

Tracking Costs of Time and Money: How Accounting Periods Affect Mental Accounting

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After people incur costs to get future benefits, they usually track these costs in their mental accounts and are keen to receive the benefits when they become available. We introduce the notion that costs and benefits can occur either in the same accounting period (day, season, etc.) or in different periods. Our key argument is that monetary costs are tracked across accounting periods but that temporal costs are written off at the end of the period in which they are incurred. Thus, accounting periods lead to a time-money asymmetry in the tracking of costs and, consequently, in the likelihood of seeking benefits. In a laboratory study, an online-panel study, and a field study with movie-theater patrons, we demonstrate how this relationship among accounting periods, cost tracking, and benefit seeking is different for time than for money. Our findings offer insights into the sunk-cost effect, time-money differences, and mental accounting.

People often incur costs first and receive benefits later. A football fan spends money on tickets weeks before attending the game, whereas an assistant professor spends time writing articles years before being awarded tenure. People may track such costs and benefits via “mental accounts.” An advance purchase of a football-game ticket may initiate a mental account that is settled in the black if the consumer receives the benefit by attending the game, or settled in the red if the consumer misses the game (Prelec and Loewenstein 1998; Thaler 1980, 1985, 1999).

Across different accounts, the mental accounting of money and time seems to be similar. For instance, pension money is treated differently from checking-account money (Shefrin and Thaler 1981), and work time is treated differently from nonwork time (Rajagopal and Rha 2009). Within mental accounts, however, the results for money and time differ. Within a game account, for instance, people keep

track of the money spent on tickets, which makes them keen to seek the benefit. They may even brave snowstorms to attend the game (Soman 2001), because they want to close the game account in the black rather than the red. Such thinking reflects a sunk-cost effect (Arkes and Blumer 1985) because decisions are based on prior costs (ticket cost) rather than future costs (driving in a snowstorm) and benefits (attending the game). In contrast, because people lack the ability to keep track of temporal costs, they are less keen to seek the associated benefits (Soman 2001). While the sunk-cost effect may still arise for time (Navarro and Fantino 2009), the effect is significantly weaker for time than it is for money (Soman 2001).

We introduce the notion that costs and benefits can occur either in the same “accounting period” (day, season, etc.) or in different periods and propose that accounting periods influence the tracking of temporal, but not monetary, costs. This asymmetric tracking of costs leads to an asymmetric seeking of benefits, such that the sunk-cost differences between time and money depend upon whether costs and benefits occur in the same accounting period or different periods.

MENTAL ACCOUNTING: INFLUENCE OF ACCOUNTING PERIOD

While financial statements denote the period of financial accounts (Jarvis and Jenkins 1998), there is no tangible record of the beginning and end of mental accounts. But mental accounts are known to open when costs are incurred and to close when benefits are either accrued or forfeited

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Debbie MacInnis served as editor and Gal Zauberman served as associate editor for this article.

Electronically published July 28, 2010

(Prelec and Loewenstein 1998; Thaler 1980). We argue that individuals might not always construe this temporal gap between costs and benefits as a single accounting period. That is, accounting periods might exist independent of a category's cost-benefit time line, because of which costs and benefits might seem to be in the same period, or in different periods.

Graham (1981) discusses how people have a linear-separable view of time. Time is perceived as a continuous linear stretch from the past to the future, which individuals mentally separate into discrete units of various kinds (Feldman and Hornik 1981). The construction of temporal units, however, is not fixed for all individuals and situations. A working woman might divide a week's supply of time into two periods—Monday to Friday versus Saturday to Sunday—but a stay-at-home mom might construe the week as just one period. Such perspectives might explain the latter's immunity to Monday-morning blues (Areni 2009). Similarly, an office worker might view two successive weeks as distinct units, a salesperson might view them as part of the same 3-month quarter, and a student might view them as part of fall-semester time. It therefore seems that people have a general system of structuring their time into different periods (days, weeks, seasons, etc.), depending on how an individual divides his or her time. As we discuss next, mental accounting of costs and benefits may or may not occur across such periods.

As long as an accounting period stays open, people seem to keep track of the costs. For example, when betting on horse races, people keep track of the betting costs they incur during the day, and try to recover those costs via long-shot bets toward the end of the day (Kahneman and Tversky 1979; Thaler 1999). Similarly, the time spent on work is considered a cost that people are known to record in their mental accounts. The accounting period within which such costs of working time are tracked can vary from one year for physicians (Rizzo and Zeckhauser 2003) to just one day for taxi drivers (Camerer et al. 1997). Once the accounting period closes, however, do costs continue to be held on the books? For example, if costs are incurred on one day, but benefits are scheduled the next day, are costs written off at the end of the period in which they are incurred, or are they maintained in mental-accounting books until the benefit is received? The answer, we propose, depends on whether costs are monetary or temporal.

Across time periods, the fungibility of time is likely to be low (LeClerc, Schmitt, and Dubé 1995). Considering days as accounting periods, the time we will have available tomorrow is a new and renewable resource (Linville and Fischer 1991). It is not exchangeable with today's time; today's expired time cannot be recouped by tomorrow's time, and today's spare time cannot be added to tomorrow's time. Therefore, while people may keep an account of temporal costs within an accounting period, they are unlikely to carry forward their costs to the next period. When the accounting period closes, they may well write off these costs and not consider them in subsequent periods. Money, how-

ever, is more fungible. If an individual incurs costs of money one day, the desired state of wealth can be maintained by spending less the next day. Similarly, money saved one day can be spent the next day. Therefore, costs of money need not be written off at the end of an accounting period; they can be carried forward to the next period. As such, people are likely to keep an account of monetary costs not only during the accounting period in which they are incurred but also in subsequent periods.

The above discussion suggests that people are more likely to keep track of temporal costs when the accounting period is the same (vs. different) but that accounting periods will not influence the tracking of monetary costs. Consequently, while the tracking of costs has been found to be higher for money than for time (Soman 2001), this time-money difference is likely to be lower when the accounting period is the same (vs. different). Hence, we predict the following:

- H1:** Accounting periods will have a stronger influence on the mental tracking of costs when costs are temporal (vs. monetary), such that time-money differences in tracking costs will be lower when the accounting period is the same (vs. different).

Having incurred costs, people are more likely to seek the associated benefits if costs and benefits are linked together, or "coupled" (Gourville and Soman 1998; Prelec and Loewenstein 1998; Soman and Gourville 2001). Given our discussion of distinct accounting periods, coupling is more likely to occur when costs and benefits occur in the same accounting period, rather than in different periods. As proposed in our motivation for hypothesis 1, people are likely to keep track of both temporal and monetary costs within a given period. So, if a benefit is expected during the same period, it will be coupled with the costs, and people will be keen to seek the benefits. However, if benefits occur in a later accounting period, an asymmetry will arise. Because monetary costs continue to stay on mental books, they will continue to be linked to the benefits that occur in a different period. In contrast, temporal costs may well be decoupled from benefits that occur in a different accounting period, making people less eager to seek the benefits.

The above discussion suggests that, given temporal costs, people are more likely to seek benefits when the accounting period is the same (vs. different). In contrast, given monetary costs, accounting periods will not influence the likelihood of seeking benefits. Consequently, while the likelihood of seeking benefits has been found to be higher for prior (sunk) costs of money than of time (Soman 2001), this time-money difference is likely to be lower when the accounting period is the same (vs. different). Hence, we predict:

- H2:** Accounting periods will have a stronger influence on the likelihood to seek benefits when costs are temporal (vs. monetary), such that time-money differences in seeking benefits will be lower when the accounting period is the same (vs. different).

Hypothesis 2 is predicated on cost tracking as a mediator. Specifically, we predict that people will track temporal costs and, consequently, seek benefits when the accounting period is the same, but not when it is different. However, in the case of monetary costs, there will be no effect of accounting periods on cost tracking and, therefore, no effect on benefit seeking. Hence:

H3: In the case of temporal (but not monetary) costs, cost tracking will mediate the effect of accounting periods on the likelihood to seek benefits.

We now test our predictions by employing a mental-accounting scale (study 1), a skiing scenario (study 2), and a movie-attendance field study (study 3).

STUDY 1: MENTAL-ACCOUNTING SCALE (LAB STUDY)

In this experiment, we test hypothesis 1, which relates to how accounting periods have a stronger influence on the mental tracking of temporal (vs. monetary) costs. To get a sense of the accounting periods that our subject population might be using, we conducted a preliminary study. Specifically, we asked 138 undergraduate students at the University of South Carolina to indicate the time periods in which they divide their time. Their responses were very heterogeneous: hour, week, month, fall semester, winter break, and so on. However, “day” was notable in that it was the most frequent accounting period mentioned by participants (21.7%; 30/138). This use of one day as an accounting period is also consistent with prior studies that suggest that people consider one day as a unit of time when betting on races (Kahneman and Tversky 1979; Thaler 1999), driving taxis (Camerer et al. 1997), and integrating outcomes (Linville and Fischer 1991).

Although “days” was mentioned most frequently, it was mentioned by only a minority (21.7%). Thus, we could not assume that participants would naturally use “days” as their accounting periods. Consequently, we created specific manipulations to make participants think in terms of days as accounting period (same vs. different). In particular, we modified Soman’s (2001) eight-item scale, which covers the key components of mental accounting (Heath and Soll 1996). Two sample items that we used in the same-time condition (the questions for money were similar) were as follows: (1) If I spent time on an activity or item today, I would keep track of this expenditure till the day gets over. (2) The more time I spent today on a lost cause, the more regret I would have at the end of this day, for having incurred the expense. Two sample items that we used in the different-time condition were as follows: (1) If I spent time on an activity or item today, I would keep track of this expenditure even after the day gets over. (2) The more time I spent yesterday on a lost cause, the more regret I would have today, for having incurred the expense.

Design and Procedure

A between-subjects design was used: 2 (type of cost: time vs. money) \times 2 (accounting period: same vs. different). The dependent variable was the level of agreement with the statements. One hundred forty-three undergraduate students at the University of South Carolina participated in exchange for course credit. They were randomly assigned to one of the four experimental conditions, shown the eight items one at a time on a computer screen, and asked to indicate their level of agreement (1 = strongly disagree; 5 = neither agree nor disagree; 9 = strongly agree).

Results and Discussion

Responses to the eight items formed a reliable scale ($\alpha = .83$). The summed measure (higher scores = higher cost tracking) was analyzed in a 2 (type of cost: time vs. money) \times 2 (accounting period: same vs. different) ANOVA (the means are summarized in table 1).

The main effect of accounting periods was not statistically significant ($F(1, 139) = .53; p = .46$). The main effect of type of costs was significant ($F(1, 139) = 8.91; p < .01$), and this effect was qualified by the significant two-way interaction ($F(1, 139) = 5.91; p < .05$), which supported hypothesis 1. As predicted, planned contrasts revealed that, for time, cost tracking was higher when the accounting period was the same, rather than different ($F(1, 139) = 5.05; p < .05$). But, for money, accounting period did not have a significant effect ($F(1, 139) = 1.43; p = .23$). Furthermore, cost tracking was higher for money than for time, when the accounting period was different ($F(1, 139) = 13.97; p < .001$). But, cost tracking for time and money was similar when the accounting period was the same ($F(1, 139) = .16; p = .68$).

STUDY 2: GOING TO SKI (ONLINE PANEL STUDY)

Having examined the time-money asymmetry in the tracking of costs, we now examine the consequent asymmetry in the likelihood of seeking benefits (hypotheses 2–3). The context involved that of a ski vacation. Soman and Gourville (2001) asked participants to imagine paying \$160 to purchase 1-day lift tickets for a 4-day ski vacation, enjoying 3 days of skiing, and facing warm rain on the fourth day. The authors show that the likelihood of skiing on the fourth day is influenced by the money paid. Using this context, we manipulated both cost (time vs. money) and accounting period (same vs. different). We manipulated cost to be either \$160 or 8 hours, assuming a wage rate of \$20/hour, which is close to the average hourly wage of U.S. adults (income/capita = \$38,611; U.S. Census Bureau 2007). We confirmed this assumption in a pretest with 25 adults, who indicated the minimum amount they would want for spending 8 hours making phone calls. Because the mean response of \$153.60 was not significantly different from

TABLE 1
SUMMARY OF MEANS, INTERACTIONS, AND PLANNED CONTRASTS

	Costs of time		Costs of money	
	Same accounting period	Different accounting period	Same accounting period	Different accounting period
Study 1: Mental accounting score ($N = 143$):				
Mean	50.64 (8.29)	45.36 (10.29)	51.56 (10.96)	54.41 (10.04)
Cost \times period interaction		$F = 5.91; p < .05$		
Same vs. different:				
Time		$F = 5.05; p < .05$		
Money		$F = 1.43; p = .23$		
Time vs. money:				
Different period		$F = 13.97; p < .001$		
Same period		$F = .16; p = .68$		
Study 2: Likelihood of skiing ($N = 184$):				
Mean	3.28 (2.28)	2.24 (1.61)	3.76 (2.63)	4.34 (2.84)
Cost \times period interaction		$F = 5.26; p < .05$		
Same vs. different:				
Time		$F = 4.29; p < .05$		
Money		$F = 1.38; p = .24$		
Time vs. money:				
Different period		$F = 17.67; p < .001$		
Same period		$F = .92; p = .34$		
Study 3: Movie attendance ($N = 400$):				
Standardized percentage	68	42	68	69
Cost \times period interaction		Wald = 7.02; $p < .01$		
Same vs. different:				
Time		Wald = 13.32; $p < .001$		
Money		Wald = .02; $p = .88$		
Time vs. money:				
Different period		Wald = 14.36; $p < .001$		
Same period		Wald = 0; $p = 1$		

NOTE.—Standard deviation is given in parentheses following the mean.

\$160 ($t(24) = -.63; p = .53$), we used 8 hours in the time condition and \$160 in the money condition.

We pretested the accounting-period manipulation with an additional sample of 37 adults. In the different-period condition, participants read that they acquire ski-lift tickets first (mid December) and then ski the next year (early January). In the same-period condition, we again mentioned mid December and early January, but as part of the “ski season.” Participants indicated the extent to which they perceived time 1 (acquire tickets) and time 2 (ski) to be in the same period or different periods (1 = different time periods; 9 = same time period). The mean response was higher when participants were in the same-period rather than different-period condition ($M_{\text{same}} = 6.16$ vs. $M_{\text{diff}} = 2.67$; $F(1, 35) = 13.29; p < .01$), confirming the manipulation.

Design and Procedure

A between-subjects design was used: 2 (type of cost: time vs. money) \times 2 (accounting period: same vs. different). The dependent variable was likelihood to ski. One hundred eighty-four adults from a paid online panel of a market-research firm (Qualtrics) participated in this experiment. The

scenario for the different {same} period, money condition was as follows:

A popular ski resort in Colorado is sponsoring a ski camp for children. The ski-camp team is selling lift tickets to raise funds for the camp.

You decide to get the tickets this year, for a 4-day vacation next year. This year (middle of December 2009), you pre-purchase 4 days' worth of lift tickets for the popular resort. Specifically, you purchase four 1-day lift tickets, for \$40 each (\$160 in all). Your vacation takes place next year (early January 2010).

{You decide to get the tickets at the beginning of this year's ski season, for a 4-day vacation later during the ski season. At the beginning of the ski season (middle of December), you pre-purchase 4 days' worth of lift tickets for the popular resort. Specifically, you purchase four 1-day lift tickets, for \$40 each (\$160 in all). Your vacation takes place later during the ski season (early January).}

The key difference in the time condition was that participants read that they had signed up to phone donors with donation requests. They had spent 2 hours every day for 4

days (8 hours in all) and received one ticket for each day's work (4 tickets in all). Then, all participants imagined being on the final day of their 2010 vacation and read the following:

It is now the morning of the last day of your vacation. You have had three excellent days of skiing with perfect conditions. Unfortunately, last night a warm rain hit the area. While skiing is still permitted, it may not be much fun. As an alternative, a friend suggests taking it easy, having a nice lunch, and leaving early to beat the traffic. You look at your remaining ski ticket and are not sure if you want to go skiing or leave early.

Participants then responded to the question, "How likely are you to go skiing on the final day?" (1 = extremely unlikely to go skiing, 9 = extremely likely to go skiing). Then, to assess the tracking of ticket costs, we asked them to respond to four statements on 1–9 scales (strongly disagree; strongly agree): (a) There is no point in considering 2009 costs in 2010; (b) 2009 costs are not recoverable in 2010; (c) There is no way for me to recoup 2009 costs in 2010; and (d) The chapter of 2009 costs is now closed. Higher scores would indicate that the 2009 costs were written off, and their tracking did not extend to 2010. To ease interpretation, we reverse-coded these items such that higher scores indicated higher cost tracking. The four items formed a reliable scale ($\alpha = .84$) and were averaged to form a cost-tracking measure.

Results and Discussion

Main Analysis (Hypothesis 2). The likelihood to ski was analyzed in a 2 (type of cost: time vs. money) \times 2 (accounting period: same vs. different) ANOVA. Statistical significance emerged for the main effect of type of cost ($F(1, 180) = 13.34; p < .001$) but not for accounting period ($F(1, 180) = .40; p = .53$). These effects were qualified by the significant two-way interaction ($F(1, 180) = 5.26; p < .05$), supporting hypothesis 2. As predicted, planned contrasts revealed that prior costs of time had a greater effect on likelihood to ski when the accounting period was the same, rather than different ($F(1, 180) = 4.29; p < .05$), but accounting period did not have an effect in the case of monetary costs ($F(1, 180) = 1.38; p = .24$). Moreover, and as predicted, prior temporal costs had a lower effect than monetary costs on likelihood to ski when costs and benefits were in different periods ($F(1, 180) = 17.67; p < .001$). But, the effects of prior temporal and monetary costs were comparable when the accounting period was the same ($F(1, 180) = .92; p = .34$; see table 1).

Mediation Analysis (Hypothesis 3). We have argued that, for costs of time (but not money), accounting period affects cost tracking which, in turn, affects likelihood to ski. That is, cost tracking is a mediator in the case of time, but not money. We confirmed these effects using a mediated-moderation procedure (Muller, Judd, and Yzerbyt 2005). Due to space considerations, we discuss only the separate mediation

tests for time and money (Baron and Kenny 1986). In the case of time, the effect of accounting period on cost tracking was significant ($\beta = .38; t(90) = 3.86; p < .001$), and, separately, the effect on likelihood to ski was also significant ($\beta = -.25; t(90) = -2.49; p < .05$). The effect of cost tracking on likelihood to ski was also significant ($\beta = -.33; t(90) = -3.29; p < .01$). Moreover, when both accounting period and cost tracking were included as predictors for the dependent variable of likelihood to ski, cost tracking continued to have a significant effect ($\beta = -.27; t(89) = -2.53; p < .05$), but the effect of accounting period was no longer significant ($\beta = -.15; t(89) = -1.43; p = .16$). A Sobel's test ($z = -2.12; p < .05$) further supported the mediating effect of cost tracking in the time condition. For money, there was no mediation possibility, because accounting period had no significant effect on either cost tracking ($\beta = -.15; t(90) = -1.45; p = .15$) or likelihood to ski ($\beta = .11; t(90) = 1.02, p = .31$).

STUDY 3: ATTENDING A MOVIE (FIELD STUDY)

Study 2 demonstrated the time-money asymmetry in seeking benefits. Here, we test the robustness of our effects with adults making real decisions. Additionally, we introduce a variable of benefit timing (early vs. late) to test whether the time-money asymmetry is due to a gradual depreciation of costs over time (Gourville and Soman 1998) or a sudden change in accounting periods. If gradual depreciation is the cause, there should be a moderating effect of benefit timing; a delay in benefits should reduce benefit seeking, but more strongly for time than for money. If a switch in accounting periods is the cause, these periods should matter, but benefit timing should not.

For this study, we partnered with a movie theater in Charlotte, North Carolina (Ayrslay Grand Cinemas). The sequence of events was as follows. (1) Participants spent either money (\$3) or time (7-minute survey) in return for an advance movie ticket. (2) They received tickets for one of four subsequent weekends, two of which were in the same accounting period (same-early; same-late) and two in a different accounting period (different-early; different-late). (3) After those tickets were used, we counted the number of movie attendees each weekend and paid the theater the full price of the tickets (\$8.50/ticket).

In the hypothetical ski study, we had introduced an obstacle (warm rain). We cannot do so in this real study, but, whatever those obstacles might be (bad weather, poor assortment of movies, etc.), we expect time and money participants to respond differently. One issue, though, is that the obstacles might vary across weekends, influencing the attendance of our participants. Because these obstacles should influence not only our participants, but also other theater patrons, we used overall attendance figures to standardize participant attendance across weekends.

The cost manipulation was based on a pretest with 33 adults, in which a 7-minute survey was seen as equivalent

to paying \$2.81. We used a round number of \$3, which was statistically not different from \$2.81 ($t(32) = -.98; p = .33$). Manipulation of accounting periods was based on a break of seasons. Although the autumnal equinox is the technical summer-fall break point, Labor Day is viewed in the United States as the end of summer and the beginning of fall. Around a month before Labor Day, we conducted a pretest with 54 adults, who imagined receiving a movie ticket that day (time 1), and using it later (time 2). Time 2 was either before Labor Day (same "summer" season), or after it (different "fall" season). Higher scale responses (1 = different vs. 9 = same time period) indicated stronger perceptions about time 1 and time 2 being in the same (vs. different) periods. The manipulation worked as intended; responses were higher in the same- than in the different-period condition ($M_{\text{same}} = 6.04$ vs. $M_{\text{diff}} = 3.85; F(1, 52) = 8.33; p < .01$).

Design and Procedure

A between-subjects design was used: 2 (type of cost: time vs. money) \times 2 (accounting period: same vs. different) \times 2 (benefit timing: early vs. late). The dependent variable was movie attendance. One thousand one hundred ninety-six adults were solicited at the movie theater over a weekend (August 21–23, 2009). In return for either \$3 or 7 minutes, they could get a ticket for use over a specific weekend in the "summer" (August 28–30, September 4–6) or in the "fall" (September 11–13, 18–20). Because Labor Day was September 7, these dates denote the same-early, same-late, different-early, and different-late conditions. An individual received only one offer (i.e., alternate dates were not offered). We stopped soliciting when 400 participants (50 in each condition) accepted our offers.

After spending \$3/7 minutes, a participant received a ticket stapled to a yellow sheet of paper that would purportedly notify the theater employees that it was an advance ticket. The main purpose was to reinforce the accounting period. In the different-period condition, the sheet was titled "Begin Fall with a Movie," but, in the same-period condition, the sheet was titled "End Summer with a Movie." The title was followed by this text in the different {same} conditions:

On Labor Day (Sep. 7), the summer season will officially end and the fall season will begin.

Use the ticket above to watch a movie after the fall season starts. Note that this ticket can be used only over the fall weekend indicated on the ticket.

{Use the ticket above to watch a movie while the summer season is still on. Note that this ticket can be used only over the summer weekend indicated on the ticket.}

Also, it is not transferable. Only the person who signed the movie-theater form is eligible to use this ticket.

After receiving tickets, participants indicated their inten-

tion to attend the movie: How likely are you to come back and use the movie ticket that you received today? (1 = very unlikely; 9 = very likely). The conditions did not matter; both money and time participants were determined to use the ticket ($M_{\text{money}} = 8.10; M_{\text{time}} = 7.97$). But, once they face any real obstacles (e.g., bad weather), we expect time and money participants to behave differently.

Results and Discussion

For the four weekends (same-early, same-late, different-early, and different-late), the movie-theater owner gave us (a) the overall attendance figures (see table 2) and (b) the used tickets, which revealed the raw attendance numbers, each out of 50, for time (30, 23, 22, and 19) and money (30, 23, 32, and 34). We used the first-weekend attendance of 4,530 as a benchmark (raw/overall attendance \times 4,530) to yield standardized numbers for time (30, 38.03, 21.74, and 20.46) and money (30, 38.03, 31.62, and 36.61). For the binary logistic analysis, fractions cannot be coded; movie attendance has to be dichotomous (i.e., attended/did not attend). So, we rounded the attendance numbers for time (30, 38, 22, and 20) and money (30, 38, 32, and 37).

These numbers reveal an initial depreciation but one that is identical for time and money. Although participants had reported a high intention of attending the movie, only 60% same-early participants returned (30 out of 50). Subsequent depreciation is not evident from a glance at the numbers, or from a logistic regression of the model (type of cost: early vs. late; accounting period: same vs. different; benefit timing: early vs. late). The predicted type of cost \times accounting period interaction ($\beta = -.28; \text{Wald} = 6.94; p < .01$) was significant, but none of the interactions of timing (early vs. late) were significant ($p > .16$), suggesting that the effect of period was beyond any effect of depreciation. We also tested the effect of timing by ignoring the variable of accounting periods and considering only type of cost (time vs. money) and timing (early vs. late). Again, the type of cost \times timing interaction was not significant ($\beta = -.09; \text{Wald} = .76; p = .38$).

In our final analysis (summarized in table 1), we ignored the variable of benefit timing and considered only type of cost (time vs. money) and accounting period (same vs. different) and, once again, found a significant cost \times accounting period interaction ($\beta = -.28; \text{Wald} = 7.02; p < .01$). Consistent with hypothesis 2, prior costs of time had a greater effect on movie attendance when the accounting period was the same, rather than different ($\beta = -.54; \text{Wald} = 13.32; p < .001$). But costs of money had a similar effect irrespective of whether the accounting period was the same, or different ($\beta = .02; \text{Wald} = .02; p = .88$). Moreover, and as predicted, when the accounting period was different, temporal costs had a lower effect than monetary costs ($\beta = -.56; \text{Wald} = 14.36; p < .001$). But, when the accounting period was the same, the effect of temporal costs was identical to that of monetary costs (68% vs. 68%).

TABLE 2
OVERALL STRUCTURE OF STUDY 3 (MOVIE STUDY)

	Time: Spent 7 minutes on a survey				Money: Spent \$3			
	Same period		Different period		Same period		Different period	
	Early (August 28–30)	Late (September 4–6)	Early (September 11–13)	Late (September 18–20)	Early (August 28–30)	Late (September 4–6)	Early (September 11–13)	Late (September 18–20)
Movie weekend								
Overall theater attendance	4,530	2,740	4,584	4,207	4,530	2,740	4,584	4,207
Raw participant attendance (each out of 50)	30	23	22	19	30	23	32	34
Standardized participant attendance (each out of 50)	30	38	22	20	30	38	32	37
Standardized early + late participant attendance (each out of 100)	68		42		68		69	

NOTE.—A total of 1,196 individuals were solicited over a weekend: August 21 (Friday) to August 23 (Sunday), 2009. Out of these, 400 individuals agreed to participate in the study. They spent either their time or their money to get a ticket for a movie. The movie was in early summer, late summer, early fall, or late fall (summer = same period; fall = different period).

GENERAL DISCUSSION

After people incur costs to get benefits, they track these costs in their mental accounts, and try their best to receive benefits, so that they can close the accounts in the black. Such mental accounting can lead to a sunk-cost effect wherein prior costs urge people to seek benefits. The current research explores how these processes may be impacted by the accounting periods that people use to structure their time. We predict that the effect of accounting periods on mental accounting will be asymmetric for money versus time. When costs are monetary, people will track costs and seek benefits, irrespective of when the benefits occur. Such mental accounting will occur for temporal costs as well, but only when benefits occur in the same accounting period as the costs. Consequently, the sunk-cost effect for time and money will be different when the accounting period is different but the same when the accounting period is the same.

Supportive results arise from a mental-accounting scale (study 1), a skiing scenario (study 2), and a field study (study 3). Study 1 employs student participants in the laboratory, study 2 relies on adult participants from an online panel of a market-research firm, and study 3 uses adult movie goers. The predicted accounting period × type of cost interaction emerges across all studies. Furthermore, we observe the mediational role of cost tracking (study 2) and show that our effects are driven not by gradual depreciation but by a sudden change in accounting periods (study 3). These results are not without limitations. We discuss two key ones.

Limitations

First, the underlying process needs to be better understood. What we show is that the asymmetric likelihood to

seek benefits occurs due to asymmetric cost tracking. But, what is asymmetric cost tracking due to? Is it, as we argue, due to changes in fungibility? Or, is it due to some other reason such as the perception of the cost-benefit distance? For instance, in study 3, could Labor Day have served as an event marker (Zauberman et al. 2010) that made costs seem more distant in the different (vs. same) period condition? Furthermore, could this change in perceived distance have been more impactful for time than for money (Zauberman and Lynch 2005)? Such questions remain unresolved. A related issue is that we show time-based accounting periods as having a stronger effect in time than in money. So, are our results the outcome of using time-based rather than money-based periods? On the one hand, time-based periods are the essence of our theorizing; because mental accounts are maintained over a period of time, we evoked structures of time to show that, contrary to prior research (Soman 2001), mental accounting can indeed occur for time just as it does for money. On the other hand, it is possible that money-based periods might have different effects. We know that people receive monetary inflows at regular intervals (e.g., paychecks), and we also know that they budget the outflows (Ülkümen, Thomas, and Morwitz 2008). So, it is possible that individuals might structure periods in terms of monetary inflows and outflows. It needs to be seen whether such periods can have a stronger effect on the accounting of money (vs. time). A related issue is whether simply thinking of time makes some accounting periods salient (e.g., day), but thinking of money makes other periods salient (e.g., month, which corresponds with paychecks). Another issue worth exploring is how the event duration (4-year degree vs. 1-month certificate program) might make different accounting periods salient, leading to different effects for time versus money.

The other key limitation relates to the accounting periods that people use in real life. In our pretest (discussed in study 1), “day” was mentioned most frequently as an accounting period, but only by a minority (21.7%) of participants. We need to understand how, a priori, one can predict the accounting periods that individuals use, and whether changes in some periods (e.g., months) have a different impact than changes in other periods (e.g., years). Even though accounting periods might be hard to predict, what makes this construct meaningful is the ease with which it varies across individuals and situations. This property bears kinship with the malleability that has been found in the broader construct of mental accounting (Cheema and Soman 2006). We invoked different accounting periods via a variety of manipulations, some of which were subtle, and some which were less so, but observed the same result: accounting periods had asymmetric effects in the case of time versus money. Similar manipulations could be implemented in real-life settings to influence the accounting periods that consumers consider.

Given that accounting periods can change, it becomes important to explore other plausible influences. For instance, Labroo and Patrick (2009) show that a positive mood allows people to step back and look at the big picture, whereas a negative mood does not foster such an abstract construal. Therefore, in situations that are happy (vs. sad), people might view accounting periods more broadly and perceive different periods to be part of the same general period. Individuals might even construct accounting periods on the fly. Malleable mental accounting (Cheema and Soman 2006) suggests that individuals construct accounts to justify what they want to do. Individuals might similarly construct accounting periods. If the obstacles faced at the time of seeking benefits are too high, individuals might relegate costs to a previous accounting period, in order to justify forfeiting the benefits. Such possibilities need to be examined further. For now, we discuss the implications for mental accounting and time-money differences.

Implications for Mental Accounting

We introduce accounting period as a new determinant of cost-benefit coupling and decoupling (Prelec and Loewenstein 1998). While depreciation (Gourville and Soman 1998) can also precipitate decoupling, we show a time-money asymmetry that emerges even when the distance between costs and benefits stays constant (study 2) and that cannot be explained by benefit timing (study 3). Accounting periods also relate to choice bracketing (Read, Loewenstein, and Rabin 1999). Within different brackets, people handle multiple sad events better because their resources get renewed (Linville and Fischer 1991); within the same bracket, their resources to handle such events might be depleted (Baumeister 2002; Vohs and Faber 2007). The distinctive feature of the brackets we discuss, accounting periods, is that they matter more for time than for money.

Our findings also apply to emotional accounting (Levav and McGraw 2009). When windfall money is received under

negative circumstances, people are more likely to spend it on a virtue (vs. vice). We speculate that the emotional tag associated with money will stick across accounting periods but that the tag associated with time will not. Consider windfall time from the cancellation of a boring meeting. If the cancellation is due to negative circumstances, such as a committee member passing away, would this time be spent more on a virtue (vs. vice)? It might be more likely to be spent on a virtue if the cancellation and the subsequent windfall time are in the same accounting period (e.g., same workweek), than if the windfall time is in a later period.

Implications for Time-Money Differences

In prior research on sunk costs, people seem to show less time accounting than money accounting (Soman 2001). However, general observation suggests that people should be experienced in handling time. Ever since humans have existed, they have been making decisions about how to spend time. Even during one’s lifetime, time management starts in early childhood, well before money management begins. We show that mental accounting of time is quite elaborate in that people consider not only costs and benefits but also accounting periods. Therefore, while mental accounting of time is indeed different from that of money, it may not always be less; and the sunk-cost effect for time might not always be weaker.

Implications also arise for time discounting. People prefer to incur costs in the distant (vs. near) future but more so for time than money. This happens because perceived surplus (i.e., slack) of time is higher in the distant future (Zauberman and Lynch 2005). Could this effect depend on whether the distant and near futures are seen to be in the same period (vs. different periods)? If they are perceived to be in the same period, people may not expect higher slack of time later, because both distant and near futures are simply part of the same future. As such, discounting might be less for time; people might even prefer to get done with the costs by incurring them in the near future. While these arguments suggest that accounting periods might determine slack, the reverse is possible too; perceptions of slack might determine accounting periods. For example, because slack is higher on weekends, people might think of workweek and weekend as different periods.

Our research also has consequences for risk aversion. LeClerc et al. (1995) show that people are risk averse when they spend time to wait for something, but Okada and Hoch (2004) show that people are risk seeking when they spend time to acquire products. It is possible that waiting for benefits evokes a single accounting period, which makes people cognizant of the costs and, hence, risk averse. But, when benefits are going to accrue in a later period, people might take more risks with their time because those costs are going to be written off anyway.

Finally, decision making is known to vary with the currency of costs. For instance, when consumers search (e.g., for low prices) by spending time rather than money, they make decisions by relying on unrelated heuristics rather than

search costs (Monga and Saini 2009; Saini and Monga 2008). Based on our results, we speculate that reliance on search costs will increase if the costs (e.g., time spent visiting stores) and payoffs (e.g., finding the desired price) occur in the same accounting period (e.g., holiday-season shopping) rather than different periods. Research has also shown that time leads to an emotional mind-set and a focus on product connection, but money leads to a value-maximization mind-set and a focus on product possession (Liu and Aaker 2008; Mogilner and Aaker 2009). Our conjecture is that mind-sets evoked by money will be sustained across accounting periods. In contrast, mind-sets evoked by time will be sustained within the accounting period in which they are activated, but will dissipate when the period ends.

Conclusion

We show that mental-accounting processes depend on whether costs and benefits are in the same accounting period or in different periods. Importantly, the effects of accounting period are asymmetric for time versus money. For time, the likelihood of tracking costs and seeking associated benefits is higher when the accounting period is the same rather than different. But, for money, the likelihood of tracking costs and seeking benefits is high irrespective of the accounting period. Consequently, time and money lead to different results when the accounting period is different, but to similar results when the accounting period is the same.

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