Journal of Economic Psychology 30 (2009) 772–781

Contents lists available at ScienceDirect

Journal of Economic Psychology

journal homepage: www.elsevier.com/locate/joep

The mental accounting of time

Priyali Rajagopal [a,*], Jong-Youn Rha [b,1]

[a] Department of Marketing, Southern Methodist University, 6212 Bishop Blvd., Dallas, TX 75275-0333, USA
[b] Department of Consumer Science, College of Human Ecology, Seoul National University, 599 Gwanangno, Gwanak-gu, Seoul 151-742, Republic of Korea

ARTICLE INFO

Article history:
Received 10 May 2007
Received in revised form 13 April 2009
Accepted 17 June 2009
Available online 21 June 2009

JEL classification:
D12

PsycINFO classification:
2340

Keyword:
Mental accounts

ABSTRACT

This paper examines the ways in which time is perceived and tracked. We investigate whether people create mental accounts for time like they do for money, how time is allotted to these accounts and if time is valued differently according to the account to which it is assigned. Across five studies, we find evidence that people create mental accounts for time and attempt to balance their time across work and non-work activities.

1. Introduction

Mr. A spends 45 min commuting to work every day. He and his wife are in the process of purchasing a new house, which is located closer to his office, which would enable him to save 30 min every day due to reduced commuting time. He plans to ***spend*** *the extra 30 min practicing basketball with his son. Ms. X complains about having* ***lost*** *time at the bank while waiting for the bank's computer malfunction to be corrected. Mrs. Y claims that using an appointment diary to schedule her appointments helps her* ***manage*** *her time more effectively.*

The above scenarios are commonly heard ones. Most of us describe time in terms similar to money. We *spend* our time on various activities and constantly look for ways to *save* it, we complain of *lost* time and constantly seek to *gain* additional quantities of it and spend large amounts of money in purchasing various tools to *manage* time more effectively.

Jacoby, Szybillo, and Berning (1976), reviewed numerous studies in economics, sociology and psychology and concluded that time is a highly valuable resource that is similar to money in that both are scarce and highly sought after resources. Despite these similarities, time is different from money in that time is available to everyone in equal quantity – 24 h a day; no more and no less. Money, on the other hand is not equally available to all. As Garretson and Mauser (1963) point out in their insightful discussion about the allocation of time, as society gets more affluent and products and services become less scarce, time becomes increasingly important to people because "*it is scarcity which creates value*". This scarcity of time has resulted in the popularity of numerous time saving techniques and devices such as the use of microwave ovens and the reliance on fast food.

* Corresponding author. Tel.: +1 214 768 3965; fax: +1 214 768 4099.
E-mail addresses: priyalir@smu.edu (P. Rajagopal), jrha@snu.ac.kr (J.-Y. Rha).
[1] Tel.: +82 2 880 9236; fax: +82 2 871 2506.

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doi:10.1016/j.joep.2009.06.008

Despite the acknowledged importance of time, there is limited research on the ways in which time is perceived and tracked. While there has been significant development in the understanding of the ways in which money is accounted for (Shefrin & Thaler, 1988; Thaler, 1985, 1999), there has been little work along the same lines for time (e.g. Leclerc, Schmitt, & Dube, 1995; Saini & Monga, 2008). Much of this research on time can be categorized into three broad streams. The first stream of research uses time diaries to understand what individuals do with their time (e.g. Hendrix, Kinnear, & Taylor, 1979; Juster & Stafford, 1991). Although these studies are useful in showing the pattern of time use, they do not offer insight into how people make decisions about time allocation between different activities. The second stream of research explores the allocation of time to various activities using a rational-choice paradigm (e.g. Becker, 1965), which assumes rational behaviors on the part of time consumers. While the rational paradigm has proven useful in the analysis of the allocation of time (Wolf, 1999), it is a normative approach which focuses on how people *ought* to behave rather than how people *actually* behave and there has been a call for considering other approaches to understanding and explaining human decision making (Simon, 1959).

The third stream of research is relatively recent and attempts to explore how people make decisions with respect to time (e.g. Leclerc et al., 1995) and contrasts time and money with respect to such decision making (Navarro & Fantino, 2009; Okada & Hoch, 2004; Soman, 2001). For example, Soman (2001) found that the sunk cost effect is weaker for time as compared to money while Navarro and Fantino (2009) found a robust sunk time effect that was moderated by personal responsibility. Okada and Hoch (2004) found that individuals display greater willingness to pay for riskier options while paying in time as compared to paying in money. Saini and Monga (2008) found that people tend to use more heuristics while making decisions with respect to time than money. This stream of research therefore suggests that time and money may not be dealt with similarly from a decision making standpoint and raises the question of how people make decisions with regard to time.

Our paper extends this stream of research and examines how consumers make decisions about time allocation between different activities. Specifically, we refer to the literature on mental accounting (Thaler, 1985) to explore whether the mental accounting principles for money hold true for time. We investigate whether people create mental accounts for time like they do for money, how time is allotted to these accounts and if time is valued differently according to the account to which it is assigned. Given the limited research on the accounting of time, our work is largely exploratory in nature.

We begin by reviewing literatures on the allocation of time and mental accounting of money. We then present results from five studies which demonstrate that people have mental accounts for time and use these mental accounts to allocate their time between work and non-work activities. Specifically, study 1 examines whether people have separate mental accounts for work and non-work activities; studies 2, 3 and 4 examine whether there is an attempt to match the source of time gained with the use of such time, and study 5 explores whether people have mental budgets for time and if they attempt to balance the allocation of their time based on such budgets. We conclude with a discussion of our findings and suggestions for future research.

2. Prior literature

2.1. Theories of allocation of time

In microeconomic theory, time use or the allocation of time to various activities is regarded as a rational-choice paradigm (Becker, 1965). Regenerative activities such as resting, eating, and self-care that have to be carried out to maintain physical functioning are distinguished from discretionary activities to which time can be allocated deliberately. Once physiological needs are fulfilled, individuals can choose whether to allocate their discretionary time to consumption activities (i.e., leisure) or to the production of goods and services (i.e., work). Traditionally, time use has thus been dichotomized into two segments – work and leisure – with leisure being defined residually (Time − Work = leisure). Given time and budget constraints, a rational individual is, therefore, expected to maximize her utility by equating the marginal gain from time allocated to the market to the marginal gain from increased leisure. According to this theory, time allocation decisions are made so that the utilities from work and non-work (leisure) are maximized under a full budget constraint which takes both monetary and time resources into consideration (Becker, 1965). At this equilibrium point, one should be indifferent between whether one's time is spent in work and non-work activities.

While economists are interested in the monetary value of time, i.e. the relation of time with the relative price of goods and services, sociologists and human-ecologists have generally adopted descriptive approaches of time expenditure focusing on how time is expended for various activities (Jacoby et al., 1976). Both sociologists (Gronau, 1973, 1977; Juster & Stafford, 1991; Robinson, 1977) and human ecologists (Rice & Tucker, 1986) posit that time can be allocated to the market (work for the production of goods and services), to household production (to generate products and services for use in home and family care), to leisure (recreational activities for personal enjoyment) and to personal care and biological maintenance. These researchers have also studied the factors affecting the decision to allocate time across different categories. Some of these factors are summarized in Robinson (1977), and include environmental factors (day of week, weather, emergencies etc.), personal factors (sex, age, education), role factors (employment, marriage, parenthood) and resource factors (income, appliances). Robinson (1977) states that each activity competes for limited time resource and one's decision to allocate time on one activity ultimately determines how much time is available for other activities.

While the above approaches to time allocation focus on objective time, some researchers have argued that there may be discrepancies between perceived time and actual time (Graham, 1981; Hornik, 1984). This argument is in line with the

notion that in understanding human decision making it is important to take into account the fact that the perceived world and the real world are different due to omissions and distortions because "perception and cognition intervene between the decision maker and his objective environment" (Simon, 1959, p. 272). In this regard, the study of people's allocation of time can benefit from incorporating the notion of perception similar to the approaches employed in behavioral economics.

To summarize, the literature on allocation of time has adopted either a descriptive approach or a rational choice approach. Our research adopts principles from the mental accounting of money and hence uses a behavioral economics approach to understanding time allocation.

2.2. Mental accounting

The notion of mental accounting of money was introduced by Thaler (1985, 1999) who noted that people constantly violate the economic principle of fungibility while making monetary decisions, i.e. all dollars are not the same. For instance, Shefrin and Thaler (1981) found that money from a pension account is not viewed as the same as money from a checking account in term of its consumability. Similarly, money won in a lottery is likely to be spent very differently than money obtained from regular income, even if the amount and the timing of receipt from these two sources were identical. People thus appear to maintain mental accounts for different sources and uses of money and treat each account differently, which violates the notion of perfect substitutability or fungibility of money. Kahneman and Tversky (1984) posited a similar notion in their concept of psychological accounts that are used to frame and evaluate outcomes with reference to a base reference state. Thus a mental account is a psychological account which individuals form to evaluate costs and benefits of outcomes which are later evaluated using the principles of prospect theory (e.g. loss aversion, risk seeking behavior for losses etc.). This leads to the differential "posting" in accounting parlance of money to different accounts. For example, the loss of a $10 bill and the loss of a ticket which cost $10 could be framed very differently and assigned to different loss accounts (Tversky & Kahneman, 1981).

People also appear to have matching norms between the sources of money gain and the sources of money consumption (Shefrin & Thaler, 1988; Thaler, 1999). Thus, money won unexpectedly (windfall) may be consumed very differently from money earned. An interesting study by Landsberger (1966) on windfalls examined the marginal propensity to consume (MPC) for Israeli families who received restitution from the German government after World War II. He found that the group that received the largest windfalls (66% of income) had a MPC of only 23% while the group that received the smallest windfalls (7% of income) had a MPC in excess of 200%, i.e. they spent twice the money of the windfall. This data corroborates Thaler's (1990) findings that the propensity to consume from windfalls is a function of their size and source.

The notion of mental accounting is further developed into the idea of mental budgeting. Heath (1995) posits that people set mental budgets that act as a check against over-escalating commitment to any course of action. Mental budgets work when people are able to track expenses and assign them to accounts. This process thus comprises two separate cognitive activities: allotting attention resources to notice and track expenses and a categorization activity to assign expenses into different accounts. Thus, people should be able to maintain mental budgets more easily when the expense item is prototypical of a category, leading to its easy assignment to the corresponding mental account. Based on this process, Heath and Soll (1996) found that when consumers purchase an item that is prototypical of an expense category, they are much less likely to purchase items in that category in the future than if they had purchased a less prototypical item. After ruling out income and satiation effects, the authors posited that this under consumption was due to mental accounting, i.e. assigning a prototypical item to an account decreased the amount of funds available for the future in that account.

People appear to be flexible and self-serving in the creation of and assignments to mental accounts (Kivetz, 1999). For example, it may be easier to support a decision to buy an expensive painting if it is viewed as an investment rather than as consumption. Similarly, de-coupling of payments and consumption (e.g. buying on credit instead of cash) appears to enhance the hedonic enjoyment of the consumption experience (Prelec & Loewenstein, 1998). A recent study by Cheema and Soman (2006) showed the malleability of mental accounting by demonstrating that people are flexible in assigning expenses to different mental accounts when faced with ambiguous expenses.

To summarize, research in the mental accounting of money has shown that people create mental accounts for money and follow psychological principles of categorization while assigning money to different accounts, thus violating the economic principle of fungibility of money. Given the similarities between time and money (both are scarce resources that require allocation across competing activities), we propose that people may have mental accounts for time like they do for money and may assign time to different accounts using psychological principles similar to the principles used in the assignment of money. That is, people may label various time accounts and attempt to match the source and destination accounts while allocating time. We also propose that people will have mental budgets for time and attempt to balance these budgets in their assignment of activities.

As stated earlier, given the limited research that adopts a psychological and behavioral approach to the allocation of time, our research is largely exploratory in nature. We begin by conducting study 1 to examine whether people have mental accounts for time. For mental accounts of time to exist, people need to frame similar outcomes into different accounts. That is, time gained or lost from work should not be viewed as similar to time gained or lost from non-work. Our consideration of two broad accounts for time – work and non-work – is in line with the notion of "necessary consumption" and "hedonic consumption" of money (Kivetz, 1999).

3. Study 1: do people have mental accounts for time?

The first study was conducted to examine whether the same amount of time is viewed differently in different contexts which would violate the notion of fungibility, a basic premise for the grounding of mental accounting. For this purpose, a scenario based experiment was employed. The use of scenarios has been common in past research on mental accounting (e.g. Prelec & Loewenstein, 1998). In this study, we used two different scenarios to elicit responses to the loss of time. The scenarios were carefully drafted to control for possible confounding factors such as the time of day, day of the week, importance of the task and differences in consequences of time loss. The scenarios referred to the same activity (waiting at the airport) with the only point of difference being the context in which the time was spent (e.g. waiting for a work trip versus waiting for a family vacation). The two scenarios that we used are provided below.

Scenario A: Jim is a business management consultant who travels every week on business. Last week, he was booked on the 4:30 pm flight to Memphis on Sunday. After he reached the airport at 3:30 pm, he finds out that his flight is delayed by an hour. Since his first business appointment is scheduled for Monday morning, the delay will not affect his work commitments at all.

Scenario B: Jim is a business management consultant who travels every week on business. Last week, he was booked on the 4:30 pm flight to Memphis on Sunday to begin a family vacation with his family who were traveling to Memphis from California. After he reached the airport at 3:30 pm, he finds out that his flight is delayed by an hour. Since his family is scheduled to join him in Memphis the next day, the delay will not affect their holiday plans at all.

Our key dependent measure was the extent to which respondents felt that the scenario protagonist (Jim) would be upset with the delay of his flight. In addition, we also included measures for confounding factors such as how important it was for Jim that his flight depart on time, whether the delay would lead to negative consequences for Jim and whether Jim enjoyed waiting at the airport. These measures were included to rule out alternative reasons for differences in how upset Jim would be at the delay aside from purely the work–non-work context. All our measures were 7-point scales with larger numbers indicating greater importance, negative consequences and enjoyment. Forty six undergraduate students from an introductory marketing class participated in the study in return for course credit. The study was a between subjects study: hence each respondent was given one of the two scenarios to read.

3.1. Results and discussion

As expected, we found a significant difference between the work and non-work scenarios in terms of how upsetting the delay was ($M_{work} = 4.54$ (SD = 1.34), $M_{non\text{-}work} = 3.37$ (SD = 1.49), $F(1, 45) = 7.76$, $p < .05$). There were no differences between the two scenarios with respect to importance of departing on time ($M_{work} = 4.0$ (SD = 1.9), $M_{non\text{-}work} = 4.11$ (SD = 1.67), $F < 1$), the negative consequences of the delay ($M_{work} = 3.36$ (SD = 1.75), $M_{non\text{-}work} = 2.95$ (SD = 1.54), $F < 1$) or the enjoyment of the wait ($M_{work} = 2.46$ (SD = 1.85), $M_{non\text{-}work} = 2.63$ (SD = 1.57), $F < 1$). Hence, the difference in how upsetting the loss of time was appears to be on account of the work–non-work context and not due to other factors.

These results provide evidence that people value time differently depending on the context of the time used. Thus, time is not fungible and there are key differences between the perception of work time and non-work time. We extend support for the presence of such mental accounts in our next study by examining how time from different sources is categorized.

4. Studies 2–4: do people match mental accounts for the gain and use of time?

In his review of the literature on mental accounting of money, Kivetz (1999) posited that consumers tend to label the sources of money (regular income versus windfall) and the consumption of money (necessary versus hedonic) and attempt to match accounts while allocating money. Thus, money gained from a windfall is more likely to be spent on hedonic activities than money gained from regular income. Using this finding, we examine whether people have different source and destination accounts for time and if they attempt to match such source and destination accounts.

4.1. Study 2

The experiment was a 2 (source of gain: work, non-work) $\times$ 2 (amount of time gained: 1 h versus 2 h) between subjects design. Forty nine undergraduate students participated in the experiment in return for credit in their marketing course. Each respondent was randomly assigned to one of four experimental scenarios. The scenarios were designed to minimize affective differences, and only to differ on the context of the activity. To this end, the activity from which time was gained was kept the same between the work and non-work conditions (visit to a bookstore), but the reason for the activity was varied so as to be either non-work (visiting in order to browse through some new bestselling fiction books and have coffee with friends) or work (visiting in order to browse through some work related books and have coffee with some colleagues). An example of the scenarios used is provided below.

Peter is going to a bookstore near his house at 10 am on a Saturday morning to spend a couple of hours browsing through some work related books that he has been meaning to read and then to have coffee with some colleagues while discussing work related issues, at the coffee shop located in the bookstore. On reaching the bookstore however, he finds that the store is closed due to some maintenance problems and will not open until 11 am. The store is located in a mall, so he can go to other stores while waiting for the bookstore to open.

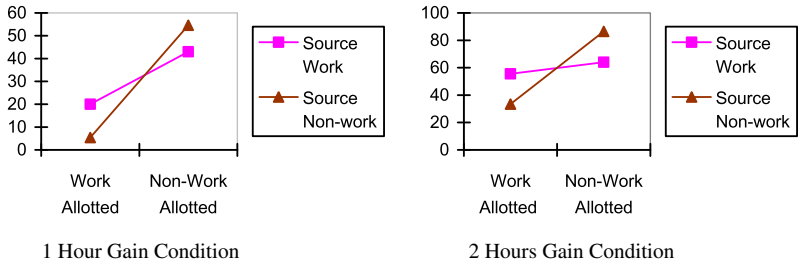

Fig. 1. Allocation of time to work/non-work activities by source and magnitude of time gain in study 2.

The respondents were asked to list out the activities they expected Peter to do along with the duration of each individual activity. They were then asked to categorize each activity that they had listed into either work (e.g. work on laptop, shop for office materials elsewhere) or non-work (e.g. coffee with friends, work out at the gym). In order to rule out alternative explanations for differences in allocation to work and non-work, we also measured respondents' mood and affective responses to the time gained using a three-item, 7-point scale (happy, pleased, cheerful: $\alpha = .78$).

4.1.1. Results and discussion

In line with our expectations, we found a significant main effect of the source of gain on the allocation of time between work and non-work activities. A significant difference was found in the minutes allocated to work activities ($F(1, 45) = 5.13$, $p < .05$) with greater minutes allotted in the work condition ($M = 34.79$ (SD = 31.6)) than the non-work condition ($M = 20$ (SD = 32.11)). A marginally significant difference was found in the minutes allocated to non-work activities ($F(1, 45) = 3.59$, $p < .06$) with greater time allotted in the non-work condition ($M = 71.2$ (SD = 33.04)) than the work condition ($M = 52.29$ (SD = 32.23)).

There was also a main effect of the magnitude of time gained for work ($F(1, 45) = 15.4$, $p < .05$) and non-work ($F(1, 45) = 9.21$, $p < .05$) with greater minutes allotted to both activities when 2 h were gained than when 1 h was gained. There was no significant interaction of source type and magnitude of time gained on either work time or non-work time allocation (both p's > .1).

Fig. 1 shows the results of how time was allocated between work and non-work activities according to the source and the magnitude of time gain. When the amount of time gained was 1 h, significantly more minutes were allotted to work when the time was gained from work than non-work ($M_{work} = 20$ (SD = 23.28), $M_{non\text{-}work} = 5.42$ (SD = 11.57), $t = 2.07$, $p < .05$). Similarly, more minutes were allotted to non-work when the time was gained from non-work than from work ($M_{work} = 43.57$ (SD = 31.34), $M_{non\text{-}work} = 54.58$ (SD = 11.57)), although this difference was not significant. When the magnitude of gain was 2 h, more minutes were allotted to work when the hours were gained from work than non-work ($M_{work} = 55.50$ (SD = 30.86), $M_{non\text{-}work} = 33.46$ (SD = 39.12), $t = 3.48$, $p < .06$) and greater minutes were allotted to non-work when the hours were gained from non-work than from work ($M_{work} = 64.50$ (SD = 30.86), $M_{non\text{-}work} = 86.54$ (SD = 39.12), $t = 2.99$, $p < .09$).[2]

There were no differences between the work and non-work conditions on the mood ($M_{work} = 3.25$ (SD = 1.07), $M_{non\text{-}work} = 3.16$ (SD = 1.46), $p > .1$) or affective responses measures ($M_{work} = 3.08$ (SD = .83), $M_{non\text{-}work} = 3.17$ (SD = 1.09), $p > .1$). Hence, differences in mood or affective responses to the gain of time cannot explain our results.

The results of study 2 reveal some interesting insights. The first is that the source of time gained significantly impacts its allocation. This was true regardless of the amount of time gained. The second insight is that people may have some threshold for time spent on work. The results indicate that a majority of the time gained from work was allotted to non-work, regardless of the magnitude of gain. Hence, although we found differences between the times allotted to work and non-work depending on whether the time was gained from work or non-work, across all experimental conditions, the total time allotted to non-work was always greater than the time allotted to work. Thus, it may be that people have a threshold time limit for work (perhaps based on the amount of pending work at any given time), which will not be exceeded. Once this threshold is reached, they will allocate the remaining gained time to non-work. To test this possibility, we conducted study 3 using a different scenario than the one used in study 2.

4.2. Study 3

Study 3 was a 2 (source of gain: work versus non-work) × 2 (magnitude of gain: 1 versus 3 h) between subjects study. Respondents were asked to read a scenario in which they gained time (either 1 h or 3 h) from either a work activity or non-work activity and were asked to list out the activities that they would undertake during the time gained along with the duration of each activity. In order to rule out potential differences in affective responses to the gain in time from different activities, we kept the activity from which time was gained the same across both the work and non-work scenarios (surfing the Internet), but varied the reason for undertaking the activity (working on a class assignment versus surfing to relax). An example of one of the versions used is listed below.

[2] The total number of minutes for the experimental conditions added up to more than the allotted minutes in all our studies, due to calculation errors on the part of our respondents. We did not adjust for these errors.

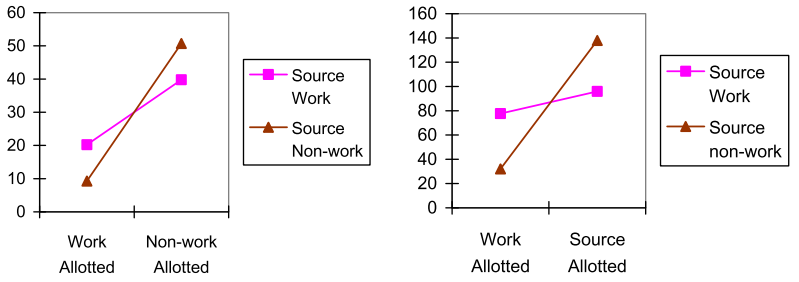

Fig. 2. Allocation of time to work/non-work activities by source and magnitude of time gain in study 3.

It is 4 pm on a typical weekday. You are in your apartment and have planned to relax by surfing online for the next 3 h using the Internet. However, you realize that your Internet service is experiencing a failure and that there is nowhere else for you to access a computer that can connect to the Internet. What will you do for the next 3 h, i.e. from 4 to 7 pm? Please specify all the activities and the duration of each that you would undertake during these 3 h.

After listing out the activities that they would undertake, respondents were asked to categorize each activity as either work (e.g. study for class, work on class project) or non-work (e.g. talk to friend, listen to music). We included the same measures for mood and affective responses as were used in study 2. Respondents were 89 undergraduate students who participated in the study in return for course credit in their introductory marketing class.

4.2.1. Results and discussion

We found a significant main effect of the source of gain for work time ($F(1, 85) = 10.07$, $p < .05$) and non-work time ($F(1, 85) = 8.28$, $p < .05$) with greater minutes allotted to work activities in the work condition ($M = 53.05$ (SD = 53.92)) than the non-work condition ($M = 17.58$ (SD = 25.92)), and greater minutes allotted to non-work activities in the non-work condition (82.42 (SD = 52.17)) than the work condition (71.86 (SD = 53.1)). There were no differences between the work and non-work conditions in terms of affective responses ($M_{work} = 2.74$ (SD = 0.9), $M_{non\text{-}work} = 2.84$ (SD = .82), $p > .1$) or mood ($M_{work} = 2.60$ (SD = 1.29), $M_{non\text{-}work} = 2.94$ (SD = 1.27), $p > .1$).

There was also a main effect of the magnitude of time gained for work time ($F(1, 85) = 20.32$, $p < .05$) and non-work time ($F(1, 85) = 60.73$, $p < .05$) with greater minutes allotted to both activities when 3 h were gained than when 1 h was gained. There was no significant interaction of source type and magnitude of time gained on either work time or non-work time allocation (both p's > .1).

Fig. 2 depicts the allocation of time to work and non-work based on the source and magnitude of time gained. When the time gained was an hour, marginally more minutes were allotted to work when the source of gain was work (20.21 (SD = 24.11)) than non-work (9.29 (SD = 19.31), $t = 1.78$, $p = .08$). Similarly, marginally greater minutes were allotted to non-work when the source of gain was non-work (50.71 (SD = 19.31)) as compared to work (39.79 (SD = 24.11), $t = -1.67$, $p < .1$). When the time gained was 3 h, significantly greater minutes were allotted to work when the source of gain was work (77.69 (SD = 57.15)) than non-work (32.08 (SD = 30.26), $t = 3.41$, $p < .05$). Similarly, significantly greater minutes were allotted to non-work when the source of gain was non-work (137.92 (SD = 44.28)) as compared to work (95.91 (SD = 56.37), $t = -2.59$, $p < .05$).

The results of study 3 replicate the results found in study 2 and lend further support to our contention that the source of time gained exerts influence in the allocation of time to different mental accounts. In addition, regardless of the source and magnitude of gain, greater time was always allotted to non-work activities than work activities, suggesting some kind of threshold for time spent on work. The results of studies 2 and 3 lead to the question of how time is allotted when the source of time gained is neither work nor non-work, i.e. a pure windfall gain. Previous literature on the mental accounting of time has shown that windfall monetary gains are allotted to pleasure or hedonistic activities. We study how windfall gains of time are spent in study 4.

4.3. Study 4

For examining windfall gain allocation, we used the time savings that accrue from daylight savings time as the source of gain. Daylight savings time was selected because it is a pure windfall source with no association with either work or non-work. One limitation with the use of DSL is that the magnitude of gain is restricted to an hour and is always restricted to a weekend day (Sunday). Given that weekdays are usually associated with non-work and rest, it is possible that the association of DSL with Sundays might bias the allocation of time to non-work activities. To account for this possibility, we asked respondents to consider a scenario in which DSL was on a weekday. Thus, we examined if the weekend allocation would differ from a weekday allocation. We asked respondents to allocate the additional time gained from DSL to work, non-work and necessary activities (e.g. sleep). One hundred and twenty two undergraduate students participated in the study in return for course credit in their marketing course.

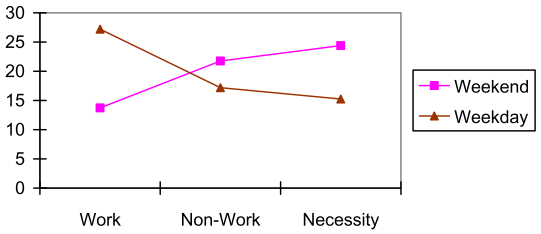

Fig. 3. Allocation of time among different categories by day of the week in study 4.

4.3.1. Results and discussion

The allocation of time gained from DSL on a weekend exhibited a significant difference between mean time allotted to work versus non-work, with greater minutes allotted to non-work (M_{work} = 13.73 (SD = 16.42) minutes, $M_{non\text{-}work}$ = 21.76 (SD = 21.7) minutes, $t = -3.26$, $p < .05$). The greatest allocation of time from the 1 h gained was for necessary activities: 24.39 (SD = 26.97) minutes (primarily sleeping).

When asked to imagine that the daylight savings time gain occurred on a weekday instead of a Sunday, the pattern of results was reversed, with the largest allocation of time to work activities (27.21 (SD = 23.66) minutes), as compared to non-work (17.19 (SD = 21.13) minutes) or necessary activities (15.25 min (SD = 24.17)). There was a significant difference between the allocation to work and non-work ($t = 2.93$, $p < .05$).

Fig. 3 depicts the allocation of time between work, non-work and necessary activities. The differences between times allotted to work, non-work and necessary activities were significantly different for the weekend versus weekday context ($t_{work} = -7.2$, $p < .05$, $t_{non\text{-}work} = 2.12$, $p < .05$, $t_{necessary\ activities} = 4.2$, $p = .05$). This supports the notion that people have categories for days of the week such that weekends connote greater non-work activities than weekdays, leading to differential allotment of time for work and non-work activities on weekdays versus weekends. Thus, when time is gained on a weekday, a larger proportion of that time is spent on work than non-work while when time is gained on a weekend, a larger proportion of the time is spent of non-work than work.

Results from the four studies above indicate that people do have mental accounts of time and attempt to match these accounts based on source and consumption. We posit that people maintain not just mental accounts for time, but mental budgets for time as well. Mental budgets for time are the "checks and balances" system for time accounting. They result in balanced time use and prevent people from spending too much time on one category of activity. Mental budgets therefore are akin to threshold levels for the values in any mental account (e.g. "I will not spend more than 8 h a day on work" or "I will exercise for at least 30 min every day.") The presence of mental budgets may explain why we find that greater time is allotted to non-work activities than work activities in studies 2 and 3, i.e. people's budgets for non-work exceed their budgets for work.

Although preferences on how to budget time for work and non-work may differ based on individual differences (age, gender, personality type etc) and temporal periods (phases of heavy work load versus phases of light work load), we posit that once people have decided their budgets, they will try and balance their time in accordance with these budgets. Thus, if someone has a heavily work oriented day schedule, s/he may allot any time gained towards non-work and vice versa, in order to avoid exceeding work and non-work budgets. We conducted a fifth study to examine this hypothesis.

5. Study 5: mental budgets for time

5.1. Pretest

Prior to conducting the main study, we conducted an exploratory pretest to examine if people did have mental budgets for work and non-work activities. To this end, we questioned 122 marketing undergraduate students about their time allocation patterns. We asked them if they had a fixed amount of time that they spent on work and non-work activities each day and if they tried to balance their activities when these limits were violated (e.g. if they exceeded their limit for work on a given day, did they try to spend more time on non-work the next day?).

The results of the pretest revealed that our respondents spent an average of 7.7 (SD = 2.5) hours on work, 6 (SD = 2.5) hours on non-work and 10.3 (SD = 2.3) hours on necessary activities that could not be categorized as either work or non-work. A significant majority (61%) of the respondents stated that they would attempt to compensate for excess time spent on non-work ($\chi^2 = 5.5$, $p < .05$). That is, they stated that they would spend greater time on work the next day if they spent excess time on non-work on any given day. However, the percentage of respondents who stated that they would attempt to compensate for excess time spent on work was not significant (56%, $\chi^2 = 2.09$, $p > .1$).These results suggest that people have mental budgets for time spent on non-work and the fact that people attempt to compensate for excess time spent on non-work suggests that they are attempting to balance their mental budgets. To examine this possibility further, we conducted study 5.

5.2. Study 5

Respondents were 154 undergraduate students who participated in the study in return for course credit in their marketing class. Each respondent was randomly assigned to one of two scenarios. The scenarios were variations of a hypothetical schedule of a typical weekday for a fictitious student in the same university. The schedules were varied so as to be heavily laden with work activities or non-work activities. For example, in the work schedule, the student spent 6 h of the day on work activities such as attending classes, group meetings etc and 90 min on non-work activities such as dinner with friends. On the other hand, in the non-work schedule, the student spent 6 h on non-work activities such as surfing the Internet, watching TV etc. and 90 min on work activities such as attending class.

Both schedules had two 90 min time blocks left unfilled; from 3:30 to 5 pm and from 9 to 10:30 pm and respondents were asked to fill in these time slots with activities that they thought the fictitious student would undertake. They were given a list of 12 activities (six work and six non-work activities) to choose from in order to fill in the time slots. The 12 activities were chosen based on a pre-test with 32 undergraduate students. An example of the scenarios used is provided in Appendix A.

Thus the study was a between subjects, single factor design with the type of schedule (work versus non-work) as the factor. The dependent measure analyzed was the mean number of minutes allotted to work and non-work activities across the 180 min in each scenario. We did not assign specific durations for any activities, so that respondents had full discretion in the number and duration of activities.

5.2.1. Results and discussion

We expected to find a main effect of the schedule type on mean minutes allotted to work versus non-work activities such that more minutes were allotted to work in a non-work schedule and vice versa. In line with expectations, an analysis of variance revealed a marginally significant effect of schedule type on the mean number of minutes allocated to work ($F(1, 74) = 3.28$, $p = < .07$) and non-work activities ($F(1, 74) = 3.38$, $p = .07$). The pattern of means revealed that greater time was allotted to non-work activities in a work schedule ($M_{work} = 95.57$ (SD = 42.5) minutes, $M_{non\text{-}work} = 79.39$ (SD = 36.3) minutes) while greater time was allotted to work activities in a non-work schedule than work schedule ($M_{work} = 84.71$ (SD = 42.71) minutes, $M_{non\text{-}work} = 100.61$ (SD = 35.4) minutes). Thus, the results provide support for our contention that people mentally budget their time between work and non-work and attempt to balance their times between these two broad categories.

6. Conclusions and directions for future research

Our paper delves into a research area that is relatively unexplored and applies principles from the literature on the mental accounting of money (e.g. Thaler, 1985, 1990) to a new variable, namely time. Across five studies we find evidence that people have mental accounts for their time as they do for their money. People appear to maintain separate mental accounts for time based on the work versus non-work context. Thus time spent waiting at the airport is viewed differently depending on whether the waiting is for a work related objective or a non-work related objective. This is strong evidence against the notion of perfect fungibility of time (study 1).

A second finding of our paper is that the source of the time gained has a significant influence on the allocation of the time that is gained. An attempt is made to utilize time received from a particular category within the category itself (studies 2 and 3). Time received from a purely uncategorized source (daylight savings – study 4) is treated as a buffer source and used to a greater extent in either work or non-work depending on the day of the week (weekday or weekend). This leads to the notion of mental budgets for time and an attempt to maintain these budgets. Our third finding is that there is an attempt to balance the time budget or to allocate time in some predetermined fashion between work and non-work (study 5). The results of the pretest for study 5 also suggest that people are sensitive to too much non-work and too little work. In other words, people may have larger budgets for work as compared to non-work. We speculate that this could be due to an inherent orientation towards work or a strong work ethic that renders excess work but not non-work acceptable. Our results do not allow us to test this explanation and we leave this as an issue for future research.

Our paper contributes to the literatures on allocation of time and mental accounting. We extend the literature on time allocation by considering how individuals use psychological principles to allocate time between different accounts. This approach is notably different from much of the past research on time allocation that is either descriptive in nature (Juster & Stafford, 1991) or utilizes a rational choice paradigm (Becker, 1965). However, at least one of our findings – the fact that weekdays are accounted for differently than weekends (study 4) – is consistent with the findings from such descriptive approaches (Robinson, 1977). Our findings suggest that people violate the rationality assumption while allocating time, just like they do while allocating money. For example, time gained due to the postponement of a work related activity is spent differently than time gained from the postponement of a non-work related activity, even when the activity is identical (visiting a bookstore) and the amount of time gained from both sources is the same. Our research thus extends the recent stream of work on the similarities and differences between time and money (e.g. Saini & Monga, 2008; Soman, 2001). Hence, our results provide support for the similarity of time and money in that both are not fungible, both have mental accounts created and maintained and both appear to have budgets set and managed.

Our research yields several interesting areas for future research. One topic for future research is to consider instances where time and/or money can be spent on multiple activities simultaneously (e.g. tickets purchased for a business-cum-

pleasure trip). The question of how people categorize time under ambiguity as discussed in the malleable mental accounting of money by Cheema and Soman (2006) would also be an interesting topic for future research. Does the assignment to mental accounts in such cases depend on the time of assignment, cost or some other factors? Another interesting topic of future study is how individual difference variables impact the mental accounting of time. Chatterjee, Heath, Milberg, and France (2000) found that need for cognition affects individuals' mental accounting processes. How factors like the need for cognition or demographic variables such as age, gender, and ethnicity impact the mental accounting and budgeting of time would be interesting to examine. Since our focus was on documenting the existence of mental accounts, we did not test for these individual differences in our studies.

We suspect that there would be significant differences between the mental accounting of time versus money. These differences are likely to emerge due to important differences between time and money (e.g. greater perceived scarcity of time as compared to money, a more even distribution of time (everyone gets only 24 h a day) and the perishable nature of time (one cannot store time)). These differences suggest that the mental accounting of time may demonstrate a higher self-serving bias than for money. Future studies contrasting time and money as well as attempting to examine moderators that would explain differences between these two variables (e.g. Navarro & Fantino, 2009) would provide interesting insights into this issue.

For our set of studies, we looked at the total amount of time spent on work versus non-work rather than the number of activities assigned to each category. This was in line with the previous studies on mental accounting of money where the key dependent variable was the amount spent on each category. However, there is a possibility that people might use the number of activities as cues when they try to balance their mental budgets. What cues people actually use while they perform mental accounting would be an interesting topic to be further investigated.

Acknowledgements

The authors would like to thank Pat West and Barb Mellers for their support and K. V. Rajagopal for his comments on a previous version of this paper.

Appendix A

Work scenario used in study 5

Work schedule

Imagine that another student at your university – John Smith – has the following activities scheduled on a typical weekday (e.g. Tuesday).

9:30 am–11:00 am:	Class
11:00 am–12:30 pm:	Class
12: 30 pm–1:15 pm:	Lunch
2:00 pm–3:30 pm:	Class
5:00 pm–6:30 pm:	Group meeting on class project
7:00 pm–8:30 pm:	Dinner and time spent with friends

Given this partial schedule for John, how do you think John would spend the time between 3:30–5:00 pm and 9–10:30 pm on this day?

A partial list of John's regular weekly activities is provided below. Please pick from this list of activities and write down how much time you think John would spend on each activity on the next page.

Activity
Work out
Surf the Internet
Listen to music
Complete homework assignment
Watch TV
Work on a presentation for class
Study
Spend time with friends
Talk to friend on phone
Do research for group project
Read for class
Prepare for job interview

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