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## THE NONFUNGIBILITY OF MENTAL ACCOUNTING: A REVISION

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Nonfungibility is taken to be the fundamental characteristic of mental accounting. We put forward the hypothesis that nonfungibility is not absolute: that there is a flow of money from an account containing consumer items of low psychological value to an account containing consumer items of high psychological value. To evaluate the hypothesis we designed 2 related experiments, and invited 236 undergraduates and 240 male workers to participate in the research. It was shown in Study 1 that there was a flow of money from a luxury account to either a communication or a food account, and from a communication account to a food account, but not in the opposite directions. In Study 2 it was found that with the increased attractiveness of a gamble, the flow of money into an entertainment account from other accounts became more likely. The results in this study offer preliminary evidence of the agility of mental accounts.

*Keywords:* mental accounting, nonfungibility, psychological value, consumption items, one-way flow.

Mental accounting is a concept developed out of a synthesis of ideas in cognitive psychology and microeconomics. It was first proposed by Thaler (1980), and further developed by Tversky and Kahneman (1981). Mental accounting is defined as the set of cognitive operations used by individuals and households to organize, evaluate, and keep track of financial activities (Thaler, 1999). Thaler further theorized three components of mental accounting. How outcomes were perceived and experienced, and how decisions were made and

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subsequently evaluated were captured in the first component. Thaler developed the concept of transaction utility. An excess of the price of a commodity over a consumer's expectation means a negative transaction utility, which makes it less likely that the consumer would complete the transaction, and vice versa. This is also emphasized in this component by the special operation rule of mental accounting. Thaler (1985) summarized the operation rule as hedonic editing based on an "S" shaped value-function curve. People tended to segregate gains, integrate losses, segregate small gains from large losses, and integrate small losses with large gains. In the second component of mental accounting is the assignment of different activities to specific accounts. The main divisions of mental accounts include: (1) sources of funding (e.g., Kivetz, 1999), in which mental accounts are divided into normal earning and windfall; (2) consumer items, for example, Tversky and Kahneman's ticket experiments in which the loss of a \$10 bill or a ticket costing \$10 could lead to significant differences in participants' willingness to spend \$10 to buy a ticket for a show; (3) saving patterns, for example, people divide their wealth into fixed accounts and interim accounts on the basis of their saving goals, and generally do not transfer money from the fixed account in order to meet temporary consumption demands. Thaler (1999) emphasized that spending was sometimes constrained by implicit or explicit budgets. This cognitive process was defined as mental budgeting, which was also regarded as the tool for self-control that helped people to balance their mental accounting (Heath & Soll, 1996; Thaler & Shefrin, 1981). The third component of mental accounting concerned the frequency with which accounts were evaluated. Accounts could be evaluated on a regular basis.

Thaler (1999) concluded that in all three of the components of mental accounting the classical economic principle of fungibility was violated. Namely, that a dollar is a dollar no matter where it comes from. The nonfungibility effect is regarded as the fundamental characteristic of mental accounting (Thaler, 1990). The nonfungibility effect arises from the fact that when individuals distribute money into different mental accounts, the money placed in each mental account has different functions and uses, and cannot simply be replaced by money from other accounts (Thaler, 1985). The existence of the nonfungibility effect in daily consumption has been confirmed in research. For example, Milkman and Beshears (2009) found in their study that the use of a \$10 off coupon would significantly increase people's spending on groceries. In addition, people tended to spend the coupon on grocery items that they did not typically buy.

Since Thaler proposed the mental accounting theory, scholars (e.g., Arkes, Hirshleifer, Jiang, & Lim, 2007; Lim, 2006) have verified the correctness of its characteristics and rules. However, in other research the limitations of traditional mental accounting theory have been suggested. For example, Cowley (2008) and Lehenkari (2009) experimentally proved that hedonic editing was not universal

among different people. Personality traits had an impact on how people edit the results of multiple gains and losses. In other words, Thaler's theory of hedonic editing applies only to parts of the population. As another example, in traditional mental accounting theory it is stated that how a person attains money tends to influence the way it is used for consumption. Normal earning is generally used for savings or commodity expenses, but windfalls tend to be used for luxury consumption or entertainment (Rajagopal & Rha, 2009; Thaler, 1990). Levav and McGraw (2009) proposed that the account of this cognitive process should be complemented by an approach in which people's feelings are examined about a sum of money. For example, when someone received a large inheritance due to the death of a beloved relative, though the money was essentially a windfall, they avoided spending it on hedonic expenditures and preferred to make utilitarian or virtuous expenditures. Such money was labeled with a negative emotion; therefore, people did not use the "unhappy money" for enjoyment.

Cheema and Soman (2006) proposed the concept of "malleable mental accounting" and challenged the nonfungibility effect. These authors believed that consumer items were sometimes classified vaguely. For example, dinner at an upscale restaurant could be regarded as basic consumption and classified in the normal consumption account, but it could also be treated as entertainment and be classified in a hedonic consumption account.

In this study we questioned the universality of the nonfungibility effect, but not based on the malleability of consumer item categorization. We explored this topic from another angle: will people give up a consumer item in one account for another item in a different account? For example, someone has decided to buy a \$50 meal card and a \$50 Zippo lighter, but suddenly they realize that they accidentally lost the \$50 planned for the meal card. What will they be more likely to do with the remaining \$50? According to the mental accounting theory, two different mental accounts will be opened to store the two \$50 amounts separately. If the two accounts are absolutely nonfungible, then the loss of the \$50 means that there will be disequilibrium of the balance of payments for the mental account set-up for meal expenses, and this would not influence the purchasing of the Zippo lighter. However, if the two accounts are somewhat fungible, then the loss of \$50 means the person has to give up one of the two consumer items. We speculated that the meal card would preferred to a Zippo lighter; thus, the person would be more likely to give up the plan of buying the lighter in order to free up the money from the lighter account to make up the deficit in the meal expense account. We aimed to determine whether or not this speculation is in line with how people really make purchasing decisions. Is there some degree of transfer permitted between mental accounts and, if yes, what are the principles that govern these movements? We conducted two studies to make a preliminary exploration of these questions.

## Study 1

### Method

**Participants.** Two hundred and thirty-six undergraduates (females = 112), with a mean age of 19.23 years ( $SD = 1.92$ ), participated for extra course credits. This is a common way to recruit university students as participants in psychological experiments so we do not consider it likely to have influenced the results here. Of the 234 questionnaires distributed, 233 were returned. Among these, all were usable responses, resulting in a valid response rate of 99.6%.

**Procedures and experimental materials.** A between-subjects experimental design was employed. Participants were randomly assigned to 1 of 6 groups. We used proportionate random sampling to control for gender. The six groups were labeled as  $a_{1-6}$ . Correspondingly, there were six scenarios and participants from each group completed one decision-making task. The six scenarios were quite similar: “You are about to buy A (worth ¥200 [¥6.25 = USD\$1]) but suddenly realize you lost the money. Now you have only ¥200, which you had planned to spend on B. Will you still buy A with the ¥200 planned for B, even though you will have no money to buy B?” In scenarios  $a_{1-2}$ , “A” referred to a Zippo lighter (in China a common lighter costs ¥2, so a Zippo can be regarded as luxury), and “B” referred to a phone card (in  $a_1$ ), or meal expenses for the next week (in  $a_2$ ). In scenarios  $a_{3-4}$ , “A” was a phone card, and “B” was a Zippo lighter (in  $a_3$ ), or meal expenses (in  $a_4$ ). In scenarios  $a_{5-6}$ , “A” was the meal expenses, and “B” was a Zippo lighter (in  $a_5$ ) or a phone card (in  $a_6$ ).

Responses were made on a 6-point Likert scale ranging from 1 (*definitely no*) to 6 (*definitely yes*). As with a simple dichotomous scale where a participant chooses between yes and no, participants using a 6-point scale had to favor one procedure over the other since there was no mid-point. In addition, by using the 6-point scale we were able to determine the strength of the choice preference.

### Results and Discussion

The consumption decisions made by the six groups are shown in Table 1. We tested the mean decision score in each cell (see Table 1 for means) against a score of 3.5 (the theoretical middle point of the 6-point Likert scale) using single-sample  $t$  tests. The results for  $a_1$  and  $a_2$  suggested that upon losing ¥200 from their luxury consumption account, people would not give up a consumption item from their communication or food account ( $ta_1 = -2.29, p < .05$ ;  $ta_2 = -7.84, p < .001$ ). This indicated that money could not be transferred from communication or food accounts to a luxury account. The results for  $a_3$  and  $a_4$  suggested in the case of losing ¥200 planned for a telephone card, people tended to bypass luxury consumption in favor of saving money to make up the lost communication expense ( $t = 4.37, p < .001$ ), but not stop food consumption ( $t = -4.76, p < .001$ ).

This indicated that there was a flow of money from a communication account to a food account, but not from a communication account to a luxury account. The results for  $a_5$  and  $a_6$  showed that losing ¥200 earmarked for an expenditure on meals had a significant effect on whether participants would still spend money on a Zippo lighter or telephone card ( $ta_5 = 5.51, p < .001$ ;  $ta_6 = 4.90, p < .001$ ). The results from a one-way analysis of variance test revealed a significant difference between the decisions among the six groups ( $F = 60.15, p < .001$ ). Least significance differences (LSD) post hoc analysis indicated that the flow of money from the luxury account to the food account was easier than from the luxury account to the communication account ( $p < .01$ ).

Table 1. *Differences in Consumption Decisions Among Groups  $a_1$ -6*

Group	Mean $\pm$ SD	$t$ (test value = 3.5)	$F$	LSD post hoc test
$a_1(n = 39)$	$2.79 \pm 1.92$	-2.29*	60.15***	$a_1 < a_3, a_5, a_6$ ; $a_1 > a_2$
$a_2(n = 38)$	$1.58 \pm .95$	-12.49***		$a_2 < a_1, a_3, a_4, a_5, a_6$
$a_3(n = 39)$	$4.64 \pm 1.63$	4.37***		$a_3 > a_1, a_2, a_4$ ; $a_3 < a_5$
$a_4(n = 39)$	$2.20 \pm 1.03$	-7.85***		$a_4 < a_3, a_5, a_6$ ; $a_4 > a_2$
$a_5(n = 39)$	$5.59 \pm .72$	18.25***		$a_5 > a_1, a_2, a_3, a_4$
$a_6(n = 39)$	$5.03 \pm 1.33$	7.18***		$a_6 > a_1, a_2, a_4$

The results offer preliminary evidence of liquidity between mental accounts set up according to different categories of consumer items. The flow of money from luxury expenditures to communication and food expenditures, and from communication expenditures to food expenditures was possible, but not in the opposite directions. It seemed that the flow between mental accounts is unidirectional. We hypothesized that mental accounts set up for different consumer items were associated with psychological values. The flow of money from an account of low psychological value to an account of high psychological value was possible. This theory might explain the results of Study 1. To further confirm our hypothesis we developed Study 2.

## Study 2

### Method

**Participants.** The participants were 240 workers in one factory, with a mean age of 34.37 years ( $SD = 4.54$ ), who agreed to take part in the study, and received ¥5 (USD\$0.80) as an honorarium. In order to control the gender effect on the willingness of making gambles (Eriksson & Simpson, 2010), all participants were male.

**Procedures and experimental materials.** Participants were randomly assigned to 1 of 6 groups (labeled  $b_{1-3}$  and  $c_{1-3}$ ), and each participant completed a decision-

making task. The experimental materials for participants of groups  $b_{1-3}$  were as follows: "There is a gamble in which participants have a 50% chance of winning ¥200, and a 50% chance of losing ¥200. You have just received a ¥200 bonus for which you had no planned use, then you decide to try your luck by placing a bet of ¥200 after work. When you get to the gambling house, you suddenly realize that you have lost the ¥200 ante. Now you have only ¥200 with which you had planned to buy A. Will you still bet with the ¥200 planned for A? If so, then you might not have any money to buy A." In scenarios  $b_{1-3}$ , "A" was, respectively, "a Zippo lighter", "a phone card", and "meal expenses". The experimental materials of  $c_{1-3}$  were the same as  $b_{1-3}$  except that the gambling stakes were changed to "participants have a 50% chance of winning ¥600, and a 50% chance of losing ¥200". Responses were made using the same 6-point Likert scale as was utilized in Study 1.

### Results and Discussion

The responses of the six groups are shown in Table 2. The  $t$  tests revealed in groups  $b_{1-3}$  that participants tended to spend the money on the original plan. This indicated that there was a flow of money from luxury, communication, or food accounts to an entertainment account ( $tb_1 = -4.04$ ,  $p < .001$ ;  $tb_2 = -7.78$ ,  $p < .001$ ;  $tb_3 = -19.43$ ,  $p < .001$ ). The results of  $c_{1-3}$  showed that when faced with a 50% chance of winning ¥600 and a 50% chance of losing ¥200, participants tended to give up the original plan of buying a Zippo or telephone card in order to leave the money for the gambling game ( $tc_1 = 8.70$ ,  $p < .001$ ;  $tc_2 = 3.55$ ,  $p = .001$ ). However, such a tendency was not significant in group  $c_3$  ( $t = .29$ ,  $p = .78$ ) indicating that there was a flow of money from luxury and communication accounts, but not from the food account to the entertainment account since the gamble became so attractive.

Table 2. *Differences in Consumption Decisions Among Groups  $b_1$ - $c_3$*

Group	Mean $\pm$ SD	$t$ (test value = 3.5)	$F$	LSD post hoc test
$b_1(n = 40)$	$2.58 \pm 1.45$	-4.04***	47.19***	$b_1 > b_3$ ; $b_1 < c_1, c_2, c_3$
$b_2(n = 40)$	$2.00 \pm 1.22$	-7.78***		$b_2 > b_3$ ; $b_1 < c_1, c_2, c_3$
$b_3(n = 40)$	$1.35 \pm 0.70$	4.37***		$b_3 < b_2, b_3, c_1, c_2, c_3$
$c_1(n = 40)$	$5.18 \pm 1.22$	8.70***		$c_1 > b_1, b_2, b_3, c_2, c_3$
$c_2(n = 40)$	$4.43 \pm 1.65$	3.55**		$c_2 < c_1$ ; $c_2 > b_1, b_2, b_3, c_3$
$c_3(n = 40)$	$3.58 \pm 1.65$	0.29		$c_3 > b_1, b_2, b_3$ ; $c_3 < c_1, c_2$

There was a significant difference between the six groups in their willingness to give up the original plans in order to leave the money for gambling ( $F = 47.19$ ,  $p < .001$ ). By using LSD post hoc analysis, it was found that the flow of money from luxury and communication accounts to the entertainment account was easier than from the food account to the entertainment account ( $p < .01$ ). As the

gambling game became more attractive, there was an easier flow of money into the entertainment account from other accounts ( $p < .001$ ).

## General Discussion

According to the classic theory of mental accounting, people partition their money into different mental accounts based on sources of funding, consumer items, and saving patterns. Different mental accounts have different functions, and are thought to be nonfungible (Thaler, 1985). If this were the case, then nonfungibility should hold between the mental accounts of food expenditures, communications expenditures, luxury expenditures, and entertainment expenditures, which are associated with different types of consumer items. However, this claim is not supported by the results in the present study. The results in Study 1 showed that there is a flow of money from luxury expenditures to communication and food expenditures, and from communication expenditures to food expenditures, but not in the opposite directions. Participants in groups  $b_{1-3}$  showed a tendency to insist on their original plans for spending the money on a Zippo lighter, telephone card, or meal expense, and not to abandon these plans in order to free up money for the bet after losing the ¥200 ante. This indicates the existence of nonfungibility. When the rules of the gambling game were changed so that the entertainment consumer item became more attractive (the potential profit increasing from ¥200 to ¥600), then the willingness of the participants to reallocate changed. People tended to give up their original consumption plans of buying a Zippo or phone card to save the money to participate in the gamble. This indicates that when the entertainment consumer item becomes more attractive, it allows the flow of money from luxury and communication accounts to the entertainment account. In other words, the results dispute the rule of nonfungibility. Though such a tendency is not significant for  $c_3$  when the existing plan was to leave the money for meal expenses, there is still a significant increase of willingness compared with  $b_3$ .

Sweeney and Soutar (2001) have argued that consumer items are associated with psychological values. We believe that mental accounts set up for different consumer items are likewise associated with psychological values. Mental accounts of low value are fungible for mental accounts of high value, but nonfungibility holds between mental accounts of equal value, or from mental accounts of high value to those of low value. Our experimental results showing unidirectional flow support this hypothesis. In addition, the results of groups  $b_{1-3}$  and  $c_{1-3}$  also showed that when the psychological value of the entertainment consumer item increased, the flow of money from the luxury, communication, and food expense accounts to entertainment expense accounts was significantly easier.



Self-control and mental accounting are highly related (Shefrin & Thaler, 1988; Thaler & Shefrin, 1981). We hypothesized that self-control can be used to achieve not only the balancing within accounts, but also between different accounts. When a deficit appears in one mental account, individuals may consider freeing some money from other accounts to make up the deficit. The key principle governing such inter-account balancing is the importance assigned to the mental account.

In this study we have made a preliminary exploration of the flow between mental accounts, and only examined the flow between mental accounts associated with different types of consumer items. Is some degree of movement also permitted between mental accounts set up according to saving patterns and sources of funding? How much difference in psychological value is required before transfers are allowed between mental accounts? These issues await further study.

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