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Mental Accounting Matters

RICHARD H. THALER
Graduate School of Business, University of Chicago, USA

ABSTRACT

Mental accounting is the set of cognitive operations used by individuals and households to organize, evaluate, and keep track of financial activities. Making use of research on this topic over the past decade, this paper summarizes the current state of our knowledge about how people engage in mental accounting activities. Three components of mental accounting receive the most attention. This first captures how outcomes are perceived and experienced, and how decisions are made and subsequently evaluated. The accounting system provides the inputs to be both *ex ante* and *ex post* cost–benefit analyses. A second component of mental accounting involves the assignment of activities to specific accounts. Both the sources and uses of funds are labeled in real as well as in mental accounting systems. Expenditures are grouped into categories (housing, food, etc.) and spending is sometimes constrained by implicit or explicit budgets. The third component of mental accounting concerns the frequency with which accounts are evaluated and 'choice bracketing'. Accounts can be balanced daily, weekly, yearly, and so on, and can be defined narrowly or broadly. Each of the components of mental accounting violates the economic principle of fungibility. As a result, mental accounting influences choice, that is, it matters.

KEY WORDS mental accounting; choice bracketing; fungibility; budgeting

- A former colleague of mine, a professor of finance, prides himself on being a thoroughly rational man. Long ago he adopted a clever strategy to deal with life's misfortunes. At the beginning of each year he establishes a target donation to the local United Way charity. Then, if anything untoward happens to him during the year, for example an undeserved speeding ticket, he simply deducts this loss from the United Way account. He thinks of it as an insurance policy against small annoyances.*
- A few years ago I gave a talk to a group of executives in Switzerland. After the conference my wife and I spent a week visiting the area. At that time the Swiss franc was at an all-time high relative to the US dollar, so the usual high prices in Switzerland were astronomical. My wife and I comforted ourselves that I had received a fee for the talk that would easily cover the outrageous prices for hotels

* This strategy need not reduce his annual contribution to the United Way. If he makes his intended contribution too low he risks having 'uninsured' losses. So far he has not been 'charitable' enough to have this fund cover large losses, such as when a hurricane blew the roof off his beach house.

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and meals. Had I received the same fee a week earlier for a talk in New York though, the vacation would have been much less enjoyable.

- A friend of mine was once shopping for a quilted bedspread. She went to a department store and was pleased to find a model she liked on sale. The spreads came in three sizes: double, queen and king. The usual prices for these quilts were $200, $250 and $300 respectively, but during the sale they were all priced at only $150. My friend bought the king-size quilt and was quite pleased with her purchase, though the quilt did hang a bit over the sides of her double bed.

INTRODUCTION

The preceding anecdotes all illustrate the cognitive processes called mental accounting. What is mental accounting? Perhaps the easiest way to define it is to compare it with financial and managerial accounting as practised by organizations. According to my dictionary accounting is 'the system of recording and summarizing business and financial transactions in books, and analyzing, verifying, and reporting the results'. Of course, individuals and households also need to record, summarize, analyze, and report the results of transactions and other financial events. They do so for reasons similar to those which motivate organizations to use managerial accounting: to keep trace of where their money is going, and to keep spending under control. Mental accounting is a description of the ways they do these things.

How *do* people perform mental accounting operations? Regular accounting consists of numerous rules and conventions that have been codified over the years. You can look them up in a textbook. Unfortunately, there is no equivalent source for the conventions of mental accounting; we can learn about them only by observing behavior and inferring the rules.

Three components of mental accounting receive the most attention here. The first captures how outcomes are perceived and experienced, and how decisions are made and subsequently evaluated. The accounting system provides the inputs to do both *ex ante* and *ex post* cost–benefit analyses. This component is illustrated by the anecdote above involving the purchase of the quilt. The consumer's choice can be understood by incorporating the value of the 'deal' (termed transaction utility) into the purchase decision calculus.

A second component of mental accounting involves the assignment of activities to specific accounts. Both the sources and uses of funds are labeled in real as well as in mental accounting systems. Expenditures are grouped into categories (housing, food, etc.) and spending is sometimes constrained by implicit or explicit budgets. Funds to spend are also labeled, both as flows (regular income versus windfalls) and as stocks (cash on hand, home equity, pension wealth, etc.). The first two anecdotes illustrate aspects of this categorization process. The vacation in Switzerland was made less painful because of the possibility of setting up a Swiss lecture mental account, from which the expenditures could be deducted. Similarly, the notional United Way mental account is a flexible way of making losses less painful.

The third component of mental accounting concerns the frequency with which accounts are evaluated and what Read, Loewenstein and Rabin (1998) have labeled 'choice bracketing'. Accounts can be balanced daily, weekly, yearly, and so on, and can be defined narrowly or broadly. A well-known song implores poker players to 'never count your money while you're sitting at the table'. An analysis of dynamic mental accounting shows why this is excellent advice, in poker as well as in other situations involving decision making under uncertainty (such as investing).

The primary reason for studying mental accounting is to enhance our understanding of the psychology of choice. In general, understanding mental accounting processes helps us understand

choice because mental accounting rules are not neutral.* That is, accounting decisions such as to which category to assign a purchase, whether to combine an outcome with others in that category, and how often to balance the 'books' can affect the perceived attractiveness of choices. They do so because mental accounting violates the economic notion of fungibility. Money in one mental account is not a perfect substitute for money in another account. Because of violations of fungibility, mental accounting matters.

The goal of this paper is to illustrate how mental accounting matters. To this end I draw upon research conducted over the past two decades. This describes where I think the field is now, having been informed by the research of many others, especially over the past few years.

THE FRAMING OF GAINS AND LOSSES

The value function

We wish to understand the decision-making process of an individual or a household interacting in an economic environment. How does a person make economic decisions, such as what to buy, how much to save, and whether to buy or lease an item? And how are the outcomes of these financial transactions evaluated and experienced?

Following my earlier treatment of these questions (Thaler, 1980, 1985) I assume that people perceive outcomes in terms of the value function of Kahneman and Tversky's (1979) prospect theory. The value function can be thought of as a representation of some central components of the human perceived pleasure machine.† It has three important features, each of which captures an essential element of mental accounting:

(1) *The value function is defined over gains and losses relative to some reference point*. The focus on changes, rather than wealth levels as in expected utility theory, reflects the piecemeal nature of mental accounting. Transactions are often evaluated one at a time, rather than in conjunction with everything else.
(2) *Both the gain and loss functions display diminishing sensitivity*. That is, the gain function is concave and the loss function is convex. This feature reflects the basic psychophysical principle (the Weber–Fechner law) that the difference between \$10 and \$20 seems bigger than the difference between \$1000 and \$1010, irrespective of the sign.
(3) *Loss aversion*. Losing \$100 hurts more than gaining \$100 yields pleasure: $v(x) < -v(-x)$. The influence of loss aversion on mental accounting is enormous, as will become evident very quickly.

Decision frames

The role of the value function in mental accounting is to describe how events are perceived and coded in making decisions. To introduce this topic, it is useful to define some terms. Tversky and Kahneman (1981, p. 456) define a mental account‡ quite narrowly as 'an outcome frame which specifies (i) the set

* An accounting system is a way of aggregating and summarizing large amounts of data to facilitate good decision making. In an ideal world the accounting system would accomplish this task in such a way that the decision maker would make the same choice when presented with only the accounting data as she would if she had access to all the relevant data. This is what I mean by 'neutral'. In a sense, such an accounting system would provide decision makers with 'sufficient statistics'. Of course, achieving this goal is generally impossible, because something must be sacrificed in order to reduce the information the decision maker has to look at. Thus neither organizational nor mental accounting will achieve neutrality.

† Prospect theory predates Kahneman's (1994) important distinction between decision utility and experienced utility. In his terms, the prospect theory value function measures decision utility.

‡ Actually, they use the term psychological account in their 1981 paper, following the terminology I used in my 1980 paper. Later (Kahneman and Tversky, 1984) they suggest the better term 'mental account'.

of elementary outcomes that are evaluated jointly and the manner in which they are combined and (ii) a reference outcome that is considered neutral or normal'. (Typically, the reference point is the status quo.) According to this definition, a mental account is a frame for evaluation. I wish to use the term 'mental accounting' to describe the entire process of coding, categorizing, and evaluating events, so this narrow definition of a mental account is a bit confining. Accordingly, I will refer to simply outcome frames as 'entries'.

In a later paper, Kahneman and Tversky (1984, p. 347), propose three ways that outcomes might be framed: in terms of a minimal account, a topical account, or a comprehensive account. Comparing two options using the minimal account entails examining only the differences between the two options, disregarding all their common features. A topical account relates the consequences of possible choices to a reference level that is determined by the context within which the decision arises. A comprehensive account incorporates all other factors including current wealth, future earnings, possible outcomes of other probabilistic holdings, and so on. (Economic theory generally assumes that people make decisions using the comprehensive account.) The following example* illustrates that mental accounting is topical:

> Imagine that you are about to purchase a jacket for (\$125)[\$15] and a calculator for (\$15)[\$125]. The calculator salesman informs you that the calculator you wish to buy is on sale for (\$10)[\$120] at the other branch of the store, located 20 minutes drive away. Would you make the trip to the other store? (Tversky and Kahneman, 1981, p. 459)

When two versions of this problem are given (one with the figures in parentheses, the other with the figures in brackets), most people say that they will travel to save the \$5 when the item costs \$15 but not when it costs \$125. If people were using a minimal account frame they would be just asking themselves whether they are willing to drive 20 minutes to save \$5, and would give the same answer in either version.

Interestingly, a similar analysis applies in the comprehensive account frame. Let existing wealth be W, and W^* be existing wealth plus the jacket and calculator minus \$140. Then the choice comes down to the utility of W^* plus \$5 versus the utility of W^* plus 20 minutes. This example illustrates an important general point — the way a decision is framed will not alter choices if the decision maker is using a comprehensive, wealth-based analysis. Framing does alter choices in the real world because people make decisions piecemeal, influenced by the context of the choice.

Hedonic framing

The jacket and calculator problem does demonstrate that mental accounting is piecemeal and topical, but there is more to learn from this example. Why are we more willing to drive across town to save money on a small purchase than a large one? Clearly there is some psychophysics at work here. Five dollars seems like a significant saving on a \$15 purchase, but not so on a \$125 purchase. But this disparity implies that the utility of the saving must be associated with the differences in values rather than the value of the difference. That is, the utility of saving \$5 on the purchase of the expensive item must be ($v(-\$125) - v(-\$120)$ (or perhaps the ratio of these values) rather than $v(\$5)$, otherwise there would be no difference between the two versions of the problem.

What else do we know about mental accounting arithmetic? Specifically, how are two or more financial outcomes (within a single account) combined? This is an important question because we would like to be able to construct a model of how consumers evaluate events such as purchases that typically involve combinations of outcomes, good or bad.

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* This problem was based on similar examples discussed by Savage (1954) and Thaler (1980).

One possible place to start in building a model of how people code combinations of events is to assume they do so to make themselves as happy as possible. To characterize this process we need to know how someone with a prospect theory value function could wish to have the receipt of multiple outcomes framed. That it, for two outcomes x and y, when will $v(x + y)$ be greater than $v(x) + v(y)$? I have previously considered this question (Thaler, 1985). Given the shape of the value function, it is easy to derive the following principles of hedonic framing, that is, the way of evaluating joint outcomes to maximize utility:

(1) Segregate gains (because the gain function is concave).
(2) Integrate losses (because the loss function is convex).
(3) Integrate smaller losses with larger gains (to offset loss aversion).
(4) Segregate small gains (silver linings) from larger losses (because the gain function is steepest at the origin, the utility of a small gain can exceed the utility of slightly reducing a large loss).

As I showed, most people share the intuition that leads to these principles. That is, if you ask subjects 'Who is happier, someone who wins two lotteries that pay \$50 and \$25 respectively, or someone who wins a single lottery paying \$75?' 64% say the two-time winner is happier. A similar majority shared the intuition of the other three principles.

These principles are quite useful in thinking about marketing issues. In other words, if one wants to describe the advantages and disadvantages of a particular product in a way that will maximize the perceived attractiveness of the product to consumers, the principles of hedonic framing are a helpful guide. For example, framing a sale as a 'rebate' rather than a temporary price reduction might facilitate the segregation of the gain in line with principle (4).

The failure of the hedonic editing hypothesis

It would be convenient if these same principles could also serve as a good descriptive model of mental accounting. Can people be said to edit or parse the multiple outcomes they consider or experience in a way that could be considered optimal, that is, hedonic editing.* More formally, if the symbol '&' is used to denote the cognitive combination of two outcomes, then hedonic editing is the application of the following rule:

$$v(x \,\&\, y) = \mathrm{Max}[v(x + y), v(x) + v(y)]$$

The hypothesis that people engage in hedonic editing has obvious theoretical appeal,† but some thought reveals that it cannot be descriptively correct. Consider the jacket and calculator problem again. If the \$5 saving were coded in a utility-maximizing way it would be segregated in either case, inconsistent with the data. Furthermore, there must be some limits to our abilities to engage in self-deception. Why stop at segregating the \$5 gain? Why not code it as five gains of \$1? Nevertheless, hedonic editing represents a nice starting point for the investigation of how people do code multiple events.

Eric Johnson and I have investigated the limits of the hedonic editing hypothesis (Thaler and Johnson, 1990). Our ultimate goal was to explore the influence of prior outcomes on risky choices (see

* Johnson and I used the term 'editing' for this process, though on reflection 'parsing' might have been better. I will stick with the original term to avoid confusion with the prior literature. Note that editing refers to active cognitions undertaken by the decision maker. In contrast, I will use 'framing' to refer to the way a problem is posed externally. As we will see, people prefer to have outcomes framed hedonically, but fail to edit (or one could say, reframe) them accordingly.
† Indeed, see Fishburn and Luce (1995) for an axiomatic treatment of hedonic editing.

below), but we began with the more basic question of how people choose to code multiple events such as a gain of $30 followed by a loss of $9. One approach we used was to ask people their preferences about temporal spacing. For two specified financial outcomes, we asked subjects who would be happier, someone who had these two events occur on the same day, or a week or two apart? The reasoning for this line of inquiry was that temporal separation would facilitate cognitive segregation. So if a subject wanted to segregate the outcomes x and y, he would prefer to have them occur on different days, whereas if he wanted to integrate them, he would prefer to have them occur together. The hedonic editing hypothesis would be supported if subjects preferred temporal separation for cases where the hypothesis called for segregation, and temporal proximity when integration was preferred. For gains, the hedonic editing hypothesis was supported. A large majority of subjects thought temporal separation of gains produced more happiness. But, in contrast to the hedonic editing hypothesis, subjects thought separating losses was also a good idea. Why?

The intuition for the hypothesis that people would want to combine losses comes from the fact that the loss function displays diminishing sensitivity. Adding one loss to another should diminish its marginal impact. By wishing to spread out losses, subjects seem to be suggesting that they think that a prior loss makes them *more* sensitive towards subsequent losses, rather than the other way around. In other words, subjects are telling us that they are unable to simply add one loss to another (inside the value function parentheses). Instead, they feel that losses must be felt one by one, and that bearing one loss makes one more sensitive to the next.*

To summarize, the evidence suggests that the rules of hedonic framing are good descriptions of the way people would like to have the world organized (many small gains including silver linings; losses avoided if possible but otherwise combined). People will also actively parse outcomes consistent with these rules, with the exception of multiple losses.

There are two important implications of these results for mental accounting. First, we would expect mental accounting to be as hedonically efficient as possible. For example, we should expect that opportunities to combine losses with larger gains will be exploited wherever feasible. Second, loss aversion is even more important than the prospect theory value function would suggest, as it is difficult to combine losses to diminish their impact. This result suggests that we should expect to see that some of the discretion inherent in any accounting system will be used to avoid having to experience losses.

MENTAL ACCOUNTING DECISION MAKING

Transaction utility

What happens when a consumer decides to buy something, trading money for some object? One possibility would be to code the acquisition of the product as a gain and the forgone money as a loss. But loss aversion makes this frame hedonically inefficient. Consider a thirsty consumer who would rather have a can of soda than one dollar and is standing in front of a vending machine that sells soda for 75 cents. Clearly the purchase makes her better off, but it might be rejected if the payment were cognitively multiplied by 2.25 (an estimate of the coefficient of loss aversion). This thinking has led both Kahneman and Tversky (1984) and me (Thaler, 1985) to reject the idea that costs are generally viewed as losses.

Instead, I proposed that consumers get two kinds of utility from a purchase: *acquisition utility* and *transaction utility*. Acquisition utility is a measure of the value of the good obtained relative to its price, similar to the economic concept of consumer surplus. Conceptually, acquisition utility is the value the consumer would place on receiving the good as a gift, minus the price paid. Transaction utility

* Linville and Fischer (1991) also investigate the predictive power of hedonic editing, with similar results.

measures the perceived value of the 'deal'. It is defined as the difference between the amount paid and the 'reference price' for the good, that is, the regular price that the consumer expects to pay for this product. The following example (from Thaler, 1985) illustrates the role of transaction utility.

> You are lying on the beach on a hot day. All you have to drink is ice water. For the last hour you have been thinking about how much you would enjoy a nice cold bottle of your favorite brand of beer. A companion gets up to go make a phone call and offers to bring back a beer from the only nearby place where beer is sold (a fancy resort hotel) [a small, run-down grocery store]. He says that the beer might be expensive and so asks how much you are willing to pay for the beer. He says that he will buy the beer if it costs as much or less than the price you state. But if it costs more than the price you state he will not buy it. You trust your friend, and there is no possibility of bargaining with the (bartender) [store owner]. What price do you tell him?

Two versions of the question were administered, one using the phrases in parentheses, the other the phrases in brackets. The median responses for the two versions were \$2.65 (resort) and \$1.50 [store] in 1984 dollars. People are willing to pay more for the beer from the resort because the reference price in that context is higher. Note that this effect cannot be accommodated in a standard economic model because the consumption experience is the same in either case; the place of purchase should be irrelevant.

The addition of transaction utility to the purchase calculus leads to two kinds of effects in the marketplace. First, some goods are purchased primarily because they are especially good deals. Most of us have some rarely worn items in our closets that are testimony to this phenomenon. Sellers make use of this penchant by emphasizing the savings relative to the regular retail price (which serves as the suggested reference price). In contrast, some purchases that would seemingly make the consumer better off may be avoided because of substantial negative transaction utility. The thirsty beer drinker who would pay \$4 for a beer from a resort but only \$2 from a grocery store will miss out on some pleasant drinking when faced with a grocery store charging \$2.50.

Opening and closing accounts

One of the discretionary components of an accounting system is the decision of when to leave accounts 'open' and when to 'close' them. Consider the example of someone who buys 100 shares of stock at \$10 a share. This investment is initially worth \$1000, but the value will go up or down with the price of the stock. If the price changes, the investor has a 'paper' gain or loss until the stock is sold, at which point the paper gain or loss becomes a 'realized' gain or loss. The mental accounting of paper gains and losses is tricky (and depends on timing — see below), but one clear intuition is that a realized loss is more painful than a paper loss. When a stock is sold, the gain or loss has to be 'declared' both to the tax authorities and to the investor (and spouse). Because closing an account at a loss is painful, a prediction of mental accounting is that people will be reluctant to sell securities that have declined in value. In particular, suppose an investor needs to raise some cash and must choose between two stocks to sell, one of which has increased in value and one of which has decreased. Mental accounting favors selling the winner (Shefrin and Statman, 1987) whereas a rational analysis favors selling the loser.* Odean (1998) finds strong support for the mental accounting prediction. Using a data set that tracked the trades of investors using a large discount brokerage firm, Odean finds that investors were more likely to sell one of their stocks that had increased in value than one of their stocks that had decreased.†

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* A rational investor will choose to sell the loser because capital gains are taxable and capital losses are deductible.

† Of course, such a strategy could be rational if the losers they kept subsequently increased in value more than the winners they sold, but this outcome was not observed. Indeed, these investors are not particularly savvy. The stocks they sell subsequently outperform the stocks they buy!

Other evidence of a reluctance to close an account in the 'red' comes from the world of real accounting. Most public corporations make official earnings announcements every quarter. Although earnings are audited, firms retain some discretion in how quickly to count various components of revenues and expenses, leaving them with some control over the actual number they report. Several recent papers (e.g. Burgstahler and Dichev, 1997; Degeorge, Patel and Zeckhauser, forthcoming) show that firms use this discretionary power to avoid announcing earnings decreases and losses. Specifically, a plot of earnings per share (in cents per share) or change in earnings per share (this quarter versus same quarter last year) shows a sharp discontinuity at zero. Firms are much more likely to make a penny a share than to lose a penny a share, and are much more likely to exceed last year's earnings by a penny than to miss by a penny. So small losses are converted into small gains. In contrast, large gains seem to be trimmed down (to increase the chance of an increase again next year) whereas moderate losses are somewhat inflated (a procedure known in accounting circles as 'taking the big bath'). Apparently, firms believe that shareholders (or potential shareholders) react to earnings announcements in a manner consistent with prospect theory.

Advance purchases, sunk costs, and payment depreciation

Another situation in which a consumer has to decide when to open and close an account is when a purchase is made well in advance of consumption. Consider paying $100 for two tickets to a basketball game to be held in a month's time. Suppose that the tickets are being sold at the reference price so transaction utility is zero. In this case the consumer can be said to open an account at the point at which the tickets are purchased. At this time the account has a negative balance of $100. Once the date of the game comes and the game is attended, the account can be closed.

What happens if something (a blizzard) prevents the consumer from attending the game? In this case the consumer has to close the account at a loss of $100; in accounting terminology the loss has to be recognized. Notice that this event turns a cost into a loss, which is aversive. Still, why does the prior expenditure (now a sunk cost) make someone more willing to go to the game in a blizzard (as in the example in Thaler, 1980)?

To answer this question we need to consider how transactions are evaluated. For most routine purchases there is no *ex post* evaluation of the purchase when the account is closed. Such evaluations become more likely as the size of the transaction increases or as the purchase or situation becomes more unusual. Failing to attend an event that has been paid for makes the purchase highly salient and an evaluation necessary. By driving through the storm, the consumer can put the game back into the category of normal transactions that are not explicitly evaluated and thus avoid adding up the costs and benefits (barring an accident!). Furthermore, even if an *ex post* evaluation is made, the extra cost of going to the game may not be included in the evaluation. As Heath (1995) suggests, because the costs of driving to the game are not monetary, they may not be included in the analysis.* In Heath's terms they are incidental, that is, in a different mental account. He makes the telling comparison between this case and the Kahneman and Tversky (1984) theater ticket example, in which subjects are *less* willing to buy a ticket to a play after having lost their ticket than after having lost an equivalent sum of money. In the theater ticket example, buying a second ticket is aversive because it *is* included in the mental account for the theater outing, but the loss of the money is not.

* Of course, although the driving costs may not be included in the basketball game account, they must be compared, at least prospectively, to something when one is deciding whether to go. In this formulation someone would choose to take the drive, not in order to enjoy the game, but to avoid feeling the pain associated with the unamortized ticket expense.

Although sunk costs influence subsequent decisions, they do not linger indefinitely. A thought experiment illustrates this point nicely. Suppose you buy a pair of shoes. They feel perfectly comfortable in the store, but the first day you wear them they hurt. A few days later you try them again, but they hurt even more than the first time. What happens now? My predictions are:

(1) The more you paid for the shoes, the more times you will try to wear them. (This choice may be rational, especially if they have to be replaced with another expensive pair.)
(2) Eventually you stop wearing the shoes, *but you do not throw them away*. The more you paid for the shoes, the longer they sit in the back of your closet before you throw them away. (This behavior cannot be rational unless expensive shoes take up less space.)
(3) At some point, you throw the shoes away, regardless of what they cost, the payment having been fully 'depreciated'.

Evidence about the persistence of sunk costs effects is reported by Arkes and Blumer (1985). They ran an experiment in which people who were ready to buy season tickets to a campus theater group were randomly placed into three groups: one group paid full price, one group got a small (13%) discount, and one group received a large (47%) discount. The experimenters then monitored how often the subjects attended plays during the season. In the first half of the season, those who paid full price attended significantly more plays than those who received discounts, but in the second half of the season there was no difference among the groups. People do ignore sunk costs, eventually.

The gradual reduction in the relevance of prior expenditures is dubbed 'payment depreciation' by Gourville and Soman (1998) who have conducted a clever field experiment to illustrate the idea. They obtained usage data from the members of a health club that charges the dues to its members twice a year. Gourville and Soman find that attendance at the health club is highest in the month in which the dues are paid and then declines over the next five months, only to jump again when the next bill comes out.

Similar issues are involved in the mental accounting of wine collectors who often buy wine with the intention of storing it for ten years or more while it matures. When a bottle is later consumed, what happens? Eldar Shafir and I (1998) have investigated this pressing issue by surveying the subscribers to a wine newsletter aimed at serious wine consumers/collectors. We asked the following question:

> Suppose you bought a case of a good 1982 Bordeaux in the futures market for $20 a bottle. The wine now sells at auction for about $75 a bottle. You have decided to drink a bottle. Which of the following best captures your feeling of the cost to you of drinking this bottle?

We gave the respondents five answers to choose from: $0, $20, $20 plus interest, $75, and −$55 ('I drink a $75 bottle for which I paid only $20'). The percentages of respondents choosing each answer were 30, 18, 7, 20 and 25. Most of the respondents who selected the economically correct answer ($75) were in fact economists. (The newsletter, *Liquid Assets*, is published by economist Orley Ashenfelter and has many economist subscribers). More than half the respondents report that drinking the bottle either costs nothing or actually saves them money!

The results of this survey prompted us to run a follow-up survey the following year. The question this time was:

> Suppose you buy a case of Bordeaux futures at $400 a case. The wine will retail at about $500 a case when it is shipped. You do not intend to start drinking this wine for a decade. At the time that you acquire this wine which statement more accurately captures your feelings?
> (a) I feel like I just spent $400, much as I would feel if I spent $400 on a weekend getaway.
> (b) I feel like I made a $400 investment which I will gradually consume after a period of years.

(c) I feel like I just saved $100, the difference between what the futures cost and what the wine will sell for when delivered.

Respondents rated each answer on a five-point scale. Most respondents selected answer (b) as their favorite, coding the initial purchase as an investment. Notice that this choice means that the typical wine connoisseur thinks of his initial purchase as an investment and later thinks of the wine as free when he drinks it. We have therefore titled our paper 'Invest Now, Drink Later, Spend Never'. Note that this mental accounting transforms a very expensive hobby into one that is 'free'. The same mental accounting applies to time-share vacation properties. The initial purchase of a week every year at some resort feels like an investment, and the subsequent visits feel free.

Payment decoupling

In the wine example, the prepayment separates or 'decouples' (Prelec and Loewenstein, 1998; Gourville and Soman, 1998) the purchase from the consumption and in so doing seems to reduce the perceived cost of the activity. Prepayment can often serve this role, but the mental accounting advantages of decoupling are not all associated with prepayment. Consider the case of the pricing policies of the Club Med resorts (Thaler, 1980). At these vacation spots consumers pay a fixed fee for a vacation that includes meals, lodging, and recreation. This plan has two advantages. First, the extra cost of including the meals and recreation in the price will look relatively small when combined with the other costs of the vacation. Second, under the alternative plan each of the small expenditures looks large by itself, and is likely to be accompanied by a substantial dose of negative transaction utility given the prices found at most resorts.

Another disadvantage of the piece-rate pricing policy is that it makes the link between the payment and the specific consumption act very salient, when the opposite is highly desirable. For example, a *prix fixe* dinner, especially an expensive multi-course meal, avoids the unsavory prospect of matching a very high price with the very small quantity of food offered in each course.* Along the same lines, many urban car owners would be financially better off selling their car and using a combination of taxis and car rentals. However, paying $10 to take a taxi to the supermarket or a movie is both salient and linked to the consumption act; it seems to raise the price of groceries and movies in a way that monthly car payments (or even better, a paid-off car) do not.

More generally, consumers don't like the experience of 'having the meter running'. This contributes to what has been called the 'flat rate bias' in telecommunications. Most telephone customers elect a flat rate service even though paying by the call would cost them less.† As Train (1991, p. 211) says, 'consumers seem to value flat-rate service over measured service even when the bill that the consumer would receive under the two services, given the number of calls the consumer places, would be the same ... The existence of this bias is problematical. Standard theory of consumer behavior does not accommodate it'. Similarly, health clubs typically charge members by the month or year rather than of a per-use basis. This strategy decouples usage from fees, making the marginal cost of a visit zero. This plan is attractive because a health club is a service that many consumers feel they should use more often, but fail to do so for self-control reasons (see below). Indeed, the monthly fee, although a sunk cost, encourages use for those who want to reduce their per-visit charges. Compare this system to a pure usage-based pricing system in which Stairmaster users pay 'per step'. This pricing system would be

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* In contrast, the review of one expensive San Francisco restaurant in the Zagat guide includes the following gripe from a customer. '$13 for two scallops. Who are they kidding?'

† This example is cited by Prelec and Loewenstein (1998). American OnLine seems to have learned this lesson the hard way. When they offered a flat rate Internet service in early 1996 they were so overwhelmed with demand that consumers had trouble logging on to the service, causing embarrassing publicity.

completely incompatible with the psychological needs of the club member who desires usage encouragement rather than discouragement.

Perhaps the best decoupling device is the credit card. We know that credit cards facilitate spending simply by the fact that stores are willing to pay 3% or more of their revenues to the card companies (see also Feinberg, 1986; Prelec and Simester, 1998). A credit card decouples the purchase from the payment in several ways. First, it postpones the payment by a few weeks. This delay creates two distinct effects: (a) the payment is *later* than the purchase; (b) the payment is *separated* from the purchase. The payment delay may be attractive to some consumers who are either highly impatient or liquidity constrained, but as Prelec and Loewenstein (1998) stress, *ceteris paribus*, consumers prefer to pay before rather than after, so this factor is unlikely to be the main appeal of the credit card purchase. Rather, the simple separation of purchase and payment appears to make the payment less salient. Along these lines, Soman (1997) finds that students leaving the campus bookstore were much more accurate in remembering the amount of their purchases if they paid by cash rather than by credit card. As he says, 'Payment by credit card thus reduces the salience and vividness of the outflows, making them harder to recall than payments by cash or check which leave a stronger memory trace' (p. 9).

A second factor contributing to the attractiveness of credit card spending is that once the bill arrives, the purchase is mixed in with many others. Compare the impact of paying $50 in cash at the store to that of adding a $50 item to an $843 bill. Psychophysics implies that the $50 will appear larger by itself than in the context of a much larger bill, and in addition when the bill contains many items each one will lose salience. The effect becomes even stronger if the bill is not paid in full immediately. Although an unpaid balance is aversive in and of itself, it is difficult for the consumer to attribute this balance to any particular purchase.

BUDGETING

So far I have been discussing mental accounting decision making at the level of individual transactions. Another component of mental accounting is categorization or labeling. Money is commonly labeled at three levels: expenditures are grouped into budgets (e.g. food, housing, etc.); wealth is allocated into accounts (e.g. checking, pension, 'rainy day'); and income is divided into categories (e.g. regular or windfall). Such accounts would be inconsequential if they were perfectly fungible (i.e. substitutable) as assumed in economics. But, they are not fungible, and so they 'matter'.

Consumption categories

Dividing spending into budget categories serves two purposes. First, the budgeting process can facilitate making rational trade-offs between competing uses for funds. Second, the system can act as a self-control device. Just as organizations establish budgets to keep track of and limit divisional spending, the mental accounting system is the household's way of keeping spending within the budget (Thaler and Shefrin, 1981). Of course, there is considerable variation among households in how explicit the budgeting process is.* As a rule, the tighter the budget, the more explicit are the budgeting rules, both in households and organizations. Families living near the poverty level use strict, explicit budgets; in wealthy families budgets are both less binding and less well defined.† Poorer families also tend to have budgets defined over shorter periods (a week or month), whereas wealthier families may use

* Many of the generalizations here are based on a series of interviews conducted on my behalf in the early 1980s. See also Zelizer (1994) and her references. At one time many households used a very explicit system with envelopes of cash labeled with various spending categories. To some extent, programs such as Quicken serve as a modern replacement for this method.

† Still, budgets can matter even in well-off families. As the discussion of 'decoupling' below will illustrate, spending on vacations may depend on whether a family rents or owns a vacation home.

annual budgets. For example, Heath and Soll (1996) report that most of their MBA student subjects had weekly food and entertainment budgets and monthly clothing budgets. It is likely that these rules changed dramatically when the students got jobs at the end of their studies (in violation of the life-cycle hypothesis — see below).

Heath and Soll describe the process by which expenses are tracked against these budgets. They divide the tracking process into two stages:

> (1) Expenses must first be noticed and (2) then assigned to their proper accounts. An expense will not affect a budget if either stage fails. To label these stages we borrow terminology from financial accounting in which the accounting system is also divided into two stages. Expenses must be booked (i.e. recorded in the accounting system) and posted (i.e. assigned to a specific expense account). Each process depends on a different cognitive system. Booking depends on attention and memory. Posting depends on similarity judgments and categorization (p. 42).*

Many small, routine expenses are not booked. Examples would include lunch or coffee at the workplace cafeteria (unless the norm is to bring these items from home, in which case buying the lunch might be booked). Ignoring such items is equivalent to the organizational practice of assigning small expenditures to a 'petty cash' fund, not subject to the usual accounting scrutiny. The tendency to ignore small items may also explain an apparent contradiction of hedonic framing. As noted by John Gourville (1998), in many situations sellers and fund raisers elect to frame an annual fee as 'pennies-a-day'. Thus a $100 membership for the local public radio station might be described as a 'mere 27 cents a day'. Given the convex shape of the loss function, why should this strategy be effective? One possibility is that 27 cents is clearly in the petty cash category, so when the expense is framed this way it tends to be compared to other items that are not booked. In contrast, a $100 membership is large enough that it will surely be booked and posted, possibly running into binding budget constraints in the charitable giving category. The same idea works in the opposite direction. A firm that markets a drug to help people quit smoking urges smokers to aggregate their annual smoking expenditures and think of the vacation they could take with these funds. Again, $2 a day might be ignored but $730 pays for a nice getaway.

Implications of violations of fungibility

Whenever budgets are not fungible their existence can influence consumption in various ways. One example is the case in which one budget has been spent up to its limit while other accounts have unspent funds remaining. (This situation is common in organizations. It can create extreme distortions especially if funds cannot be carried over from one year to the next. In this case one department can be severely constrained while another is desperately looking for ways to spend down this year's budget to make sure next year's is not cut.) Heath and Soll (1996) provide several experiments to illustrate this effect. In a typical study two groups of subjects were asked whether they would be willing to buy a ticket to a play. One group was told that they had spent $50 earlier in the week going to a basketball game (same budget); the other group was told that they had received a $50 parking ticket (different budget) earlier in the week. Those who had already gone to the basketball game were significantly less likely to go to the play than those who had gotten the parking ticket.†

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* Regarding the categorization process, see Henderson and Peterson (1992). It should be noted that in a financial accounting system in a firm any expense that is booked is also posted.

† One might think this result could be attributed to satiation (one night out is enough in a week). However, another group was asked their willingness to buy the theater ticket after going to the basketball game for free, and they showed no effect.

Using the same logic that implies that money should be fungible (i.e. that money in one account will spend just as well in another), economists have argued that time should also be fungible. A rational person should allocate time optimally, which implies 'equating at the margin'. In this case, the marginal value of an extra minute devoted to any activity should be equal.* The jacket and calculator problem reveals that this rule does not describe choices about time. Subjects are willing to spend 20 minutes to save $5 on a small purchase but not a large one. Leclerc *et al.* (1995) extend this notion by reversing the problem. They ask people how much they would be willing to pay to avoid waiting in a ticket line for 45 minutes. They find that people are willing to pay twice as much to avoid the wait for a $45 purchase than for a $15 purchase. As in the original version of the problem, we see that the implicit value people put on their time depends on the financial context.

Self-control and gift giving

Another violation of fungibility introduced by the budgeting system occurs because some budgets are intentionally set 'too low' in order to help deal with particularly insidious self-control problems. For example, consider the dilemma of a couple who enjoy drinking a bottle of wine with dinner. They might decide that they can afford to spend only $10 a night on wine and so limit their purchases to wines that cost $10 a bottle on average, with no bottle costing more than $20. This policy might not be optimal in the sense that an occasional $30 bottle of champagne would be worth more than $30 to them, but they don't trust themselves to resist the temptation to increase their wine budget unreasonably if they break the $20 barrier. An implication is that this couple would greatly enjoy gifts of wine that are above their usual budget constraint. This analysis is precisely the opposite of the usual economic advice (which says that a gift in kind can be at best as good as a gift of cash, and then only if it were something that the recipient would have bought anyway). Instead the mental accounting analysis suggests that the best gifts are somewhat more luxurious than the recipient normally buys, consistent with the conventional advice (of non-economists), which is to buy people something they wouldn't buy for themselves.

The idea that luxurious gifts can be better than cash is well known to those who design sales compensation schemes. When sales contests are run, the prize is typically a trip or luxury durable rather than cash. Perhaps the most vivid example of this practice is the experience of the National Football League in getting players to show up at the annual Pro Bowl. This all-star game is held the week after the Super Bowl and for years the league had trouble getting all of the superstar players to come. Monetary incentives were little inducement to players with seven-figure salaries. This problem was largely solved by moving the game to Hawaii and including *two* first-class tickets (one for the player's wife or girlfriend) and accommodations for all the players.

The analysis of gift giving illustrates how self-control problems can influence choices. Because expensive bottles of wine are 'tempting', the couple rules them 'off limits' to help control spending. For other tempting products, consumers may regulate their consumption in part by buying small quantities at a time, thus keeping inventories low. This practice creates the odd situation wherein consumers may be willing to pay a premium for a smaller quantity. This behavior is studied by Wertenbroch (1996), who finds that the price premium for sinful products in small packages is greater than for more mundane goods. His one-sentence abstract succinctly sums up his paper: 'To control their consumption, consumers pay more for less of what they like too much'.

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* I am abstracting from natural discontinuities. If television shows come in increments of one hour, then one may have to choose an integer number of hours of TV watching, which alters the argument slightly.

Wealth accounts

Another way of dealing with self-control problems is to place funds in accounts that are off-limits. Hersh Shefrin and I have proposed (Shefrin and Thaler, 1988) that there is a hierarchy of money locations arranged by how tempting it is for a household to spend the money in each. The most tempting class of accounts is in the 'current assets' category, for example cash on hand and money market or checking accounts. Money in these accounts is routinely spent each period. Less tempting to spend is money in the 'current wealth' category, which includes a range of liquid asset accounts such as savings accounts, stocks and bonds, mutual funds, and so on. These funds are typically designated for saving. Next in the hierarchy is home equity. Even though the advent of home equity loans has made this category of funds somewhat less sacred, still most households aim to pay off their mortgage by the time they retire (and most succeed). Finally, in the least tempting category of funds lies the 'future income' account. These funds include money that will be earned later in life (i.e. human capital) and designated retirement savings accounts such as IRAs and 401(k)s. According to our analysis, the marginal propensity to spend a dollar of wealth in the current income account is nearly 1.0, whereas the propensity to spend a dollar of future income wealth is close to zero.

These predictions are in sharp contrast to standard economic theory of saving: the life-cycle model (Modigliani and Brumberg, 1954; Friedman, 1957). Here is a simplified version that captures the spirit of the life-cycle model. Suppose a person has a certain remaining lifetime of N years, and that the rate of interest is zero. Let W be the person's wealth, equal to the sum of her assets, this year's income, and future (expected) income over the rest of her life. Consumption in this period is then equal to W/N.* Notice that in this model any change in wealth, ΔW, no matter what form it takes (e.g. a bonus at work, an increase in the value of one's home, even an inheritance expected in a decade), produces the same change in current consumption namely $\Delta W/N$. In other words, the theory assumes that wealth is perfectly fungible.

Shefrin and I proposed a modified version of the life-cycle model, the behavioral life-cycle model, that incorporates the mental accounting temptation hierarchy described above. A powerful prediction of the mental accounting model is that if funds can be transferred to less tempting mental accounts they are more likely to be saved. This insight can be used in designing government programs to stimulate saving. According to the behavioral life-cycle model, if households can be persuaded to move some of their funds from the current income account to future income accounts, long-term savings will increase. In other words, IRAs and 401(k)s are good vehicles to promote savings.† My reading of the literature on this topic is that this prediction is borne out. Households who contribute to retirement savings plans display steady increases in the funds in these accounts with no apparent reduction in the funds in other accounts. That is, they save more.‡

Income accounting

So far we have considered violations of fungibility produced either by the budgeting process or by the location of funds. A third class of violations can be produced by the source of the income. O'Curry (1997) investigates this phenomenon. She first has one group of subjects judge both sources and uses of

* More generally, in a world with uncertainty and positive interest rates, the life-cycle theory says that a person will spend the annuity value of his wealth in any period, that is, if he used W to buy a level annuity that paid y in every period, he would set consumption equal to y. Bequests can also be accommodated.

† These accounts are especially good because not only are they less tempting 'mental' accounts but they also have a penalty for withdrawal that provides an additional incentive to leave the money in these accounts alone.

‡ See Poterba, Venti and Wise (1996) for a current summary of the evidence supporting my claim. Their results are hotly disputed by Engen, Gale and Scholz (1996). One reason I side with the first set of authors (aside from the fact that their results support mental accounting) is that the simplest analyses show that the savings plans increase saving. Obtaining the opposite results seems to require a lot more work.

funds on a serious–frivolous scale: the winnings of an office football pool are considered frivolous whereas an income tax refund is serious; eating out is frivolous but paying the bills is serious. She then asks other subjects to say what they would do with a particular windfall, such as $30 found in the pocket of a jacket in the back of the closet. She finds that people have a tendency to match the seriousness of the source of some windfall with the use to which it is put. Another example of income non-fungibility is provided by Kooreman (1997). He studies the spending behavior of families that receive child allowance payments from the Dutch government. He finds that spending on children's clothing is much more sensitive to changes in the designated child allowance than to other income sources.*

In the previous example the fact that the child allowance was labeled as such seemed to matter in the way people spent the money. Labeling effects are common. One surprising domain in which this idea can be applied is dividend payments by corporations. Suppose a corporation is earning profits and wishes to return some of these profits to its shareholders. One (traditional) method is to pay a dividend. Another method is simply to repurchase shares. In a world with no taxes, these two methods are equivalent. But, if (as in the United States) dividends are taxed at a higher rate than capital gains, then tax-paying shareholders would prefer share repurchases to dividends (and those who have their shares in non-taxable accounts are indifferent). Under these conditions no firm should ever pay a dividend.

Why do firms pay dividends? Shefrin and Statman (1984) have proposed an explanation based on mental accounting. They argue that investors like dividends because the regular cash payment provides a simple self-control rule: spend the dividends and leave the principal alone. In this way, the dividend acts like an allowance. If, instead, firms simply repurchased their own shares, stockholders would not receive a designated amount to spend, and would have to dip into capital on a period basis. Retirees (who tend to own high-dividend-paying stocks) might then worry that they would spend down the principal too quickly. A similar non-fungibility result is offered by Hatsopoulos, Krugman and Poterba (1989). Although capital gains in the stock market tend to have little effect on consumption, these authors found that when takeovers generate cash to the stockholders, consumption does increase. This is sometimes called the 'mailbox effect'. When the check arrives in the mailbox it tends to get spent. Gains on paper are left alone.

CHOICE BRACKETING AND DYNAMIC MENTAL ACCOUNTING

A recurring theme of this paper is that choices are altered by the introduction of notional (but non-fungible) boundaries. The location of the parentheses matters in mental accounting — a loss hurts less if it can be combined with a larger gain; a purchase is more likely to be made if it can be assigned to an account that is not already in the red; and a prior (sunk) cost is attended to if the current decision is in the same account. This section elaborates on this theme by considering other ways in which boundaries are set, namely whether a series of decisions are made one at a time or grouped together (or 'bracketed' to use the language of Read, Loewenstein and Rabin, 1998).

* There is a similar finding in public finance called the 'flypaper effect'. When local governments receive earmarked payments for particular kinds of expenditure (e.g. schools), they tend to increase their spending on that activity by the full amount of the grant. Economic theory predicts that they would increase their spending only by the fraction of their income that they normally spend on this activity. See Hines and Thaler (1995).

Prior outcomes and risky choice

In their prospect paper, Kahneman and Tversky mention the empirical finding that betting on long shots increases on the last race of the day,* when the average bettor is (i) losing money on the day, and (ii) anxious to break even. An interesting feature of this sunk cost effect is that it depends completely on the decision to close the betting account daily. If each race were a separate account, prior races would have no effect, and similarly if today's betting were combined with the rest of the bettor's wealth (or even his lifetime of bets), the prior outcome would likely be trivial.

This analysis applies to other gambling decisions. If a series of gambles are bracketed together then the outcome of one gamble can affect the choices made later. Johnson and I investigated how prior outcomes affect risky choice (Thaler and Johnson, 1990). Subjects were MBA students who played for real money. The following three choices illustrate the type of problems studied. The percentage of subjects taking each option appears in brackets.

Problem 1. You have just won \$30. Now choose between:
(a) A 50% chance to gain \$9 and a 50% chance to lose \$9. [70]
(b) No further gain or loss. [30]

Problem 2. You have just lost \$30. Now choose between:
(a) A 50% chance to gain \$9 and a 50% chance to loose \$9. [40]
(b) No further gain or loss. [60]

Problem 3. You have just lost \$30. Now choose between:
(a) A 33% chance to gain \$30 and a 67% chance to gain nothing. [60]
(b) A sure \$10. [40]

These and other problems of this sort were used to investigate how prior outcomes affect risky choices. Two results are worth noting. First, as illustrated by Problem 1, a prior gain can stimulate risk seeking in the same account. We called this phenomenon the 'house money' effect since gamblers often refer to money they have won from the casino as house money (the casino is known as 'the house'). Indeed, one often sees gamblers who have won some money early in the evening put that money into a different pocket from their 'own' money; this way each pocket is a separate mental account. Second, as illustrated by Problems 2 and 3, prior losses did not stimulate risk seeking unless the gamble offered a chance to break even.

The stakes used in the experiments just described were fairly large in comparison to most laboratory experiments, but small compared to the wealth of the participants. Limited experimental budgets are a fact of life. Gertner (1993) has made clever use of a set of bigger stakes choices over gambles made by contestants on a television game show called 'Card Sharks'.† The choices Gertner studies were the last in a series of bets made by the winner of the show that day. The contestant had to predict whether a card picked at random from a deck would be higher or lower than a card that was showing. Aces are high and ties create no gain or loss. The odds on the bet therefore vary from no risk (when the showing card is a 2 or an Ace) to roughly 50–50 when the up-card is an 8. After making the prediction, the contestant then can make a bet on the outcome, but the bet must be between 50% and 100% of the amount she has won on the day's show (on average, about \$3000). Ignoring the sure bets, Gertner estimates a Tobit regression model to predict the size of the contestant's bet as a function of the card showing (the odds), the stake available (that is, today's winnings), and the amount won in previous days on the show. After controlling for the constraint that the bet must lie between 50% and 100% of

* That is, long shots become even worse bets at the end of the day. They are always bad bets. See Thaler and Ziemba (1988).
† See also Biswanger (1981), who obtains similar results. He also was able to run high stakes experiments by using subjects in rural villages in India.

the stake, Gertner finds that today's winnings strongly influences on the amount wagered.* In contrast, prior cash won has virtually no effect. This finding implies that cash won *today* is treated in a different mental account from cash won the day before.† This behavior is inconsistent with any version of expected utility theory that treats wealth as fungible.

Narrow framing and myopic loss aversion

In the gambling decisions discussed above, the day of the experiment suggested a natural bracket. Often gambles or investments occur over a period of time, giving the decision-maker considerable flexibility in how often to calculate gains and losses. It will come as no surprise to learn that the choice of how to bracket the gambles influences the attractiveness of the individual bets. An illustration is provided by a famous problem first posed by Paul Samuelson. Samuelson, it seems, was having lunch with an economist colleague and offered his colleague an attractive bet. They would flip a coin, and if the colleague won he would get \$200; if he lost he would have to pay only \$100. The colleague turned this bet down, but said that if Samuelson would be willing to play the bet 100 times he would be game. Samuelson (1963) declined to offer this parlay, but went home and proved that this pair of choices is irrational.‡

There are several points of interest in this problem. First, Samuelson quotes his colleague's reasoning for rejecting the single play of the gamble: 'I won't bet because I would feel the \$100 loss more than the \$200 gain'. Modern translation: 'I am loss averse'. Second, why does he like the series of bets? Specifically, what mental accounting operation can he be using to make the series of bets attractive when the single play is not?

Suppose Samuelson's colleague's preferences are a piecewise linear version of the prospect theory value function with a loss aversion factor of 2.5:

$$U(x) = \begin{cases} x & x \geqslant 0 \\ 2.5x & x < 0 \end{cases}$$

Because the loss aversion coefficient is greater than 2, a single play of Samuelson's bet is obviously unattractive. What about two plays? The attractiveness of two bets depends on the mental accounting rules being used. If each play of the bet is treated as a separate event, then two plays of the gamble are twice as bad as one play. However, if the bets are combined into a portfolio, then the two-bet parlay {\$400, 0.25; 100, 0.50; −\$200, 0.25} yields positive expected utility with the hypothesized utility function, and as the number of repetitions increases the portfolio becomes even more attractive. So Samuelson's colleague should accept any number of trials of this bet strictly greater than one *as long as he does not have to watch*!

More generally, loss-averse people are more willing to take risks if they combine many bets together than if they consider them one at a time. Indeed, although the puzzle to Samuelson was why his colleague was willing to accept the series of bets, the real puzzle is why he was unwilling to play one. Risk aversion cannot be a satisfactory explanation if his colleague has any significant wealth. For example, suppose Samuelson's colleague's utility function is $U(W) = 1\text{n}\, W$ and his wealth is a modest

* Gertner offers the following example to illustrate this difference. Suppose a first-time contestant has won \$5000 so far and has a Jack showing, so a bet of 'lower' offers 3–1 odds. (She loses with an A, K, or Q, ties with a J, and wins otherwise.) The regression predicts a bet of \$2800. Compare this contestant to one who has won only \$3000 today but won \$2000 the previous day. Although their winnings on the show are identical, this player is predicted to bet only \$1544.

† This result is all the more striking because 'yesterday's' show was probably taped just an hour before 'today's' (several shows are taped in the same day) and 'yesterday's' winnings have certainly not been collected.

‡ Specifically, he showed that an expected utility maximizer who will not accept a single play of a gamble for any wealth level that could obtain over a series of such bets will not accept the series. For a more general result, see Tversky and Bar Hillel (1983).

$10,000. In that case he should be willing to risk a 50% chance of losing $100 if he had a 50% chance to gain a mere $101.01! Similar results obtain for other reasonable utility functions. In fact, Rabin (1998) shows that expected utility theory implies that someone who turns down Samuelson's bet should also turn down a 50% chance to lose $200 and a 50% chance to win $20,000. More generally, he shows that expected utility theory requires people to be virtually risk neutral for 'small' bets. To explain the fact that many people do reject attractive small bets (such as Samuelson's), we need a combination of loss aversion and one-bet-at-a-time mental accounting.

Benartzi and I (1995) use the same analysis to offer a mental accounting explanation for what economists call the equity premium puzzle (Mehra and Prescott, 1985). The equity premium is the difference in the rate of return on equities (stocks) and a safe investment such as treasury bills. The puzzle is that this difference has historically been very large. In the USA the equity premium has been roughly 6% per year over the past 70 years. This means that a dollar invested in stocks on 1 January 1926 was worth more than $1800 on 1 January 1998, whereas a dollar invested in treasury bills was worth only about $15 (half of which was eaten up by inflation). Of course, part of this difference can be attributed to risk, but what Mehra and Prescott show is that the level of risk aversion necessary to explain such a large difference in returns is implausible.*

To explain the puzzle we note that the risk attitude of loss-averse investors depends on the frequency with which they reset their reference point, i.e. how often they 'count their money'. We hypothesize that investors have prospect theory preferences (using parameters estimated by Tversky and Kahneman, 1992).† We then ask how often people would have to evaluate the changes in their portfolios to make them indifferent between the (US) historical distributions of returns on stocks and bonds? The results of our simulations suggest that the answer is about 13 months. This outcome implies that if the most prominent evaluation period for investors is once a year, the equity premium puzzle is 'solved'.

We refer to this behavior as myopic loss aversion. The disparaging term 'myopic' seems appropriate because the frequent evaluations prevent the investor from adopting a strategy that would be preferred over an appropriately long time horizon. Indeed, experimental evidence supports the view that when a long-term horizon is imposed externally, subjects elect more risk. For example, Gneezy and Potters (1997) and Thaler *et al.* (1997) ran experiments in which subjects make choices between gambles (investments). The manipulations in these experiments are the frequency with which subjects get feedback. For example, in the Thaler *et al.* study, subjects made investment decisions between stocks and bonds at frequencies that simulated either eight times a year, once a year, or once every five years. The subjects in the two long-term conditions invested roughly two-thirds of their funds in stocks while those in the frequent evaluation condition invested 59% of their assets in bonds. Similarly, Benartzi and I (forthcoming) asked staff members at a university how they would invest their retirement money if they had to choose between two investment funds, A and B, one of which was based on stock returns, the other on bonds. In this case the manipulation was the way in which the returns were displayed. One group examined a chart showing the distribution of *one-year* rates of return, and the other group was shown the simulated distribution of *30-year* rates of return. Those who saw the one-year returns said they would invest a majority of their funds in bonds, whereas those shown the 30-year returns invested 90% of their funds in stocks.‡

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* They estimate that it would take a coefficient of relative risk aversion of about 40 to explain the history equity premium. In contrast, a log utility function has a coefficient of 1.

† Specifically, the value function is: $v(x) = x^{\alpha}$ if $x \geqslant 0$ $-\lambda(-x)^{\beta}$ if $x < 0$ where λ is the coefficient of loss aversion. They have estimated α and β to be 0.88 and λ to be 2.25. We also use their rank-dependent weighting function. For details see Benartzi and Thaler (1995).

‡ Similar results for gambles are also obtained by Keren and Wagenaar (1987) and Redelmeier and Tversky (1992).

Myopic loss aversion is an example of a more general phenomenon that Kahneman and Lovallo (1993) call narrow framing; projects are evaluated one at a time, rather than as part of an overall portfolio. This tendency can lead to an extreme unwillingness to take risks. I observed an interesting illustration of this phenomenon while teaching a group of executives from one firm, each of whom was responsible for managing a separate division. I asked each whether he would be willing to undertake a project for his division if the payoffs were as follows: 50% chance to gain $2 million, 50% chance to lose $1 million. Of the 25 executives, three accepted the gamble. I then asked the CEO, who was also attending the session, how he would like a portfolio of 25 of these investments. He nodded enthusiastically. This story illustrates that the antidote for excessive risk aversion is aggregation, either across time or across different divisions.

The examples discussed so far show that narrow bracketing can inhibit risk taking. Narrow bracketing can also have other perverse side-effects. For example, Camerer *et al*. (1997) study the daily labor supply decisions of New York City taxi drivers. In New York, as in many cities, the cab drivers typically rent their cars for a 12-hour period for a fixed fee. They are then entitled to keep all the revenues they earn during that half-day. Since 12 hours is a long time to drive a car, especially in New York City, the drivers must decide each day how long to drive; that is, whether to keep the car for the full 12 hours or quit earlier. This decision is complicated by the fact that there is more demand for their services on some days than others (because of differences in weather or the presence of a big convention, for example). A rational analysis would lead drivers to work longer hours on busy days, as this policy would maximize earnings per hour worked. If, instead, drivers establish a target earnings level *per day*, they will tend to quit earlier on good days. This is precisely what Camerer *et al*. find. The elasticity of hours worked with respect to the daily wage (as measured by the earnings of *other drivers that day*) is strongly negative. The implication is that taxi drivers do their mental accounting one day at a time.*

The diversification heuristic

The unit of analysis can also influence how much variety consumers elect. This effect was first demonstrated by Simonson (1990). He gave students the opportunity to select among six snacks (candy bars, chips, etc.) in one of two conditions: (a) sequential choice: they picked one of the six snacks at each of three class meetings held a week apart; (b) simultaneous choice: on the first class meeting they selected three snacks to be consumed one snack per week over the three class meetings. Simonson observed that in the simultaneous choice condition subjects displayed much more variety seeking than in the sequential choice condition. For example, in the simultaneous choice condition 64% of the subjects chose three different snacks whereas in the sequential choice condition only 9% of the subjects made this choice. Simonson suggests that this behavior might be explained by variety seeking serving as a choice heuristic. That is, when asked to make several choices at once, people tend to diversify. This strategy is sensible under some circumstances (such as when eating a meal — we typically do not order three courses of the same food), but can be misapplied to other situations, such as sequential choice. This mistake represents a failure of predicted utility to accurately forecast subsequent experienced utility. Many students who liked Snickers best elected that snack each week when they picked one week at a time, but went for variety when they had to choose in advance.

This result has been called the 'diversification bias' by Read and Loewenstein (1995). They demonstrate the role of choice bracketing in an ingenious experiment conducted on Halloween night. The 'subjects' in the experiment were young trick-or-treaters who approached two adjacent houses. In one

* Rizzo and Zeckhauser (1998) find a similar result for physicians whose evaluation period appears to be one year rather than one day.

condition the children were offered a choice between two candies (Three Musketeers and Milky Way) at each house. In the other condition they were told at the first house they reached to 'choose whichever two candy bars you like'. Large piles of both candies were displayed to assure that the children would not think it rude to take two of the same. The results showed a strong diversification bias in the simultaneous choice condition: every child selected one of each candy. In contrast, only 48% of the children in the sequential choice condition picked different candies. This result is striking, since in either case the candies are dumped into a bag and consumed later. It is the portfolio in the bag that matters, not the portfolio selected at each house.

The diversification bias is not limited to young people choosing among snacks. Benartzi and I (1998) have found evidence of the same phenomenon by studying how people allocate their retirement funds across various investment vehicles. In particular, we find some evidence for an extreme version of this bias that we call the $1/n$ heuristic. The idea is that when an employee is offered n funds to choose from in her retirement plan, she divides the money evenly among the funds offered. Use of this heuristic, or others only slightly more sophisticated, implies that the asset allocation an investor chooses will depend strongly on the array of funds offered in the retirement plan. Thus, in a plan that offered one stock fund and one bond fund, the average allocation would be 50% stocks, but if another stock fund were added, the allocation to stocks would jump to two thirds. We find evidence supporting just this behavior. In a sample of pension plans we regress the percentage of the plan assets in stocks on the percentage of the funds that are stock funds and find a very strong relationship.

We also find that employees seem to put stock in the company they work for into a separate mental account. For companies that do not offer their own stock as one of the options in the pension plan the employees invest 49% of their money in bonds and 51% in stocks. When the company stock is included in the plan this investment attracts 42% of the funds. If the employees wanted to attain a 50% equity exposure, they would invest about 8% of the rest of their funds in stocks, the rest in bonds. Instead they invest their non-company stock funds evenly: 29% in stocks, 29% in bonds.

DISCUSSION

My own thinking about mental accounting began with an attempt to understand why people pay attention to sunk costs, why people are lured by bargains into silly expenditures, and why people will drive across town to save $5 on a small purchase but not a large one. I hope this paper has shown that we have learned quite a bit about these questions, and in so doing, the researchers working in this area have extended the scope of mental accounting far beyond the original set of questions I had set out to answer. Consider the range of questions that mental accounting helps us answer:

- Why do firms pay dividends?
- Why do people buy time-share vacation properties?
- Why are flat-rate pricing plans so popular
- Why do sales contests have luxuries (instead of cash) as prizes?
- Why do 401(k) plans increase savings?
- Why do stocks earn so much higher a return than bonds?
- Why do people decline small-stakes attractive bets?
- Why can't you get a cab on a rainy day? (hint: cab drivers earn more per hour on rainy days).

A question that has not received much attention is whether mental accounting is good for us. What is the normative status of mental accounting? I see no useful purpose in worrying about whether or not mental accounting is 'rational'. Mental accounting procedures have evolved to economize on time and thinking costs and also to deal with self-control problems. As is to be expected, the procedures do not

work perfectly. People pay attention to sunk costs. They buy things they don't need because the deal is too good to pass up. They quit early on a good day. They put their retirement money in a money market account.

It is not possible to say that the system is flawed without knowing how to fix it. Given that optimization is not feasible (too costly) repairing one problem may create another. For example, if we teach people to ignore sunk costs, do they stop abiding by the principle: 'waste not, want not'? If we stop being lured by good deals, do we stop paying attention to price altogether? There are no easy answers.

Those interested in improving individual decision making can do more work on mental accounting as a prescriptive device. How can mental accounting rules be modified to achieve certain goals?* For example, Jonathan Clements, the author of a regular column for new investors in the *Wall Street Journal*† called 'Getting Going' invited readers to submit tips on how to do a better job of saving and investing. Many of the tips he later published had a strong mental accounting flavor. A reader called David Guerini submitted the following advice:

> I started a little 'side' savings account eight years ago. During the day, I try to accumulate change. If I spend $4.50 at a store, I give the cashier a $5 bill, even if I have 50 cents in my pocket. At the end of each day, the money is put aside. If I have no change, I put a $1 bill aside. I add income-tax refunds, money from products I purchased and returned for a refund, and all those annoying little mail-in rebates they give you when you purchase batteries, shaving cream, and so on. I end up painlessly saving between $500 and $1000 each year.

An economist might argue that it would be even less painful to just write a check once a year and send it to his mutual fund. But that would miss the point: mental accounting matters.

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REFERENCES

Ainslie, G. 'Special reward: A behavioral theory of impulsiveness and impulse control', *Psychological Bulletin*, **82**(4) (1975), 463–496.

Arkes, H. R. and Blumer, C. 'The psychology of sunk cost', *Organizational Behavior and Human Decision Processes*, **35**(1) (1985), 124–140.

Benartzi, S. and Thaler, R. H. 'Myopic loss-aversion and the equity premium puzzle', *Quarterly Journal of Economics*, **CX** (1995), 75–92.

Benartzi, S. and Thaler, R. H. 'Risk aversion or myopia: choices in repeated gambles and retirement investments', *Management Science*, forthcoming.

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* Along these lines, Read, Loewenstein and Rabin (1998) have a useful discussion of when broad bracketing works better than narrow bracketing. Short answer: usually.

† See his column on 20, 24, and 31 January 1998.

Benartzi, S. and Thaler, R. H. 'Illusory diversification and retirement savings, working paper', University of Chicago and UCLA, (1998).
Biswanger, H. 'Attitudes toward risk: theoretical implications of an experiment in rural India', *Economic Journal*, **XCI** (1981), 867–890.
Burgstahler, D. and Dichev, I. 'Earnings management to avoid earnings decreases and losses', *Journal of Accounting and Economics*, **24**(December) (1997), 99–126.
Camerer, C., Babcock, L., Loewenstein, G. and Thaler, R. H. 'Labor supply of New York City cabdrivers: one day at a time', *Quarterly Journal of Economics*, **CXII**(May) (1997), 407–442.
Degeorge, F., Patel, J. and Zeckhauser, R. J. 'Earnings management to exceed thresholds', *Journal of Business*.
Engen, E. M., Gale, W. G. and Scholz, J. K. 'The illusory effects of saving incentive programs', *Journal of Economics Perspectives*, **10**(Fall) (1996), 113–138.
Feenberg, D. and Skinner, J. 'Sources of IRA saving', in Summers, L. (ed.), *Tax Policy and the Economy: Vol. 3* (pp. 25–46), Cambridge, MA: MIT Press, 1989.
Feinberg, R. A. 'Credit cards as spending facilitating stimuli: a conditioning interpretation', *Journal of Consumer Research*, **12** (1986), 304–356.
Fishburn, P. and Luce, D. 'Joint receipt and Thaler's hedonic editing rule', *Mathematical Social Science*, **29** (1995), 33–76.
Friedman, M. *A Theory of Consumption Function*, Princeton, NJ: Princeton University Press, 1957.
Gertner, R. 'Game shows and economic behavior: risk taking on ''card sharks'' ', *Quarterly Journal of Economics*, **CVI** (1993), 507–521.
Gneezy, U. and Potters, J. 'An experiment on risk taking and evaluating periods', *Quarterly Journal of Economics*, **CXII**(May) (1997), 631–646.
Gourville, J. T. 'Pennies-a-day: the effect of temporal re-framing on transaction evaluation', *Journal of Consumer Research*, **24** (1998), 395–408.
Gourville, J. T. and Soman, D. 'Payment depreciation: the effects of temporally separating payments from consumption', *Journal of Consumer Research* (1998).
Hatsopoulous, G. N., Krugman, P. R. and Poterba, J. M. 'Overconsumption: the challenge to U.S. economic policy', American Business Conference (1989).
Heath, C. 'Escalation and de-escalation of commitment in response to sunk costs: the role of budgeting in mental accounting', *Organizational Behavior and Human Decision Processes*, **62** (1995), 38–54.
Heath, C. and Soll, J. B. 'Mental accounting and consumer decisions', *Journal of Consumer Research*, **23** (1996), 40–52.
Henderson, P. and Peterson, R. 'Mental accounting and categorization', *Organizational Behavioral and Human Decision Processes*, **51** (1992), 92–117.
Hines, J. and Thaler, R. H. 'Anomalies: the flypaper effect', *Journal of Economics Perspectives*, **9** (1995), 217–226.
Kahneman, D. 'Reference points, anchors, norms, and mixed feelings', *Organizational Behavior and Human Decision Processes*, **51** (1992), 296–312.
Kahneman, D. 'New challenges to the rationality assumption', *Journal of Institutional and Theoretical Economics*, **150** (1994), 43–56.
Kahneman, D., Knetsch, J. and Thaler, R. H. 'Fairness as a constraint on profit-seeking: entitlements in the market', *American Economic Review*, **76** (1986), 728–741.
Kahneman, D. and Lovallo, D. 'Timid choices and bold forecasts: a cognitive perspective on risk taking', *Management Science*, **39** (1993), 17–31.
Kahneman, D. and Tversky, A. 'Prospect theory: an analysis of decision under risk', *Econometrica*, **47** (1979), 263–291.
Kahneman, D. and Tversky, A. 'Choices, values, and frames', *The American Psychologist*, **39** (1984), 341–350.
Keren, G. 'Additional tests of utility theory under unique and repeated conditions', *Journal of Behavioral Decision Making*, **4** (1991), 297–304.
Keren, G. and Wagenaar, W. A. 'Violation of utility theory in unique and repeated gambles', *Journal of Experimental Psychology: Learning, Memory and Cognition*, **13** (1987), 387–391.
Kooreman, P. 'The labeling effect of a child benefit system', unpublished working paper, University of Groningen, (1997).
Leclerc, F., Schmidt, B. and Dube, L. 'Decision making and waiting time: is time like money?', *Journal of Consumer Research*, **22** (1995), 110–119.
Linville, P. and Fischer, G. W. 'Preferences for separating or combining events', *Journal of Personality and Social Psychology*, **60** (1991), 5–23.

Mehra, R. and Prescott, E. C. 'The equity premium: a puzzle', *Journal of Monetary Economics*, **15** (1985), 145–161.
Modigiliani, F. and Brumberg, R. 'Utility analysis and the consumption function: an interpretation of cross-section data', in Kurihara, K. K. (ed.), *Post Keynesian Economics*, New Brunswick, NJ: Rutgers University Press, 1954.
O'Curry, S. 'Income source effects', Unpublished working paper, DePaul University, (1997).
Odean, T. 'Are investors reluctant to realize their losses', *Journal of Finance*, (October 1998).
Poterba, J. M., Venti, S. F. and Wise, D. A. 'How retirement savings programs increase saving', *Journal of Economics Perspectives*, **10**(Fall) (1996), 91–112.
Prelec, D. and Loewenstein, G. 'The red and the black: mental accounting of savings and debt', *Marketing Science*, **17** (1998), 4–28.
Prelec, D. and Simester, D. 'Always leave home without it', working paper, MIT Sloan School, March (1998).
Rabin, M. 'Risk aversion, diminishing marginal utility, and expected-utility theory: a calibration theorem', working paper, Department of Economics, University of California, Berkeley (1998).
Read, D. and Loewenstein, G. 'Diversification bias: explaining the discrepancy in variety seeking between combined and separated choices', *Journal of Experimental Psychology: Applied*, **1** (1995), 34–49.
Read, D., Loewenstein, G. and Rabin, M. 'Choice bracketing', unpublished working paper, Carnegie Mellon University, 1998.
Redelmeier, D. A. and Tversky, A. 'On the farming of multiple prospects', *Psychological Science*, **3**(3) (1992), 191–193.
Rizzo, J. A. and Zeckhauser, R. J. 'Income targets and physician behavior', JFK School of Government, Harvard University working paper, March 1998.
Samuelson, P. A. 'Risk and uncertainty: a fallacy of large numbers', *Scientia*, (1963), 108–113.
Savage, L. J. *The Foundations of Statistics*, New York: John Wiley, 1954.
Shafir, E. and Thaler, R. H. 'Invest now, drink later, spend never: the mental accounting of advanced purchases', working paper, Graduate School of Business University of Chicago (1998).
Shefrin, H. M. and Statman, M. 'Explaining investor preference for cash dividends', *Journal of Financial Economics*, **13** (1984), 253–282.
Shefrin, H. M. and Statman, M. 'The disposition to sell winners too early and ride losers too long', *Journal of Finance*, **40** (1987), 777–790.
Shefrin, H. H. and Thaler, R. H. 'The behavioral life-cycle hypothesis', *Economic Inquiry*, **26**(October) (1988), 609–643.
Simonson, I. 'The effect of purchase quantity and timing on variety-seeking behavior', *Journal of Marketing Research*, **28** (1990), 150–62.
Soman, D. 'Contextual effects of payment mechanism on purchase intention: check or charge?', Unpublished working paper, University of Colorado, 1997.
Thaler, R. H. 'Toward a positive theory of consumer choice', *Journal of Economic Behavior and Organization*, **1** (1980), 39–60.
Thaler, R. H. 'Mental accounting and consumer choice', *Marketing Science*, **4** (1985), 199–214.
Thaler, R. H. 'Saving, fungibility and mental accounts', *Journal of Economic Perspectives*, **4** (1990), 193–205.
Thaler, R. H. and Johnson, E. J. 'Gambling with the house money and trying to break even: the effects of prior outcomes on risky choice', *Management Science*, **36**(6) (1990), 643–660.
Thaler, R. H. and Shefrin, H. M. 'An economic theory of self-control', *Journal of Political Economy*, **39** (1981), 392–406.
Thaler, R. H., Tverskey, A., Kahneman, D. and Schwartz, A. 'The effect of myopia and loss aversion on risk taking: an experimental test', *Quarterly Journal of Economics*, **CXII** (1997), 647–661.
Thaler, R. H. and Ziemba, W. 'Pari-mutual betting markets: racetracks and lotteries', *Journal of Economic Perspectives*, **2** (1988), 161–174.
Train, K. E. *Optimal Regulation*, Cambridge, MA: MIT Press, 1991.
Tversky, A. and Bar-Hillel, M. 'The long run and the short', *Journal of Experimental Psychology: Human Learning, Memory, and Cognition*, **9** (1983), 713–717.
Tversky, A. and Kahneman, D. 'The framing of decisions and the rationality of choice', *Science*, **211** (1981), 453–458.
Tversky, A. and Kahneman, D. 'Advances in prospect theory: cumulative representation of uncertainty', *Journal of Risk and Uncertainty*, **5** (1992), 297–323.
Wertenbroch, K. 'Consumption self-control via purchase rationing', working paper, Yale University, November 1996.

Zelizer, V. A. *The Social Meaning of Money: Pin Money, Paychecks, Poor Relief, and Other Currencies*, New York: Basic Books, 1994.

Author's address:
Richard H. Thaler, Graduate School of Business, University of Chicago, 1101 East 58th Street, Chicago, IL 60637, USA.

