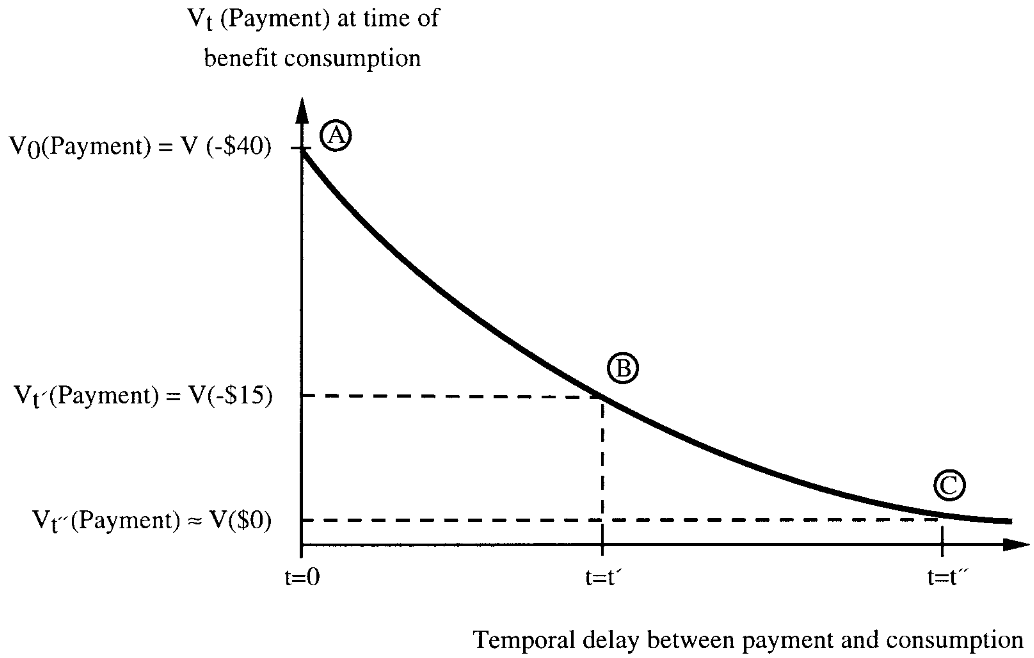
First, consider instances in which a benefit cannot be inventoried, as in the case of a ticket to a sporting event. In such instances, without the option to defer consumption, one is forced to make a ''go versus no go'' decision. Payment depreciation should lead to an increased likelihood of forgoing the pending benefit in such cases.

To illustrate, let us return to Mr. A and Mr. B. Having

[7] In keeping with Thaler's framework, we say ''potential hedonic impact'' to highlight that no pain is actually felt at time $t = 0$ unless the transaction is completed at that time (i.e., the benefit is either consumed or foregone).

FIGURE 1

THE HEDONIC IMPACT OF AN UPSTREAM PAYMENT AT THE TIME OF DOWNSTREAM CONSUMPTION



just purchased his ticket to tonight's basketball game, Mr. B finds himself at point *A* in Figure 1. For him, the hedonic impact of forgoing the game would be a perceived loss of V(−$40), the full value of his ticket. In contrast, Mr. A may find himself at point *B* in Figure 1 because of the payment depreciation that has taken place in the year since purchasing his ticket. At point *B*, the hedonic impact of forgoing the game would be a perceived loss of only V(−$15). As a result, the sunk-cost pressure to attend the game should be significantly greater for Mr. B than for Mr. A. As a general rule, then, in cases where a benefit cannot be inventoried, payment depreciation should result in an increased likelihood of forgoing the pending benefit.

Next, consider instances in which the pending benefit can be inventoried, such as in the case of a bottle of wine. Here, a decision to not consume today allows for consumption in the future. In these cases, payment depreciation should lead to an increased likelihood of consuming the pending benefit.

To illustrate, consider the person who paid $40 at time $t = 0$ for the bottle of wine. If consumed at or near the time of purchase (i.e., Fig. 1, *A*), she would require a wine-drinking occasion that offered a perceived benefit exceeding V($40) to experience a net benefit for the overall transaction. If she were to hold the wine for a period of time, however, the perceived benefit required to experience a net benefit would decrease. To experience a net benefit at time t', for instance, she would require a perceived benefit in excess of only V($15). And at time t'', she would experience a net benefit with any positive consumption occasion. Therefore, as payment depreciation increases, the magnitude of the perceived benefit required for a net positive transaction should decrease, thereby increasing one's likelihood of consumption.

Formally, these two predictions are combined to form the following hypothesis:

> **H1:** Relative to a transaction in which payment and benefit occur concurrently, consumers will have a higher propensity to either forgo or consume a pending benefit in a transaction in which payment significantly precedes that benefit.

In a series of four studies, we now will try now to confirm the existence and explore the effect of payment depreciation. Specifically, we will test our primary hypothesis (Hypothesis 1), attempting to demonstrate an increased willingness to forgo a benefit that is scheduled to expire (study 1) and an increased willingness to consume a benefit that can be inventoried (study 2). We will then attempt to establish the extent of payment depreciation (study 3) and to differentiate our explanation for the phenomenon from the categorization-based explanation suggested by the 1992 research of Henderson and Peterson (study 4).

STUDY 1

Consider two individuals who have each purchased a durable good sometime in the distant past, one having made a single lump-sum payment at the time of purchase, the other having made a single lump-sum payment only recently (i.e., a delayed payment). Because of factors such as liquidity constraints and the time value of money, economic theory would have allowed for each individual to prefer either delaying or not delaying their respective payments at the time of purchase. However, with payment now complete, economic theory would dictate that each individual's consumption of their durable good should be indifferent to the timing of their respective payments. Payment depreciation, in contrast, would predict a greater sunk-cost effect for the payment that has been completed only recently. As a result, forgoing the benefits of the durable good should be more hedonically painful, and therefore less likely, for the individual who opted for the delayed payment than for the individual who opted to pay at the time of purchase (Hypothesis 1). Study 1 was designed to test this prediction.

Method

Subjects. Subjects were 97 individuals in a Boulder, CO, shopping mall who were approached and asked to fill out a brief questionnaire. These subjects were not paid.

Design and Procedure. The survey employed in this study asked all subjects to place themselves in the following situation. Two years ago, they had purchased a new desktop computer and a big-screen television set, each costing $1,500. However, they were able to fully pay for only one of the two items at the time of purchase. Conveniently, one of the two stores in which these items were purchased had offered a deferred-payment plan with free financing for two years. As a result, each subject was told they had paid $1,500 for one of the two items at the time of purchase and that they had only recently made their payment of $1,500 for the second item.

Within this basic scenario, approximately half of the subjects ($N = 47$) were told it was the computer store that had offered the deferred-payment plan. As a result, these subjects were told they had paid for the big-screen television at the time of purchase (concurrent-payment condition) and paid for the computer only recently. The remaining subjects ($N = 50$) were told it was the television store that had offered the deferred-payment plan. Therefore, these subjects were told they had paid for the computer at the time of purchase and paid for the television only recently (deferred-payment condition).

All subjects were then asked to imagine that a coworker had asked to borrow their big-screen television. It was explained that this coworker was throwing a Super Bowl party and that his television had recently broken. With this in mind, subjects were asked to indicate their strength of preference for lending their big-screen television to their coworker on a nine-point response scale (1 = definitely will not lend TV, 9 = definitely will lend TV).

Results and Discussion

From an economic perspective, at the time of their decision to lend their big-screen television, all subjects possessed identical, fully paid-for, two-year-old television sets. In addition, all subjects were in identical wealth states; each owned a computer and a television, each had made a $1,500 payment two years prior and each had made a $1,500 payment just recently. Given these facts, the timing of each subject's television payment should have been irrelevant to their decision to lend their television.[8]

From a payment-depreciation perspective, however, subjects who paid for their televisions in the distant past (concurrent-payment condition) should have experienced greater payment depreciation, and therefore perceived a lower sunk cost, than subjects who only recently made payment (deferred-payment condition). Therefore, we would predict the concurrent-payment subjects to be more likely to lend (or temporarily forgo) their big-screen televisions than the deferred-payment subjects (Hypothesis 1).

Results support this payment-depreciation perspective. Mean strength of preference for lending one's big-screen television was significantly higher for those subjects in the concurrent-payment condition than for those in the deferred-payment condition ($\bar{X}_{\text{concurrent payment}} = 5.02$ vs. $\bar{X}_{\text{deferred payment}} = 3.90$; $t(94) = 2.37$, $p < .02$). Subjects were significantly more likely to lend their televisions when payment for those televisions was incurred in the distant past as opposed to the recent past. That is, subjects behaved as if they valued their televisions differently based on how recently they had incurred costs on those televisions.

STUDY 2

Study 1 was a pencil-and-paper study designed to show that payment depreciation can lead to an increased willingness to forgo the consumption of a pending benefit. However, for a benefit that can be inventoried, we have proposed that payment depreciation can lead to an increased willingness to consume that benefit. This second study was designed to test this parallel prediction. In addition, in an attempt to provide a more compelling demonstration of payment depreciation, study 2 employed real costs, real benefits, and the actual passage of time.

The sunk-cost effect is defined by Arkes and Blumer (1985) as the ''greater tendency to continue an endeavor once an investment of money, time or effort has been made'' (p. 124). In keeping with their definition, we have elected to operationalize transaction costs in the form of effort in this study; subjects were asked to fill out a long and tedious questionnaire regarding perceived similarities between pairs of popular soft drinks. In addition, transaction benefits were operationalized in the form of money;

[8] One could argue, given a 0 percent finance rate, the cost of the television under the deferred payment was lower than the cost of the television when payment was made at purchase. If we were to apply a traditional sunk-costs argument, this would imply a pattern of results opposite that predicted by payment depreciation.

subjects received $7 as compensation for completing the survey. The relative timing of these costs and benefits was manipulated so that half the subjects experienced no delay between costs and benefits and half experienced a three-week delay.

Because of payment depreciation, subjects who experienced a three-week delay should have adapted to the effort expended and should have viewed their $7 compensation more like ''free money,'' while subjects who experienced no delay should have not yet adapted to their effort and should have viewed their compensation more like ''earned money.'' As a result, subjects should have been more likely to spend (i.e., consume) their compensation under the delay than the no-delay condition (Hypothesis 1). To test this prediction, immediately following the receipt of their compensation, we offered all subjects the opportunity to double a portion of their compensation via a simple gamble. Consistent with Hypothesis 1, we expected subjects in the delay condition to be more willing to risk their compensation on such a gamble.[9]

Method

Subjects. Subjects were 43 undergraduates at the University of Colorado who were recruited with the understanding that they would receive $5–$9 in compensation.

Design and Procedure. This study consisted of three tasks spread over three weeks. The first two tasks entailed a short and a long survey, each involving a subject's evaluation of popular soft drinks. The short survey was designed to require minimal effort and was expected to take approximately five minutes to complete. It consisted of the following three questions: (1) ''Please list the first five brand names which come to mind in the product category soft drinks''; (2) ''How often do you buy soft drinks?''; and (3) ''Please rank order the importance of the following attributes in the selection of a soft drink: Taste, Color, Refreshing, Price, whether it is Fizzy, whether it is Fruity.''

In contrast, the long survey was designed to require considerable effort and was expected to take approximately 30 minutes to complete. It consisted of pairwise similarity ratings and pairwise preference ratings for 10 brands of soft drinks (e.g., Pepsi, 7UP), for a total of 90 ratings across 45 pairs of soft drinks. For each pair, subjects were asked to rate the similarity between the pair (1 = extremely similar, 7 = extremely dissimilar) and to report their preference for either of the two brands (1 = strongly prefer brand A, 7 = strongly prefer brand B).

These first two tasks were separated in time by three weeks, with the order of the two surveys counterbalanced across subjects. As a result, approximately half of the subjects (N = 20) completed the short survey, experienced a three-week delay, then completed the long survey (no-delay condition). The remaining subjects (N = 23) completed the long survey, experienced the three-week delay, then completed the short survey (delay condition). Before beginning the first of the surveys, all subjects were presented with the same cover story linking the two surveys and justifying the three-week delay.

On completing the second survey, all subjects were paid $7 in the form of a $5 bill and eight quarters. Subjects were then presented with the third and final task, an ostensibly unrelated exercise in which subjects faced a real-money gamble. They were told they could bet up to $2, in increments of $.25, on a single roll of a pair of dice. They were told that if they rolled a seven or greater, they would double their bet, but that if they rolled a number less than seven, they would lose their bet. They were asked to indicate the amount they were willing to gamble, after which they were asked to roll the dice. Based on the outcome of that roll, the amount they had indicated was either added to or subtracted from their $7 payment.

Procedurally, subjects in the no-delay and the delay conditions were run separately to avoid administrative confusion and subject suspicion. Given this fact, care was taken to avoid potential demand effects during the administration of the study. First, a research assistant who was blind to the purpose and predictions of the study was employed to run the experiment. Second, written instructions for each phase of the study were prepared, with these instructions read by the research assistant to all subjects across both experimental conditions.

Results and Discussion

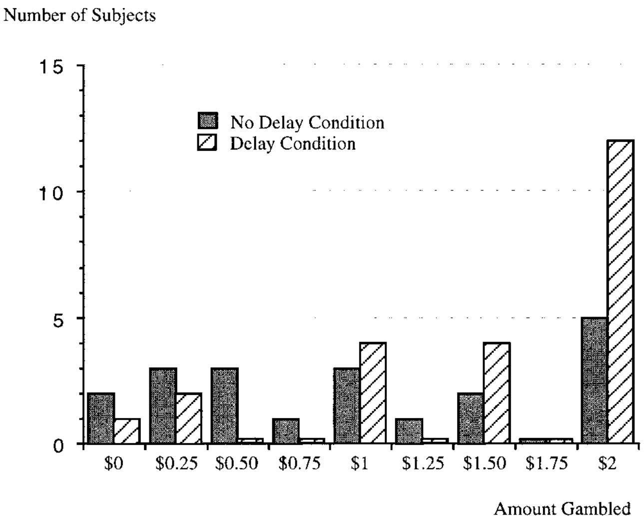
On entering the real-money gamble, all subjects had incurred and received the exact same costs and benefits. Subjects differed only in the relative timing of those costs and benefits. If we assume the long survey represented the bulk of the effort (or cost) incurred, then half of the subjects (N = 20) had experienced little or no delay between transaction costs and benefits (i.e., the no-delay condition) and the rest (N = 23) had experienced a three-week delay (i.e., the delay condition).

Based on payment depreciation, we expected this difference to directly impact consumption behavior. Specifically, subjects in the delay condition should have experienced less of a sunk-cost effect and, therefore, been more likely to spend, or consume, their compensation than subjects in the no-delay condition. Figure 2 shows the distribution of gambles across the two conditions. Given the skewed distribution of gambles in the delay condition, a Mann-Whitney U-test was performed to assess the difference in means across the delay and no-delay conditions. This analysis supported our expectations. The mean gamble was significantly higher for subjects in the delay condition than for subjects in the no-delay condition

[9]This compensation/gamble design is adapted from Arkes et al. (1994).

FIGURE 2

DISTRIBUTION OF AMOUNTS GAMBLED: STUDY 2



($\bar{X}_{\text{delay}}$ = \$1.50 vs. $\bar{X}_{\text{no delay}}$ = \$1.01; U = 144, z = 2.16, $p < .05$).[10]

Aside from payment depreciation, one possible explanation for this result is that subjects in the no-delay condition, having just completed the long and arduous task, may have been tired and eager to leave the experiment. As such, they may have elected not to gamble, skewing the results in favor of the predicted findings. As shown in Figure 2, a review of the gambles across each of the two conditions suggests this was not the case. Only two of 20 subjects in the no-delay condition and one of 23 subjects in the delay condition chose not to gamble, a difference that was not significant ($\chi^2[1] < 1$). Therefore, the data suggest the difference in mean amount gambled across the two conditions was not caused by subjects' decision to either gamble or not gamble, but rather by the amount they chose to gamble, a result consistent with the process of payment depreciation.

STUDIES 3 AND 4

Studies 1 and 2 have demonstrated that the sunk-cost impact of an upstream payment on the consumption of a downstream benefit is attenuated by the temporal separation of that cost and benefit. To more fully understand payment depreciation, however, two important issues still need to be addressed.

First, although studies 1 and 2 establish the attenuation of the sunk-cost effect, they do not measure the degree of that attenuation. We have argued that as the temporal delay between an upstream cost and downstream benefit increases, the benefit should increasingly take on the characteristics of a free good. In the extreme, consumers should fully ignore sunk costs and behave as if they had received the pending benefit for free. Study 3 was designed to test this prediction by incorporating a free condition into a payment-depreciation scenario so as to provide a benchmark for comparison.

Second, it remains to be determined whether the attenuation of the sunk-cost effect is a gradual and continuous process, as would be expected under payment depreciation, or a discontinuous, steplike process, which we will argue is suggested by the categorization-based theory of Henderson and Peterson (1992). Study 4 was intended to address this concern by considering intermediate temporal delays between upstream payments and downstream consumption.

Study 3

According to payment depreciation, given a sufficient temporal separation between an upstream payment and a downstream benefit, the hedonic impact of the upstream payment should become negligible. Specifically, given the functional form, $V_t(x) = V_0(x) * e^{-dt}$, as the t gets large, $V_t(x)$ should tend toward 0 (or V[\$0]). As a result, the sunk-cost impact of that payment should be fully attenuated and consumption behavior should be no different than if the product had been obtained for free. This study was designed to assess this claim.

Method

Subjects. Subjects were 240 visitors to a popular Chicago museum who were approached as they entered or exited the museum and asked to complete a one-page questionnaire. Subjects were unpaid.

Design and Procedure. All subjects were presented with a general scenario in which they were asked to imagine they possessed two nonrefundable tickets to a Chicago Bulls basketball game to be played later that day. They were also asked to imagine they lived 60 miles from the basketball arena.

The specific details of each questionnaire were manipulated in a 2 (price) × 2 (payment) × 2 (delay) between-subjects design, resulting in eight experimental conditions with 30 subjects in each condition. The first factor, price, manipulated the price of the two tickets. Half the subjects were told the total price of the two tickets was \$50, and half were told it was \$100.

The second factor, payment, manipulated whether or not subjects actually paid for the tickets. Half of the subjects were told they had paid the stated price for the two tickets, and half were told they had obtained the tickets for free. To control for interest in attending the game, subjects in the free conditions were told they had planned to purchase the tickets in question but had unexpectedly received them for free as part of a special promotion.

The third factor, delay, manipulated the temporal sepa-

[10]We thank a reviewer for recommending this analysis.

TABLE 1

EFFECTS OF PAYMENT, DELAY, AND PRICE ON MEAN LIKELIHOOD OF ATTENDING GAME: STUDY 3

Payment delay	Free tickets: One day	Free tickets: Six months	Paid-for tickets: One day	Paid-for tickets: Six months
Price = \$50	3.93 (1.62)	3.87 (1.76)	5.13 (2.27)	4.16 (2.34)
Price = \$100	3.77 (1.85)	3.93 (1.91)	6.53 (1.96)	4.20 (2.01)

NOTE.—Scale: 1 = will definitely stay at home; 9 = will definitely go. Standard deviations in parentheses. Thirty subjects per cell.

ration between obtaining the tickets (either via payment or promotional gift) and game attendance. Half the subjects were told they had obtained the two tickets one day before the game. The other half were told they had obtained the tickets six months before the game. To control for anticipation, subjects in the one-day conditions were told they had called and reserved the tickets six months before the game.

After reading their particular scenario, each subject was told there was a snowstorm on the evening of the game. They were told their options were to either brave the storm and attend the game or to stay home and watch the game on television. At this point, all subjects were asked to indicate their likelihood of attending the game on a nine-point response scale (1 = will definitely stay at home, 9 = will definitely go).

Results and Discussion

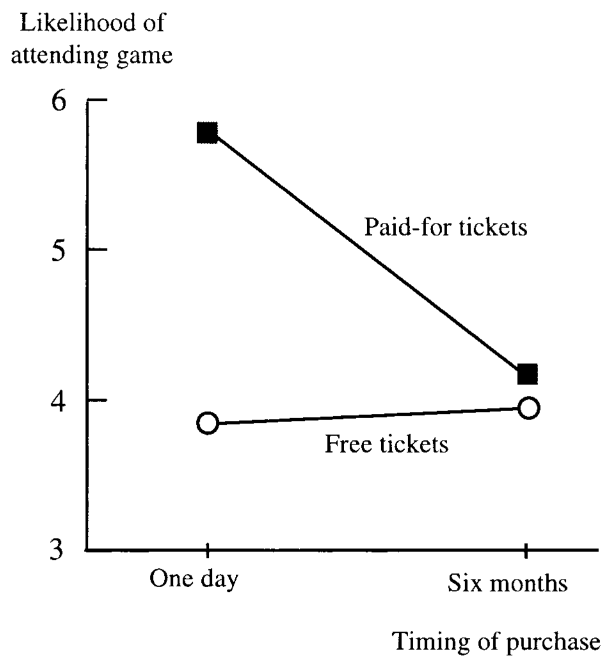
Subjects' likelihood ratings were analyzed in a 2 (price: \$50 vs. \$100) × 2 (payment: paid-for vs. free) × 2 (delay: one day vs. six months) ANOVA. Table 1 shows the mean likelihood of attending the game across each of the eight experimental conditions.

Results revealed significant main effects for payment ($F(1, 232) = 19.72$; $p < .0001$) and for delay ($F(1, 232) = 9.83$; $p < .005$). However, these significant main effects were qualified by a significant two-way interaction of payment × delay ($F(3, 232) = 11.09$; $p < .001$). As shown in Figure 3, the delay had no effect on subjects' likelihood of attending the game when the tickets were free ($\bar{X}_{\text{one day/free}} = 3.85$ vs. $\bar{X}_{\text{six months/free}} = 3.90$; $F(1, 232) = 0.02$; $p > .85$) but a highly significant effect when the tickets were paid for ($\bar{X}_{\text{one day/paid-for}} = 5.83$ vs. $\bar{X}_{\text{six months/paid-for}} = 4.18$; $F(1, 232) = 20.90$, $p < .0001$). No other interactions proved significant.

As with studies 1 and 2, these results support the predicted attenuation of the sunk-cost effect (Hypothesis 1). Subjects in the paid-for conditions were significantly more willing to forgo consumption given a distant, as opposed to a proximate, upstream payment. More important, given the expressed purpose of this third study, the sunk-cost effect appears to be fully attenuated for subjects in the two six-months/paid-for conditions, as shown in Figure 4. Let us explore this result in detail.

FIGURE 3

EFFECTS OF PAYMENT AND DELAY ON MEAN LIKELIHOOD OF ATTENDING GAME: STUDY 3



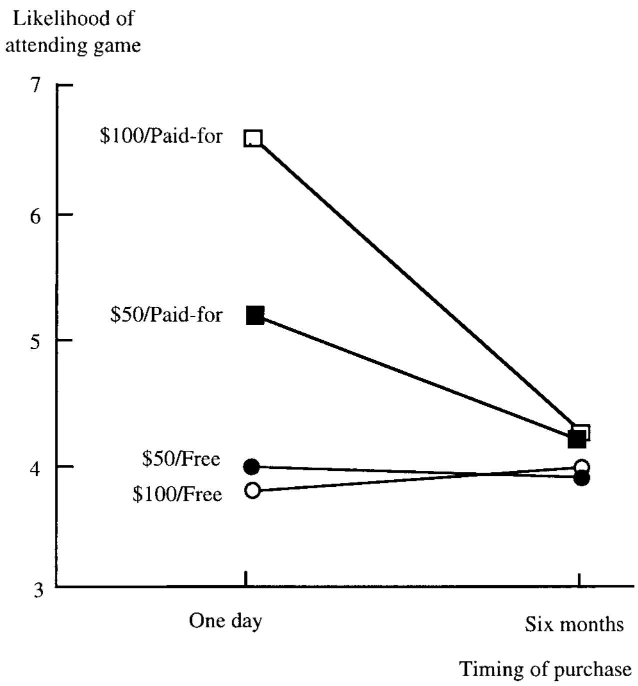
First, consistent with the sunk-cost literature (Arkes and Blumer 1985; Thaler 1980), we did not expect nor did we find a difference in attendance across the four free conditions (pairwise contrasts: $p > .70$ or more). With no real costs incurred (aside from those incidental costs held constant across all conditions) there were no sunk costs to attend to and no reasons to expect differential behavior across the various price and delay manipulations.

Second, consistent with the finding of Arkes and Blumer (1985), we expected and found a significant difference across the four paid-for conditions. Specifically, we anticipated a greater sunk-cost effect for subjects who paid \$100, as opposed to \$50, for their tickets. However, we expected this greater effect to be attenuated by time because of payment depreciation. An interaction contrast supported these expectations ($F(1, 232) = 3.59$, $p < .06$). There was a significant difference in mean attendance across the \$50 and \$100 conditions given a one-day delay ($\bar{X}_{\$50/\text{one day/paid-for}} = 5.13$ vs. $\bar{X}_{\$100/\text{one day/paid-for}} = 6.53$; $F(1, 232) = 7.52$, $p < .01$), but no significant difference given a six-month delay ($\bar{X}_{\$50/\text{six months/paid-for}} = 4.16$ vs. $\bar{X}_{\$100/\text{six months/paid-for}} = 4.20$; $F(1, 232) = 0.00$, $p > .90$).

Finally, consistent with the primary premise of this study, subjects who paid for their tickets six months in advance behaved as if they had obtained their tickets for

FIGURE 4

EFFECTS OF PAYMENT, DELAY, AND PRICE ON MEAN LIKELIHOOD OF ATTENDING GAME: STUDY 3



free. Specifically, while there was a significant difference in mean likelihood of attendance between the four free conditions and the two one-day/paid-for conditions ($\bar{X}_{\text{free}} = 3.88$ vs. $\bar{X}_{\text{one day/paid-for}} = 5.83$; $F(1, 232) = 39.26$, $p < .0001$), there was no significant difference between the four free conditions and the two six-month/paid-for conditions ($\bar{X}_{\text{free}} = 3.88$ vs. $\bar{X}_{\text{six months/paid-for}} = 4.18$; $F(1, 232) = 0.97$, $p > .30$).

Based on the results of study 3, we can argue that the sunk-cost effect, although prominent and significant when upstream payments are proximate, is virtually eliminated when upstream payments are sufficiently distant. In this case, subjects who obtained their tickets one day in advance were significantly more likely to attend the basketball game if those tickets had been paid for as opposed to free, a finding that mirrors the prediction by Thaler (1980) in his basketball game/snowstorm thought experiment. In contrast, subjects who obtained their tickets six months in advance behaved identically across conditions, regardless of whether those tickets were paid for or free, a result predicted by payment depreciation. It appears that subjects in the six month/paid-for conditions found themselves at or near point *C* in Figure 1 having fully adapted to their upstream payments, resulting in those payments having a negligible impact on their decision to attend the game.

Study 4

According to payment depreciation, consumers continuously adapt to an upstream payment, resulting in the gradual attenuation of the sunk-cost effect over time. Specifically, the model $V_t(x) = V_0(x) * e^{-dt}$ suggests that the hedonic or sunk-cost impact of an upstream payment is monotonically and continuously decreasing in time *t*.

In contrast, research by Henderson and Peterson (1992) suggests that categorization may be driving the observed effects, with the relative timing of a transaction payment impacting the mental account to which that payment is categorized. According to their theory, a payment may initially get categorized into one mental account, only to be recategorized into another account at some point later in time. This should result in a discontinuous, steplike attenuation of the sunk-cost effect, with no attenuation occurring while the payment is categorized to the initial account, but significant attenuation occurring on recategorization.

Study 4 was undertaken to differentiate between our explanation for the observed results and that suggested by the research of Henderson and Peterson. This was accomplished by considering intermediate temporal delays between payment and consumption and observing the resulting pattern of consumption. Specifically, this study employed historic data from an athletic facility that tracked membership payment and monthly attendance for each of its members. In keeping with our theory, we anticipated that any given individual would be most likely to attend the facility when payments were recent, but increasingly less likely to attend as those payments became distant in time.

A second goal of this study was to provide external validity for our theory of payment depreciation. Although our first three studies support the proposed process, they do so in laboratory settings. Study 4 was intended to provide evidence of payment depreciation in a real-world context.

Method

Study 4 was a field study that used historic payment and attendance data for a select set of members of a major Colorado athletic facility. The data covered a six-month period from January 1, 1997, to June 30, 1997, and were collected as part of the normal course of business for this particular athletic facility.

Description of Data. Attendance was recorded by means of a personalized magnetic ''swipe'' card that each member used to enter the facility. As part of its normal practice, this facility aggregated each member's record of attendance on a monthly basis, resulting in six monthly attendance records for each individual in the data sample.

In terms of payments, all members in this study were contractually committed to a one-year membership costing $672, payable in two semiannual installments of $336 each.[11] However, while payments were due on the first

[11]This facility also offers annual, quarterly, and monthly payment plans. For this study, however, we have elected to look only at members with a semiannual payment plan.

TABLE 2

EFFECT OF PAYMENT TIMING ON MEAN MONTHLY ATTENDANCE FOR SEMIANNUAL MEMBERS: STUDY 4

	Month of attendance					
Month of payment	January	February	March	April	May	June
January (*N* = 16)	14.6[a]	10.8	6.8	4.8	2.6	2.1
February (*N* = 1)	.0	23.0[a]	15.0	9.0	5.0	3.0
March (*N* = 0)	na	na	na[a]	na	na	na
April (*N* = 8)	5.3	5.0	3.9	13.8[a]	10.4	6.4
May (*N* = 3)	14.7	12.0	9.3	8.0	22.0[a]	15.3
June (*N* = 5)	11.6	9.0	7.6	5.6	4.2	15.6[a]

NOTE.—Numbers in parentheses show number of members making payment in indicated month. Numbers with superscript letters show mean attendance in month a payment is made. na = not applicable.

day of a specific month, that month differed across members based on when the member first joined the facility. Finally, all payments were prompted by a bill mailed by the facility to its members.

Screening of Data. Individuals were screened for inclusion in this study based on the following three factors. First, a member must have had an individual membership as opposed to a joint or family membership, thereby assuring that each instance of attendance could be traced to a single individual. Second, a member must have been with the facility for at least one year before the start of the data sample, thereby eliminating any first-time members who might have joined only to find they disliked the facility and/or the process of exercising. Third, to assure some degree of reliability in the attendance data, a member must have attended the facility at least 12 times over the six-month data window. Based on these screening criteria, the data for 33 members were retained and analyzed.

Results and Discussion

A priori, we expected two principle results. First, in keeping with the sunk-cost effect, we expected members to display an increased likelihood of attendance in the month a payment was made. Second, because of payment depreciation, we expected members to gradually decrease, or forgo, their attendance in each month following payment. Importantly, we anticipated this gradual decrease in attendance not only at the aggregate level, but also at the individual level.

Mean monthly attendance as a function of payment timing is reported in Table 2. As expected, attendance was highest in the month of payment, declining steadily through the month just before the next scheduled payment. For example, mean monthly attendance for those who made payment on January 1 peaked at 14.6 in January and gradually decreased to 2.1 by June. Similarly, mean monthly attendance for those who made payment on April 1 peaked at 13.8 in April and decreased to 6.4 by June. This overall pattern of attendance is robust across each of the payment schedules and is as predicted by payment depreciation.

In addition to this basic exposition of the data, a second set of analyses were run in which each member's record of attendance was recoded in the following fashion. First, each member's monthly attendance was converted to a ''fractional'' attendance. For instance, a person who attended the facility 20 times in February and 80 times over the six months would have his February attendance recoded as .25, reflecting the fact that 25 percent of his overall attendance occurred in that month. This recoding allowed for a more meaningful comparison of attendance across members who differed in their base rate of attendance.

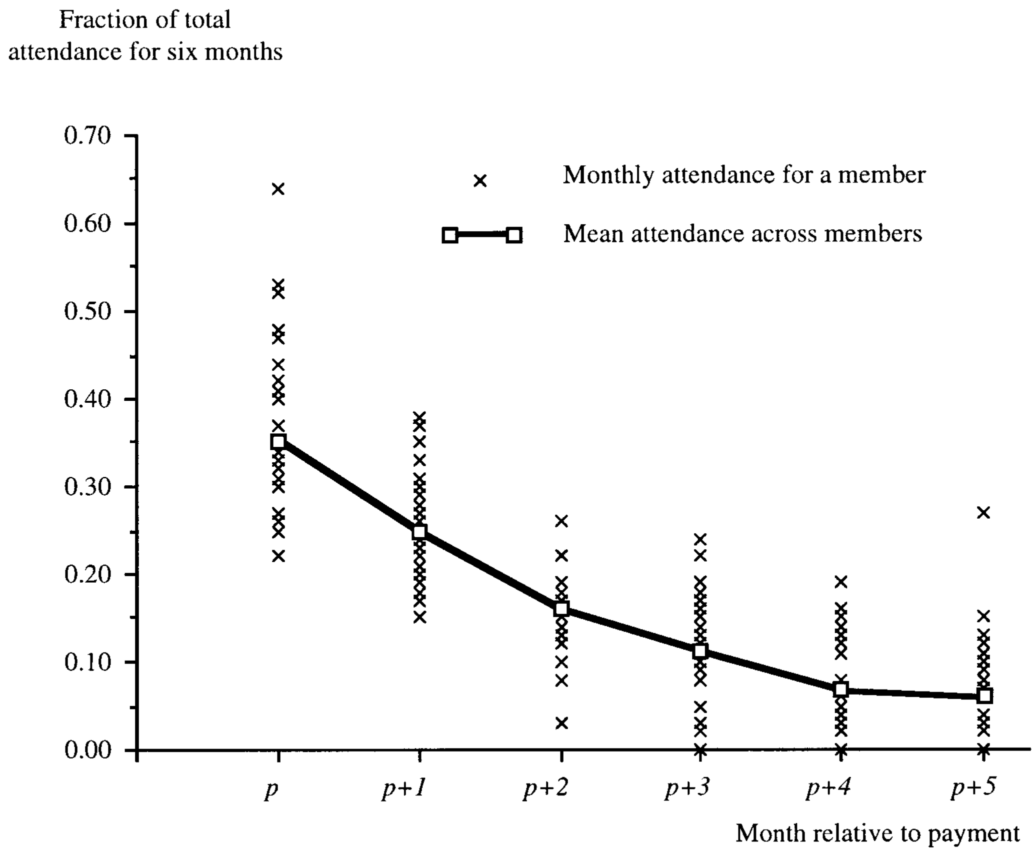
Second, to align attendance across members who differed in their payment schedules, we recoded each member's calendar-based attendance to a record of attendance conditional on the timing of his payment. Specifically, attendance in the month of payment was recoded as having occurred in month p, attendance in the first month after payment was recoded as having occurred in month $p + 1$, and so on. In addition, for payment schedules that did not begin in January, we noted that the month immediately preceding the month of payment (i.e., month $p - 1$) also followed that member's previous semiannual payment by five months. Therefore, for a member making payment on April 1, we recoded attendance in the month of March as having occurred in month $p + 5$. This conversion allowed for an aggregation of data across the several different payment schedules.[12]

Based on this recoding of the data, the impact of payment depreciation on likelihood of attendance is readily

[12]With seasonality as a concern, we separately analyzed attendance for members who were on a monthly payment plan. Based on this analysis, we found attendance to be relatively stable over the six-month period, with a very slight (but significant) downward trend. Although the analyses reported in this article do not account for this limited seasonality, we conducted a parallel set of analyses incorporating this underlying seasonality. Substantively, the results of these more extensive analyses did not differ from those more straightforward analyses reported here.

FIGURE 5

ATTENDANCE TRENDS FOR SEMIANNUAL MEMBERS: STUDY 4



apparent. As shown in Figure 5, the mean attendance across subjects in the month of payment (i.e., month p) was 35 percent. This figure gradually dropped to 25 percent, 16 percent, 11 percent, 7 percent, and 6 percent in months $p + 1$ through $p + 5$, respectively. A series of paired t-tests revealed each of these drops in attendance to be highly significant ($t(32) = 3.05$ or more, $p < .005$ or less), except for the drop from 7 percent to 6 percent, which approached significance ($t(32) = 1.91$, $p < .07$). In addition, the increase in attendance between the month just before a payment (month $p + 5$) and the month of a payment (month p) was also highly significant ($t(32) > 100$, $p < .0001$).

Given the purposes of this study, it is important to note this gradual decrease in attendance occurred at both the aggregate and the individual level. A categorization-based explanation for payment depreciation suggests a discontinuous, steplike attenuation process. Such an explanation could account for the observed downward sloping aggregate attendance if the timing of that ''step'' varied across individuals. However, this would imply a bimodal distribution of attendance across individuals in any given time period, with those individuals who had crossed the categorization threshold being significantly less likely to attend than those who had not. Within this framework, the gradual decrease in attendance at the aggregate level would be caused by an ever-increasing number of individuals crossing that threshold with the passing of months.

However, as shown in Figure 5, this was not the case. Rather than a bimodal distribution of attendance across members in months $p + 1$ through $p + 5$, we observe a distinctly unimodal, or perhaps uniform, distribution whose central tendency decreases over time. Further strengthening this argument, we note that 18 of 33 members had a strictly decreasing attendance trend over the full six-month data window. In addition, attendance decreased for 32 members between months p and $p + 1$; for 29 members between $p + 1$ and $p + 2$; for 23 between $p + 2$ and $p + 3$; for 21 between $p + 3$ and $p + 4$; and for 18 between $p + 4$ and $p + 5$. All of this suggests that, at an individual level, the underlying process driving payment depreciation is continuous in nature, as theorized under payment depreciation.

Study 4 serves two important functions in our investigation of payment depreciation. First, it provides external validity for the process of payment depreciation, thereby nicely complementing the three laboratory experiments that precede it. Second, the study provides evidence that the process of payment depreciation is continuous in nature at the level of the individual. This finding, most clearly shown in Figure 5, challenges the alternative explanation suggested by the research of Henderson and Peterson (1992), which hinges on the changing categorization of an upstream transaction payment.

At this point, it should be noted that there exists at least one competing explanation for payment depreciation that this fourth study does not address. It is possible that a temporally delayed payment may have a weaker memory trace than a more concurrent payment, thereby increasing the probability of that payment being forgotten at the time of benefit consumption.[13] This memory-based explanation could imply a continuous attenuation process, as observed in this final study, if the probability of remembering a past expense is gradually decreasing in time. However, evidence of payment depreciation also was found in studies 1 and 3, laboratory experiments that did not entail a memory component. In those studies, each subject was asked to imagine that they had made a payment in the distant past and was told the exact amount of that payment. As such, although a memory-based explanation may contribute to the results observed in study 4, such an explanation seems insufficient to fully explain the results across the four experiments presented in this article.

GENERAL DISCUSSION

Summary of Research

In four experiments, we confirmed the existence and explored one of the primary consequences of payment depreciation, namely, its impact on consumption likelihood. In studies 1 and 2, we demonstrated that the sunk-cost effect is attenuated by a temporal separation between an upstream cost and a downstream benefit, resulting in a greater willingness to forgo a benefit that is scheduled to expire and a greater willingness to consume a benefit that can be inventoried. In study 3, we identified the extent of this sunk-cost attenuation, revealing that with a sufficient temporal delay, an upstream payment will be fully discounted and the pending benefit will take on the characteristics of a free good. Finally, in study 4 we showed payment depreciation to be a continuous process, resulting in the gradual and steady attenuation of the sunk-cost effect over time.

Managerial Implications

Although interesting from a purely theoretical perspective, we believe these findings also have some important managerial implications.

Volume Purchasing. One such implication involves the role of payment depreciation in accelerating and increasing consumption of products purchased in volume (e.g., cases of wine, multipacks of snacks). Past research has shown that the bulk purchase of some products can lead to their accelerated consumption (Ailawadi and Neslin 1998; Wansink 1996; Wansink and Deshpande 1994). Payment depreciation would provide an explanation for such findings. Assume that some amount of a bulk-purchased product is intended for consumption over an extended period of time (i.e., stockpiled). On each successive consumption occasion, the sunk-cost impact of the up-front payment should decrease because of payment depreciation. As a result, the remaining product should be consumed more readily, accelerating overall product consumption.

From a product-pricing perspective, this accelerated consumption suggests the potential for additional profits. Assuming a discount is required to encourage volume purchasing, a manufacturer stands to increase profits if the gains from the accelerated product consumption more than offset the losses because of the discount. Photocopy centers and university libraries may be tapping into this strategy when they offer photocopy cards that give buyers a discount if they prepay for a very large number of copies. Users of such cards may find themselves making copies of articles that they might not otherwise have copied. Similarly, wine retailers who offer 10 percent discounts for full-case purchases may recognize and be taking advantage of this increased consumption.

Payment Scheduling for Scarce Resources. A second implication of the present research involves the impact of payment scheduling on product usage. Study 4 revealed that the overall usage of a resource, in this case an athletic facility, could be influenced by the timing of payment for that usage. In particular, the study demonstrated an increase in usage immediately following payment and a steady decrease in usage until the subsequent payment. In the management of a scarce resource, one which is limited in its ability to properly accommodate all who wish access (e.g., a national park), this would argue for the careful management of payment scheduling so as to maximize the total number of consumers who pay for or support the resource, yet simultaneously limit overall and peak consumption.

Consider, for example, a resource that exhibits relatively steady demand over time, such as an indoor athletic facility. Payment depreciation would suggest the use of longer payment cycles (e.g., semiannual as opposed to monthly billing periods) so as to reduce total demand. In addition, it would suggest the staggering of payment schedules across consumers so as to smooth demand.

Alternatively, consider a resource that exhibits strong seasonal demand, such as a golf club. In this case, payment depreciation might suggest billing all club members at approximately the same time—far in advance of anticipated peak demand. This would allow payment depreciation to take full effect and reduce overall demand by the time peak season comes to pass, thereby allowing the club to maximize its membership without turning away members

[13] We thank a reviewer for highlighting this alternative theory.

wishing to play during the period of peak demand. In contrast, by billing members just before peak demand, the club will inadvertently promote peak period play because of the relative strength of the resulting sunk-cost effect.

The Buying and Selling of Stock. A third implication of payment depreciation we wish to highlight comes from the realm of finance.[14] It has long been observed that individual investors tend to hold on to losing stocks too long (Shefrin and Statman 1985). Payment depreciation would provide one rationale for such behavior. If the sunk-cost impact of the payment made to obtain a stock decreases with the passage of time, it would be emotionally less painful to sell a losing stock later as opposed to earlier. Holding on to the stock would allow for payment depreciation to occur, thereby reducing the negative hedonic impact of the payment when the stock is eventually sold. Therefore, while not necessarily rational from a normative economic perspective, an individual's insistence on holding on to a losing stock may be emotionally less distressing.

Future Research

The research presented contributes to our understanding of the sunk-cost effect and the likelihood of product consumption in situations where costs precede benefits. There are several avenues for future research, however.

First, in addition to influencing one's likelihood of benefit consumption, payment depreciation also may effect one's enjoyment from that benefit consumption as well as one's willingness to repurchase the chosen product. In the case of consumption enjoyment, for instance, the salience of a product's cost often serves either to increase enjoyment (as in the case of an hedonic product such as a fine bottle of wine) or to decrease enjoyment of that product (as in the case of a product for which one has overpaid). Payment depreciation, by decreasing the salience of a product's cost, should moderate the consumption enjoyment an individual receives from these sorts of transactions. In the case of willingness to repurchase a chosen product, we have shown that payment depreciation serves to gradually reduce one's utilization of a membership-based service (study 4). Although this decreased utilization may be advantageous for the provider of a service in the short-term, the long-term impact of such a utilization pattern on membership repurchase or renewal is unclear and should be explored.

Second, having demonstrated the existence of payment depreciation, it would now be valuable to explore how the characteristics of the underlying process vary across types of transactions. For instance, we might expect to find the rate of payment depreciation to be greater for discretionary or hedonic types of products than for nondiscretionary or utilitarian types of products. Similarly, based on research into psychological discount rates (Thaler 1981), we might expect a greater rate of payment depreciation for transactions involving small payments as opposed to large payments.

Third, although study 4 was effective at ruling out a categorization-based explanation for payment-depreciation, we are still left with the possible contributing impact of a gradually decreasing memory trace for an upstream payment. Future research should attempt to differentiate between the effects of adaptation to payments (as argued for in this article) and a decreasing memory trace on the attenuation of the sunk-cost effect.

Fourth, although this article focuses on payment depreciation, we feel there exists a related process that deserves attention, a process we refer to as ''transaction decoupling.'' Implicit in Thaler's (1985) theory of mental accounting is the assumption that consumers can uniquely identify the costs and benefits associated with a given transaction and link or couple those costs and benefits in a one-to-one fashion (Prelec and Loewenstein 1998). In many transactions, however, this may not be the case. For instance, because of the physical form of some payments (e.g., direct payroll deductions), the cost of a transaction may not be particularly salient at the time of benefit consumption. At other times, a single transaction payment may result in many product benefits, as in the purchase of a bundled vacation package consisting of airfare, lodging, and meals. In such cases, the process of mental accounting suggested by Thaler may be compromised, leading to the psychological disassociation or ''decoupling'' of transactions costs from benefits. As a result, we believe the pending benefits will take on the characteristics of a pure gain, in much the same way as in a transaction where the upstream payments have been fully depreciated. Unlike the case of payment depreciation, however, transaction decoupling should have no temporal component and should be significantly more discrete or steplike in nature. Although some preliminary research supports this characterization of decoupling, its relationship to payment depreciation should be explored in detail.

Finally, it would be interesting and informative to investigate consumer transactions in which benefits temporally precede costs. With the proliferation of consumer credit, it is increasingly common to find individuals consuming a product long before payment for that product is incurred. Credit card purchases and ''buy now, pay later'' schemes (Glassman 1996) clearly fall into this area. Although not addressed in this article, we believe a parallel process of adaptation governs consumer behavior in such situations. Specifically, we anticipate that consumers will gradually adapt to an upstream benefit, thereby causing the downstream payment to increasingly take on the characteristics of a pure loss. We have tentatively labeled this process ''benefit depreciation.'' Future research should explore the possibility and impact of such a process.

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[14]We thank a reviewer for making this observation.

REFERENCES

Ailawadi, Kusum and Scott Neslin (1998), ''The Effect of Promotion on Consumption: Buying More and Consuming It Faster,'' *Journal of Marketing Research,* in press.

Arkes, Hal R. and Catherine Blumer (1985), ''The Psychology of Sunk Cost,'' *Organizational Behavior and Human Decision Processes,* 35 (February), 124–140.

———, Cynthia A. Joyner, Mark V. Pezzo, Jane Gradwohl Nash, Karen Siegal-Jacobs, and Eric Stone (1994), ''The Psychology of Windfall Gains,'' *Organizational Behavior and Human Decision Processes,* 59 (September), 331–347.

Bettman, James R., Eric J. Johnson, and John W. Payne (1991), ''Consumer Decision Making,'' in *Handbook of Consumer Behavior,* ed. Thomas S. Robertson and Hal H. Kassarjian, Englewood Cliffs, NJ: Prentice-Hall.

Brockner, Joel (1992), ''The Escalation of Commitment to a Failing Course of Action: Toward Theoretical Progress,'' *Academy of Management Review,* 17 (January) 39–61.

Folkes, Valarie S., Ingrid M. Martin, and Kamal Gupta (1993), ''When to Say When: Effects of Supply on Usage,'' *Journal of Consumer Research,* 20 (December), 467–477.

Garland, Howard and Stephanie Newport (1991), ''Effects of Absolute and Relative Sunk Costs on the Decision to Persist with a Course of Action,'' *Organizational Behavior and Human Decision Processes,* 48 (February), 55–69.

Glassman, Cynthia A. (1996), ''Consumer Financing: The Borrowing/Savings Dilemma,'' *Journal of Retail Banking Services,* 18 (Autumn), 53–59.

Heath, Chip and M. G. Fennema (1996), ''Mental Depreciation and Marginal Decision Making,'' *Organizational Behavior and Human Decision Processes,* 68 (November), 95–108.

Helson, Harry (1964), *Adaptation-Level Theory: An Experimental and Systematic Approach to Behavior,* New York: Harper & Row.

Henderson, Pamela W. and Robert A. Peterson (1992), ''Mental Accounting and Categorization,'' *Organizational Behavior and Human Decision Processes,* 51 (February), 92–117.

Kahneman, Daniel and Amos Tversky (1979), ''Prospect Theory: An Analysis of Decision under Risk,'' *Econometrica,* 47 (March), 363–391.

———, Jack L. Knetsch, and Richard Thaler (1990), ''Experimental Tests of the Endowment Effect and the Coase Theorem,'' *Journal of Political Economy,* 98 (December), 1325–1348.

——— and Carol Varey (1991), ''Notes on the Psychology of Utility,'' in *Interpersonal Comparisons of Well-Being,* ed. John Elster and John E. Roemer, Cambridge: Cambridge University Press.

Nagle, Thomas T. and Reed K. Holden (1995), *The Strategy and Tactics of Pricing,* 2d ed., Englewood Cliffs, NJ: Prentice-Hall.

Prelec, Drazen and George Loewenstein (1998), ''The Red and the Black: Mental Accounting of Savings and Debt,'' *Marketing Science* 17 (1), 4–28.

Shefrin, Hersh M. and Meir Statman (1985), ''The Disposition to Sell Winners Too Early and Ride Losers Too Long,'' *Journal of Finance,* 40 (July), 777–790.

Simonson, Itamar (1993), ''Get Closer to Your Customers by Understanding How They Make Choices,'' *California Management Review,* 35 (Summer), 68–84.

Staw, Barry M. (1976), ''Knee-Deep in the Big Muddy: A Study of Escalating Commitment in a Chosen Course of Action,'' *Organizational Behavior and Human Performance,* 16 (June), 27–44.

——— (1980), ''The Escalation of Commitment to a Course of Action,'' *Academy of Management Review,* 6 (October), 577–587.

Teger, A. I. (1980), *Too Much Invested to Quit: The Psychology of the Escalation of Conflict,* New York: Pergamon.

Thaler, Richard H. (1980), ''Toward a Positive Theory of Consumer Choice,'' *Journal of Economic Behavior and Organization,* 1 (March), 39–60.

——— (1981), ''Some Empirical Evidence on Dynamic Inconsistency,'' *Economic Letters,* 8, 201–207.

——— (1985), ''Mental Accounting and Consumer Choice,'' *Marketing Science,* 4 (Summer), 199–214.

Tversky, Amos and Daniel Kahneman (1981), ''The Framing of Decisions and the Psychology of Choice,'' *Science,* 211 (January), 453–458.

Wansink, Brian (1996), ''Can Package Size Accelerate Usage Volume?'' *Journal of Marketing,* 60 (July), 1–14.

——— and Rohit Deshpande (1994), '''Out of Sight, Out of Mind': Pantry Stockpiling and Brand-Usage Frequency,'' *Marketing Letters,* 5 (January), 91–100.

Whyte, Glen (1986), ''Escalating Commitment to a Course of Action: A Reinterpretation,'' *Academy of Management Review,* 11 (April), 311–321.