Loss Aversion As a Self-Commitment Device to Improve Eating Habits

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We designed and tested an intervention program, based on loss aversion, which serves as an informal self-commitment device to improve people’s eating habits. Field evidence for the program demonstrates that people were more likely to show up and persist with the program at a higher rate. This effect continued post-intervention.

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EXTENDED ABSTRACT
Incentives play a central role in marketing and economics. A great deal of recent field research suggests that financial incentives can motivate people to do healthy behaviors, such as consumption of healthy foods (Dolan, Galizzi, & Navarro-Martinez, 2015), gym attendance (Milkmam, Minson, & Volpp, 2013), weight loss (Volpp et al., 2008), smoking cessation (Gine, Karlan, & Zinman, 2010), and other preventive behaviors (Kane, Johnson, Town, & Butler, 2004).

Many incentive programs studied people among who-by nature of their agreeing to participate in the study before the real study starts-are already willing to take on the tasks (Goldsmith & Dhar, 2013; Hessaini & List, 2012; Levitt, List, & Sadoff, 2016). There are a few notable exceptions that studied participation and attendance itself. For instance, Charness and Gneezy (2009) studied gym attendance and found that financial incentives can help habit formation.

For many tasks, willingness to participate is a critical first step toward success. In fact, participation rate is arguably the biggest challenge in corporate wellness initiatives (Hailey, Volpp, Pellath, & Loewenstein, 2012). This essay proposes a solution that increases participation rates without increasing per capita incentive rate. Although this essay focuses on a health-related behavioral task, the proposed solution can apply to other tasks.

Prepayment as a Proposed Solution
Our proposed solution is prepayment: moving the reward timing in traditional incentive programs to the start of the program or even before the program starts. People are told that acceptance of the prepayment is equivalent to acceptance of the task, which will be carried out later. If they are not able to complete the pre-specified task, the prepayment will be clawed back in the future.

Clawing back in extant literature refers to paying people their expected bonus in advance and taking it back if they underperform (Fryer Jr, Levitt, List, & Sadoff, 2012). Previous research has demonstrated the effectiveness of loss aversion and clawback incentives on people’s performance (Fryer Jr et al., 2012; Hessani & List, 2012; Levitt, List, Neckerman, & Sadoff, 2012). In these studies, people were incentivized to do things that they had already committed to (e.g., teaching students, preparing for exams, manufacturing consumer electronics, resulting in program participation rates of close to 100%. Instead of using claw-back to motivate people who already committed to certain tasks, we extended the use of incentive claw-back to initial participation.

In our proposed solution, both participation and subsequent effort to fulfill the task are voluntary; people still have the option of not fulfilling the task even after they have accepted the prepayment. This arrangement of prepayment and claw back can be seen as an informal contract. We have come up with this solution based on two major findings in economics and psychology.

Hyperbolic discounting (Laibson, 1997) states that valuation falls rapidly during initial delays but more slowly as time goes by (Thaler, 1981). One consequence of the hyperbolic discounting is that people are present biased (Frederick, Loewenstein, & O’Donoghue, 2002; O’Donoghue & Rabin, 1999, 2001; O’Donoghue & Rabin, 2002). That is, they excessively favor gratification now at the expense of future gratification. Therefore, we proposed the following hypothesis:

Hypothesis 1: People are more likely to accept a payment to perform a task if the payment is made earlier (prepayment) than later (post-payment)

Loss aversion refers to the notion that losses have greater impact on preferences than gains, or losses loom larger than gains (Tversky & Kahneman, 1991). An immediate consequence of loss aversion is that the anticipated loss of utility associated with giving up a valued good is greater than the anticipated utility gain associated with receiving it (Tversky & Kahneman, 1991). This discrepancy was termed the “endowment effect” by Thaler and colleagues (Kahneman, Knetsch, & Thaler, 1991; Thaler, 1980). In our proposed solution, once participants accept the prepayment, it becomes their endowment. Accepted prepayment, in the form of endowment, will therefore be valued higher than post-payment (Thaler, 1980). The endowment effect, in turn, will motivate people to keep participating in any pre-committed task in order to avoid the loss of the prepayment. Based on the above analysis we proposed our second hypothesis:

Hypothesis 2: Loss aversion after accepting prepayment can motivate people’s subsequent task participation and completion.

Study Design
Program Invitation
We posted flyers, announcing our study, on the campus of a large public university in the Southwest of the United States. We did not use any stopping rule and aimed to recruit as many participants as possible within our two-week recruitment period. One hundred and sixty-six students (72 women, aged 18-50 years, MD=21) signed up to participate in the study. We introduced our study as the “Free Fruit Program” with the goal of promoting healthy eating among the student population. Participants were asked to complete a 3-minute online survey about their eating habits and exercise regime in return for $2.00. At the end of the survey, participants were told to expect an email notification informing them about the start of the program.

Overall, 133 participants completed our online survey. We randomly assigned them to one of three treatment groups: We randomly assigned 133 students to one of three treatment groups: (1) Prepayment (N = 44), (2) Post- Payment (N = 44), and Control (N = 45). We sent an email invitation to each student two days before the start of the program phase 1:

Prepayment: You have been selected into our rewards group to get fresh fruit. That means not only can you get free fruit, you will be paid $10 upfront for your 10-day participation. You only need to collect the money on the first day of our program (Monday, Nov. 3). If you miss your first chance to get fruit and come in on the 2nd day (Tuesday, Nov. 4), you will get $9. By the same logic, if you come in on the 3rd day (which means you missed fruit twice), you will get $8, and so on. Each time you missed your portion of your fruit, you will get 1 dollar less. Once you have collected your payment, you commit to collecting your fruit each business day until the program ends on Friday, Nov. 14. If you miss a day of fresh fruit, you will need to repay us $1. If you miss your fruit on two days, you will need to repay us $2, etc.”

Post-payment: Participants in this group receive the following email: “You have been selected into our rewards group to get fresh..."
fruit. That means not only can you get free fruit, you will also be paid $1 whenever you collect your fruit. The program starts on Monday (Nov. 3). For the next 10 business days, you can get one portion of free fruit plus 1$ each day."

Control: Participants in this group received the following email: "We will provide free fresh fruit from tomorrow (Monday, Nov 3). For the next 10 business days, you can get one portion of free fruit each day."

In addition, participants in all treatment conditions were informed about the location and collection time (10-11am and 2-3pm every business day) to get their fruit (and payment).

Program Implementation

A research assistant prepared the fruit every day (consisting of 3-5 different kinds of fruit, including apples, oranges, pears, plums, watermelon, mangos, strawberries, grapes, and bananas) and recorded the participants’ choices. The fruit was displayed in cups on a stand for participants to choose from.

Program Extension

On the last day of Phase 1, we informed participants about the extension of our program for another 10 business days (i.e., 2 more weeks). They were told that “Some participants liked our program so much that they were asking for an extension. We are therefore happy to announce that we will, indeed, by extending our program for another TWO WEEKS, beginning tomorrow.” Unlike for Phase 1, participants were informed in Phase 2 that they would receive fresh fruit only, and that no monetary compensation would be provided.

Results

We examined our data in two ways. First, we analyzed aggregated daily show-up frequencies (i.e., the total number of people showing up each day) over the 20-day program period. Second, we used survival analysis to analyze individual level data.

Overall, 27 participants out of 44 (61.4%) showed up at least once in the Prepayment condition, 18 out of 44 (40.9%) in the Post-Payment condition, and 16 out of 45 (35.6%) in the Control condition (Test for Equality of Proportions, $\chi^2(2) = 6.62, p < 0.05$). Ten participants showed up every day in Phase 1, out of whom seven were from the Prepayment condition, two were from the Post-Payment condition, and one was from the Control condition ($\chi^2(2) = 6.82, p < 0.05$). None of the participants showed up every day in Phase 2.

ANOVA

We analyzed the variance of the show up data over the 10-day period of Phase 1 (see Figure 1). We treated each group of subjects as one unit of analysis ($N = 3$). Daily show ups of each group had been repeatedly observed for 10 days. A repeated measure ANOVA of the daily show up data with treatment (Prepayment, Post-Payment, Control) as between-unit factor and days as within-unit factor yielded significant main effects ($F(2, 18) = 104.6, p < 0.001$). Post-hoc tests with Bonferroni adjustment (Rosenthal & Rosnow, 1991) indicated that the average number of students showing up during Phase 1 was significantly higher in the Prepayment condition than Post-Payment condition ($M_{\text{Prepayment}} = 17.1$ vs. $M_{\text{Post-Payment}} = 9.6, p < 0.001$) or Control condition ($M_{\text{Control}} = 6.1, p < 0.001$). Show-up was also significantly higher in Post-Payment condition than in Control condition ($p < 0.01$).

An analogous ANOVA for Phase 2 (see Figure 1) yields similarly significant treatment effects ($F(2, 18) = 35.8, p < 0.001$), although for considerably lower show-up rates. Post-hoc tests with a Bonferroni adjustment indicated that show-up was significantly higher in the Prepayment condition than in the Post-Payment condition ($M_{\text{Prepayment}} = 4.1$ vs. $M_{\text{Post-Payment}} = 0.8, p < 0.001$) or Control condition ($M_{\text{Control}} = 1.1, p < 0.001$). Show-up in the Post-Payment condition was not significantly different from the Control condition.

ANOVA results showed that the between-unit factor is mainly driving the show up variance. Post-hoc test confirmed the superiority of Prepayment in motivating show ups. Due to random assignments of individual members, the between-group difference can be caused by no other reasons than experimental treatments. Therefore, causal inference in traditional RCTs are still valid; prepayment makes more people show up.

Survival Analysis

Next, we explore the dynamic process by using survival analysis. Behaviorally, task participation is measured by initial showing up to get the prepayment, while task fulfillment is measured by the number of days participants persisted before they stopped coming. In order to do survival analysis, we define a failure event first. We have selected day 18 as a cut-off date. That is, if one participant could not persist to day 18 or later, she was considered “dead” on her last day to pick up the fruit. Otherwise the participant survives our observation window. All our results remained significant and qualitatively unchanged if we define the cut-off day as any day between 15 and 20.

Each participant’s days “survived” was calculated as the number of days before their last collection of fruit (last day included). For instance, if a participant’s last day to pick up fruit is on day 15, then she survived 15 days and was dead on day 15. Most of the participants were “dead” by the end of Phase 2, with only 6 participants surviving. Among them, 5 were from Prepayment condition; 1 was from Post-Payment condition. Survival analysis showed that there was an initial loss of participants on day 1 across all three treatments. Prepayment program had a significantly higher survival probability than the other two programs, suggesting that the Prepayment program was more successful than the other two programs ($P_{\text{Prepayment}} = 61.4\%, P_{\text{Post-Payment}} = 40.9\%, P_{\text{Control}} = 35.6\%, \chi^2(2) = 6.62, p < 0.05$). Although there was a sudden drop after day 10, reflecting the removal of the financial incentives in Phase 2, Prepayment still did significantly better than the other programs.

Our survival analysis provided convergent evidence that there were significant differences among the three treatments in motivating task participation and task fulfillment, both for the entire four weeks (Phase 1 and Phase 2, Log-Rank Test, $\chi^2(2) = 13.4, p < 0.01$), as well as for the last two weeks (Phase 2, $\chi^2(2) = 9.2, p < 0.01$). Pairwise comparisons showed that Prepayment with Bonferroni adjustment had a significantly higher survival rate than Post-Payment condition ($\chi^2(1) = 7.2, p < 0.01$, entire four weeks; $\chi^2(1) = 4.9, p < 0.05$, last two weeks) and Control condition ($\chi^2(1) = 12.2, p < 0.001$, entire four weeks; $\chi^2(1) = 7.2, p < 0.01$, last two weeks). There were no significant differences between Post-Payment condition and Control condition (neither for entire four weeks nor last two weeks).

Discussion

One major issue of prepaying people is how to enforce money collection if they have not fulfilled the pre-specified task. In our study, most of the students who accepted the prepayment participated in the subsequent tasks. For those whose money needs to be collected, we were able to recover prepayments from all participants (by contacting them via email and/or text) except one. This fact indicated that students treated the prepayment program as an informal contract: once they accepted the prepayment, they knew they should either fulfil the task or return the money in the end.

Our results show that loss aversion, operationalized as daily goals, led to increased participation rates and significantly higher show-up rates and persistence with the program, even when financial incentives were removed (although at considerably lower levels).
Unlike previous studies that compared loss aversion to programs with one shot ex-post payments, we introduced a tougher-to-beat control condition, post-payment on a daily basis, that offered participants financial incentives and the flexibility to receive those without the potential of repayments. We believe that this post-payment condition is a more stringent test of our prepayment program, as the evidence from a pilot study with 150 online survey participants, who were shown all three programs side by side, indicates that most people (73%) preferred the flexibility of post-payment to the prepayment program (15%) and to the program without financial incentives (12%). This preference suggests that key to success would be to roll out the program without alternative options rather than rely on self-selection.

In summary, field evidence for the program demonstrates that people were more likely to show up and persist with the prepayment program at a higher rate. This effect continued post-intervention.

REFERENCES