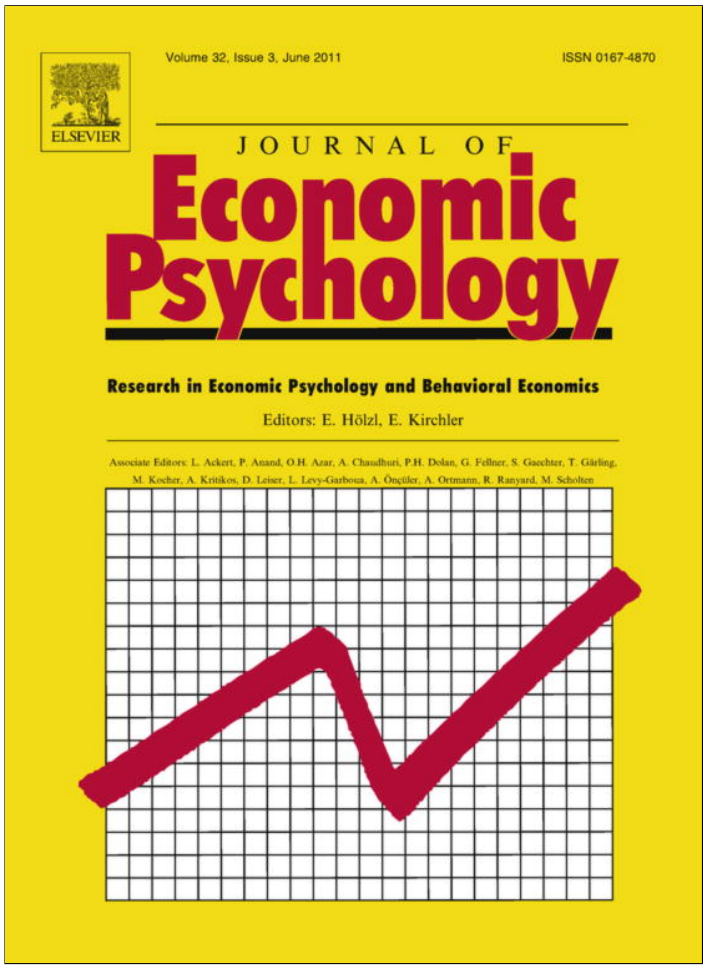

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Debiasing or rebiasing? Moderating the illusion of delayed incentives

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ABSTRACT

This paper studies corrective strategies for the illusion of delayed incentives (Soman, 1998), the phenomena that money-for-effort transactions that are unattractive in the present appear attractive when they are in the future. This illusion occurs because future effort is discounted more heavily than future monetary outcomes. In this research, we show that this bias of differential discounting can be corrected by asking consumers to perform effort at the time of decision-making. We further outline three explanations for why this intervention attenuates the illusion of delayed incentives, and discuss whether these explanations constitute a debiasing effect or a rebiasing effect (Larrick, 2004). We report the results of two laboratory experiments and discuss theoretical and practical implications of our findings.

1. Introduction

Consumers often need to choose between options that trade-off money with effort. For instance, a shopper could buy a do-it-yourself piece of furniture and assemble it at home, or purchase a more expensive but fully assembled piece. A student could choose from two summer jobs, one which pays more but involves a lot of effort, and another which pays less but is relatively easy. Choices like these can be modeled in a multi-attribute context as a simple trade-off between the extra effort required for one option and the additional cost of the other option (Payne, 1982). This trade-off approach not only applies to situations in which the choice and subsequent purchase are relatively concurrent, but also those in which purchase occurs with a temporal delay after choice.

Past research shows that the evaluation of an effort–money transactions (e.g., working in exchange for money) depends on whether the transaction is immediate or delayed (Soman, 1998, 2004; Zauberman & Lynch, 2005). Soman (2004) shows that receiving monetary reward conditioning on performing efforts might appear attractive when both the effort and money are in the future, but unattractive when both are imminent. Soman (1998) refers to the perceived attractiveness of the

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delayed transaction as the "illusion of delayed incentives;" the use of the term "illusion" suggesting that it is a bias. He proposes that when the transaction is in the future, effort gets discounted to a greater degree than the monetary reward. Consequently, transactions that appear attractive from a temporal distance start appearing increasingly unattractive as the temporal distance decreases. Soman (2004) studies the problem in a multi-attribute product context and further suggests that the degree of discounting is higher for the effort attribute compared to both the quality and price attributes. He finds preference reversals between such pairs of products as a function of the temporal perspective of the decision-maker.

Given the illusion of delayed rewards, what can consumers do to minimize this bias? In this research, we ask two questions: (1) How can the illusion of delayed incentives be corrected? We show that when consumers expend effort just prior to making a choice between options that differ in effort and price, the illusion of delayed incentive weakens and their choices are more in line with their actual future preferences. (2) What is the specific underlying mechanism with which this corrective action works? In particular, we follow Larrick (2004) in making a distinction between rebiasing and debiasing strategies, and show that the corrective strategy is more in the nature of a rebiasing strategy.

The rest of this paper is organized into three sections. First, we review relevant literature and propose our hypotheses and correcting strategy. Second, we describe two experiments designed to test the hypotheses and identify underlying process of the correcting strategy. Finally, we conclude with a general discussion and propose directions for future research.

2. The illusion of delayed incentives and a corrective intervention

Studies on intertemporal choice shows that the present evaluation of future outcomes is discounted (Akerlof, 1991; Mischel & Staub, 1965) such that the value of the future outcome (money, time, or effort) appears smaller when viewed in the present. A hyperbolic discounting function, first proposed by Mazur (1987) captures the discounted (present) value v_t of a future outcome V.

$$v_t = V/(1 + kt)$$

Here, t is the temporal distance between the present and the future outcome, and k is a discounting parameter representing the degree of discounting. In a multi-attribute choice setting, if the degree of discounting (k) remains the same for all attributes, this discounting would not substantively change the relative preference between two options as a function of when they occur. Soman (2004) proposes that some attributes are discounted more heavily than others, resulting in a preference shift (reversal) as a function of whether the choice is made for an immediate purchase or a delayed purchase. Effort is more heavily discounted than money, therefore options involving effort appear more attractive when in the future, but are preferred less when the transaction is immediate.

The illusion of delayed incentives is also consistent with construal level theory (hereafter CLT; Trope & Liberman, 2003), which suggests that time distorts the mental representation (i.e., construal) of future events. According to CLT, the more temporally distant an event is, the more likely it is to be represented by abstract features while the closer the event is in time, the more likely it is to be represented by concrete features. More importantly, the value attached to abstract features is more influential in choice for the distant future, while the value attached to concrete features is more influential in choice in the immediate future (Leiser, Azar, & Hadar, 2008; Trope & Liberman, 2003). Effort is a prime example of such an outcome – when it is afar, it can be represented quite easily in terms of tasks needed to accomplish a higher goal, but when it is proximal, each of those tasks may take on additional detail that had not been obvious from afar.

In this paper we suggest that effort itself can be represented as either high-level or low-level value (construal). When afar, it is easier to represent effort as high-level value, but when proximal effort is represented as much more detailed and concrete. Following Trope and Liberman (2003), temporal distance should increase weight of high-level value of effort, hence making the attractiveness of a future effort option higher than a current effort option.

Money is less likely to have representations that widely differ as a function of time than effort. Money itself can also be represented as either high-level or low-level value. However, compare to effort, the representation of money (or price) is less likely to vary as a function of distance. Compare to effort, the evaluability of money (price) is relatively higher (Hsee, 1996), and hence its valuation is less influenced by factors like overconfidence, ignorance of what the future outcome entails, and the biased anticipation of the emotional state associated with the future outcome. Therefore with a temporal delay, effort is more likely to be represented differently than monetary outcomes are. In sum, the illusion of delayed incentive suggests that consumers commit to choosing options that they might later not prefer.

In the present research, we demonstrate that experiencing effort at the time of choice will attenuate this bias, especially when the experienced effort is congruent (in form) with the future effort. For example, getting a consumer to expend manual labour at the time of choosing between an do-it-yourself desk and a ready-to-use desk (both to be delivered in 1 month) might give them a wake-up call and shift choice to the ready-to-use option.

It is important to note that there are different varieties of effort. In particular, previous studies have made a distinction between mental effort and physical effort (Dodge, 1917; Huey & Wickens, 1993). Although every mental task requires responses entailing a physical component and every physical exercise concerns a mental element (Gandevia, 2001), mental and physical effort have distinct effects on both psychological variables such as vigilance and physiological factors such as hormonal excretions (Huey & Wickens, 1993; Smit, Eling, Hopman, & Coenen, 2005). A sustained mental task demands relatively little muscular movement, but will primary require a vast amount of central energy expenditure. Conversely, a

physical effort task will lead to far more peripheral energy costs if it predominantly requires body movements produced by the skeletal muscles (Bouchard, Shephard, & Thomas, 1993; Smit et al., 2005).

Given the variety and distinctions of effort, effort of a similar nature (e.g., two physical tasks both completed by hands, two high-level cognitive tasks) is likely to draw from the same resources (Dragone, 2009) and similarly represented (Trope & Liberman, 2003). Therefore, we suggest that the use of current effort as a corrective strategy is more likely to work when the type of effort before choice is congruent with the type of effort involved in the future options. That is, experience of mental effort might reduce the discounting of future mental effort, while exert physical labour before choice would reduce the discounting of future physical effort. The correcting effect would be much smaller when the types of effort are incongruent.

There are three potential explanations for why this attenuation effect occurs. First, experiencing the effort could change the construal level of future effort from abstract to concrete (hereafter referred to as the construal hypothesis). In particular, experiencing congruent effort could sensitize the consumer to the details involved in performing the effort, and hence could change the construal of the future effort from abstract to concrete. Following Trope and Liberman (2003), temporal distance should increase weight of high-level value of effort, hence making the attractiveness of a future effort option higher than a current effort option. When there is no temporal delay, effort is more likely to be represented as concrete and its low-level value is more influential in choice. Therefore, consumers are less likely to choose the effort option when its mental representation is concrete.

Secondly, the perceived (negative) value of future effort could increase with learning the cost of current effort (hereafter referred to as the learning hypothesis). The pervasive devaluation of the future has typically been viewed as a natural mode of human functioning (Ainslie & Haslam, 1992, p. 59), and suggests that consumers truly do not know the value of future effort because its true cost can only be appreciated after some experience of the specific actions involved. Thereafter, exercising effort at the time of making a choice might make the estimation of the cost of the labour (time-consumption, physical or mental fatigue) easier, resulting in an attenuation in the "illusion of delayed incentives." Put simply, consumers learn to evaluate the pain of future effort because they have just experienced similar effort and realized that their predictions of its disutility were biased. Note that while both the construal hypothesis and the learning hypothesis result in an increased negative value of the future effort, they differ in the antecedents of this effect – in the first case the mental representation of effort changes while in the second case, the mental representation of effort remain the same but its evaluation increases in accuracy.

Third, the physical or mental fatigue caused by exerting right before the time of choice might invoke the use of a "no-effort heuristics" for subsequent decisions (hereafter referred to as the heuristics hypothesis). Because human attentional, cognitive, and physical abilities are limited, existing task demands reduce the resource available to attend to new stimuli or to take on new task (Weinger et al., 2000). Dragone (2009) suggests that exerting effort is fatiguing, which can negatively impact individual performance on tasks. Practicing an effortful task might impair consumers' capacity to deal with new tasks, hence their relative preference for effort-free options would increase regardless of whether the new task is immediate or in the future.

To summarize the preceding discussion, we offer the following hypothesis and note its three potential antecedent hypotheses: construal, learning and heuristic.

H1. Expending current effort will correct the discrepancy between the attractiveness of a money-for-effort transaction when it is in the present, or in the future. This corrective effect will be moderated by the congruity between current and future effort. In particular, corrective effect will be strong under high congruity, weak under low congruity.

3. Rebiasing and debiasing

In a recent review, Larrick (2004) studies strategies used to reduce biases in consumer judgment and decision-making, and categorizes them into two types: debiasing and rebiasing. Debiasing requires an intervention that corrects the error which causes the biased judgment in the first place, while rebiasing refers to the use of a second bias to offset the effects of the original bias (Larrick, 2004). We illustrate this subtle distinction with a simple analogy. Imagine a simple door that is normally held shut with a spring mechanism. If the spring is faulty (i.e., it has lost its ability to push the door shut), this door would remain open, and we use this open door as a metaphor for a bias. There are two ways to correct this bias. One option is to simply repair the faulty spring hence directly address the cause of the bias. This would constitute a debiasing strategy. Alternatively, we can exert an opposite force of the faulty spring that keeps the door shut, and this would constitute a rebiasing strategy. Note that both strategies achieve the same end result (a shut door), but do so using very different mechanisms.

To further illustrate debiasing and rebiasing strategies, we reviewed prior research in consumer psychology that had (a) demonstrated a bias in consumer judgment and decision-making, and (b) used a process intervention to moderate the bias. A summary of our review appears in Table 1. In the first seven studies listed therein, the researchers identified the cause of the bias and removed this cause to moderate the bias. In the remaining six studies, the researchers used a second bias to offset the effect of the original bias. For instance, a large body of research has shown that consumers are overconfident about their own knowledge (e.g., Mahajan, 1992; Odean, 1999). One particular mechanism that causes overconfidence is the selective focus on evidence supporting the chosen answer, i.e., consumers often look for evidence to confirm their hypotheses rather than evidence to disconfirming them. If this is indeed the mechanism, overconfidence could be attenuated by asking consumers to generate reasons for and against why a particular answer might be the correct one. Indeed, Koriat, Lichtenstein,

Table 1
Biases, causes, and nature of corrective strategies.

Biases	Cause of biases	Moderators or corrective strategies	Debiasing	Rebiasing
Overconfidence	Selective focus on evidence supporting the chosen answer	Generating for and against arguments for the chosen answer (Koriat et al., 1980)	√	
Endowment effect	Loss aversion	Increasing market experience (List, 2003)	√	
Placebo effects	Expectancy about the product efficacy	Drawing attention to the price-efficacy beliefs (Shiv, Carmon, & Ariely, 2005)	√	
Anchoring effect	Increase of anchor-consistent knowledge	"Consider-the-Opposite" Strategy (Mussweiler, Strack, & Pfeiffer, 2000)	√	
Conjunction fallacy	Low ability of reasoning with probability	Translating probability into frequency format (Sedlmeier, 1999)	√	
Negative wage elasticity	Narrow bracketing of decision and loss aversion	Increasing life experience (Camerer, Babcock, Loewenstein, & Thaler, 1996)	√	
Overspending with credit card	Weak memory of past payment and its aversive impact	Payment mechanism facilitating past payments rehearsal and immediacy payment depletion (Soman, 2001a)	√	
Sunk cost effect for time	Mental linkage of cost and benefit and the pervasive need to account	Presenting costs as time, which is difficult to evaluate and hence this hampers accounting (Soman, 2001b)		√
Low holistic judgment consistency	Inconsistency of individual judgments across situations	Improper linear statistics models (Dawes & Corrigan, 1974)		√
Preference reversal due to separate versus joint evaluation	Attribute evaluability	Attribute importance manipulation (Gonzalez-Vallejo & Moran, 2001)		√
Transaction utility	Attention to financial benefits from the deal	Adding unwanted promotion or product feature (Simonson, Carmon, & O'Curry, 1994)		√
Maladaptive conscious processing	Low processing capacity of consciousness	Unconscious thinking (Dijksterhuis, 2004)		√
Low retirement saving	Self-control failure	Changing the status quo and making use of precommitment (Thaler & Benartzi, 2004)		√

and Fischhoff (1980) employ this intervention and show that it reduces overconfidence. This intervention is metaphorically similar to the act of fixing the faculty spring.

As another example, both academics as well as the popular press alike have lamented recently about the fact that consumers do not save enough for their retirement (Greenhouse, 2006; Kyrios, Frost, & Steketee, 2004). One reason for low household saving rates is that consumers lack the willpower of self-control. They are aware of the need to save, but are tempted by immediate consumption and tend to postpone the act of setting aside money for retirement. Recently, Thaler and Benartzi (2004) recommended a prescriptive program to overcome this retirement savings bias, and called it the SMarT program. Consumers in this program (1) precommit to allocate a portion of their future salary increases toward retirement saving and (2) automatically get enrolled in the program unless they explicitly opt out (Thaler & Benartzi, 2004). Consequently, myopic consumers (i.e., those who want to consume today) who are also aware of the need to save (i.e., those who will be willing to precommit) do not experience immediate losses in consumption when they decide to enroll. Interestingly, due to the status quo bias, these consumers continue to remain enrolled in the program and likely do not experience a cut in their consumption at all because some of their increased salary gets directly diverted into their retirement funds. The SMarT program is an interesting example of how one set of biases (status quo and myopia) can be used to offset the effects of another set of biases (procrastination and loss aversion). Metaphorically speaking, this is very similar to keeping a faulty door shut by exerting an opposite force, and hence this is a classic example of a rebiasing strategy.

The construal hypothesis and learning hypothesis proposed in the paper, if correct, will belong to the camp of debiasing strategies. For the construal hypothesis, it suggests that an intervention (experiencing current effort) takes out the cause of the bias by changing construal level from abstract to concrete. Similarly, for the learning hypothesis, an intervention (experiencing current effort) corrects the error in evaluating future effort, which causes the bias in the first place. However, the heuristic hypothesis, if correct, will be a rebiasing strategy. A new bias (the use of "no-effort heuristics" for any subsequent decisions) helps to offset the effect of the original bias.

We next describe the results of two laboratory experiments conducted to (a) test H1, and (b) determine whether the corrective strategy for the illusion of delayed incentives is a rebiasing strategy, or a debiasing strategy.

4. Experiment 1

The objective of the first experiment was to test hypothesis 1.

4.1. Participants, design and procedure

One hundred and twenty participants were put in a shopping scenario and asked to choose between two product options. For each option, participants saw a photograph of the product, its brand name and information on four attributes, and were told that the products were otherwise identical. They then made a choice, and indicated a relative preference between the two options on

a nine-point scale. Within this basic procedure, we manipulated details in a 2 (Product: Desk or Computer) × 4 (Delay: no-delay, delay-no current effort, delay-physical effort, delay-mental effort) between-participants design.

Participants who made a choice between desks saw information on price, quality rating, size and style, and on the extent of assembly required. In the "no-effort" option, the desk was priced at $150, had a quality rating of 88, a "Regular Student" style and size, and was delivered fully assembled. In the "effort" option, the desk had the same quality rating and size and style, but was priced at $115. Participants were also told that it was delivered as components in a box, and that assembly involved several (specified) tasks. In choosing between these two options, participants thus traded off the extra price of the "no-effort" option with the extra effort required to assemble the other option.

Participants who made a choice between computers saw information on price, processor speed, memory and installation of software. The price and memory of both options were identical. The "no-effort" option had a processor speed of 166 MHz but came fully loaded with all the software. However, the "effort" option had a processor speed if 200 MHz, but required the consumer to undertake the effort of loading and installing all the software from 36 floppy disks onto the computer before it could become functional. In choosing between these two options, participants thus traded off the additional effort cost of installing software with an increased benefit in the form of higher processor speed.

The four delay conditions manipulated the temporal delay between choice and purchase, as well as the presence or absence of a debiasing strategy. In the "no-delay" condition, participants were told to imagine that they would be making an immediate purchase (i.e., would pay and receive the product on the same day). In the other three conditions, participants were told that they would be making the purchase (i.e., would pay and receive the product) 50 days later, but that they needed to choose and commit today. In the "delay-no current effort" condition (simplified as "delay" in later reference), participants simply responded to the questionnaire. In the two remaining conditions, participants were given an additional task in the guise of a product evaluation task. In these conditions, participants were told that a manufacturer was interested in getting some feedback on their product, and hence they would be asked to experience a product and then to answer a few simple questions about it. In the "delay-physical effort" condition, the product in question was a small, carry-on suitcase. Participants were asked to carry the small suitcase full of books along a long hallway (for about 10 min), then asked a few questions about their experience, and then answered the questionnaire. In the "delay-mental effort" condition, the product in question was a piece of computer software that needed installation. Participants were first asked to download and install the software on a PC computer and then asked questions about their experience. (which took about 20 min) before answering the questionnaire.

4.2. Data analysis and discussion

We had two dependent variables, the percent of participants choosing the effort option (CHOICE) and the relative preference for effort option (PREF, larger numbers indicating a greater preference for the effort option). The mean CHOICE and PREF data for each of the eight experimental conditions are plotted in Fig. 1.

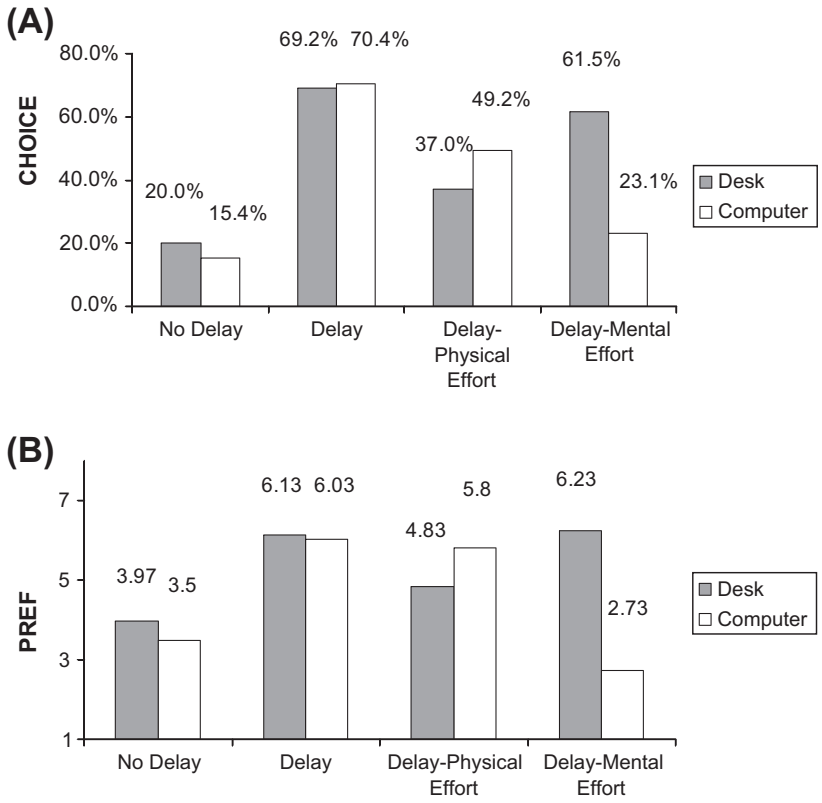

Fig. 1. Choice and preference as a function of delay and product in experiment 1.

To replicate previous research (Soman, 1998), we first analyzed CHOICE data only from the no delay and delay (with no current effort) conditions using logistic regression model of a 2 × 2 design, with Delay (delay versus no delay) and Product (desk versus computer) as independent variables. Results indicate a significant simple effect of Delay ($X^2(1) = 13.9$, $p < .001$). There was no effect of the Product ($X^2(1) = .01$, p = NS). The interaction effect between these two factors was also not significant ($X^2(1) = 1.54$, p = NS). When the purchase opportunity is in the future, participants tended to choose the "effort" option, but when it is immediate, they choose the "no-effort" option. Analysis of PREF using ANOVA consistently mirrors the results of CHOICE, and hence is not presented in subsequent discussions.

Next, we analyzed the data from the "delay," "delay-physical effort" and "delay-mental effort" conditions using Effort Type (no-effort versus physical effort versus mental effort) and Product (desk versus computer) as two factors. The logistic regression indicates a significant interaction between Effort Type and Product ($X^2(2) = 7.34$, $p < .03$), qualified by a simple effect of the Effort Type ($X^2(2) = 10.91$, $p < .03$). There was no effect of the Product ($X^2(2) = 1.08$, p = NS).

In order to better interpret these results, we recoded the data by replacing the "Effort Type" variable with "Effort Congruity." When the current effort is physical effort for participants choosing desks, or mental effort for participants choosing computers, we coded these condition as "congruent" while the others (i.e., physical effort for computers, mental effort for desks) were coded as "incongruent." We then conducted another logistic regression with Effort Congruity (no-effort versus congruent versus incongruent) and Product (desk versus computer) as two factors. The result indicates a marginally significant effect of Effort Congruity ($X^2(1) = 3.19$, $p < .1$). There was no effect of the Product ($X^2(1) = .92$, p = NS) or interaction between these two factors ($X^2(1) = .02$, p = NS). For PREF data, ANOVA analysis shows a significant interaction between Effort Congruity and Product ($F(2, 174) = 6.28$, $p < .05$), qualified by main effects of Effort Congruity ($F(1, 174) = 37.54$, $p < .01$) and Product ($F(1, 174) = 12.45$, $p < .01$).

Table 2 shows the pattern of data that generate these effects. We conduct pair-wise Chi-square tests comparing CHOICE between "delay – no-effort," "congruent effort" and "incongruent effort" conditions. For desks, more participants choose the effort option in the "delay – no-effort" condition than in the "congruent" condition (M = 69.23% versus 37.04%; $X^2(1) = 3.84$, $p < .05$), while CHOICE in the "delay – no-effort" condition is not significantly different from the "incongruent" condition (M = 68.23% versus 61.54 %; $X^2(1) = 1.38$, p = NS). The results for computer choices follow a similar pattern. This suggest that expending current effort could correct the illusion of delayed incentives; however, the corrective effect of current effort is much larger when the types of effort are congruent, but smaller when the types of effort are incongruent, in support of hypothesis 1.

In our first experiment, therefore, we were able to (a) replicate the illusion of delayed incentives effect, (b) show that the effect is weakened when participants exert effort at the time of making a choice, and further (c) show that this corrective intervention works only when the current effort is in the same genre as the future effort.

5. Experiment 2

The second experiment was conducted to explore the antecedent of the corrective effect of the effort intervention demonstrated in experiment 1. In particular, we wanted to investigate which of the three antecedent hypotheses: construal, learning, or heuristic, were driving the effects seen in experiment 1.

5.1. Participants, design and procedure

One hundred and thirty-seven participants were put in a shopping scenario similar to the one in experiment 1 and asked to choose between two desks. Product information for the desk was the same as in the first experiment. In this study, all participants were told that there would be a 50 day delay between the time they made their choice and when the desk

Table 2
Means of the choice and preference under different delay and Effort Congruity conditions in experiment 1.

	CHOICE		PREF	
	Desk	Computer	Desk	Computer
Delay conditions				
No delay	20.00% (N = 25)	15.38% (N = 25)	3.97 (N = 30)	3.5 (N = 30)
Delay – no-effort	69.23% (N = 26)	70.37% (N = 27)	6.13 (N = 30)	6.03 (N = 30)
Effort Congruity conditions				
Delay – no-effort	69.23% (N = 26)	70.37% (N = 27)	6.13 (N = 30)	6.03 (N = 30)
Delay-congruent effort	37.04% (N = 27)	23.08% (N = 26)	4.83 (N = 30)	2.73 (N = 30)
Delay-incongruent effort	61.54% (N = 26)	47.83% (N = 23)	6.23 (N = 30)	5.80 (N = 30)

was delivered. All participants also performed some effort just prior to making a choice. Within this basic task, we used a 2 (current effort: physical or mental) × 2 (construal priming: abstract or concrete) × 2 (level of future effort: no-effort or minimum effort) between-participants design to generate eight different experimental conditions.

The first factor we manipulated was the nature of the current effort being performed. Participants had to undergo either physical effort (carrying heavy stacks of printer paper while walking upstairs and downstairs for about 10 min) or mental effort (completing a "product design" questionnaire from an unrelated study for 15 min) before making their choice of desk. The second factor was manipulated to test for the construal hypothesis, and involved priming participants to look either for abstract or concrete aspects of an object. Specifically, we asked participants to view a complex Chinese painting and write down their thoughts and the description of this painting. Some of the participants (the concrete priming group) were asked to view the painting standing right in front of it such that they could capture every detail of the painting (e.g., detailed representations, thickness and graininess of brushstrokes, etc.). The rest of the participants (in the abstract priming group) saw the same painting from a distance of 8 m such that they could appreciate the holistic meaning and overall theme of the painting (but not the details). If the construal hypothesis is the right mechanism, we expect that participants in the concrete priming group are more likely to represent future effort as concrete and less likely to choose the effort option.

The third factor we manipulated was the level of future effort of one of the options. Some participants were in the "no-effort" condition and chose between two options: a do-it-yourself "effort option" desk and a ready-to-use "no-effort option" desk. The "no-effort option" required no-effort at all before it could be used. The remaining participants were in the "minimum effort" condition and looked at two options of the same desk: a do-it-yourself "effort option" and a "minimum effort option." In the "minimum effort option" the desk came assembled in three major parts and needed a trivial (but positive) amount of effort in stacking them together. This manipulation was used to examine whether consumers adopted a "no-effort heuristics" in making decisions. We would propose that the "no-effort heuristics" could only be used when there was a "no-effort option" available in their choice set. For participants in the "minimum effort" condition, the invoking of a "no-effort hypothesis" on performing the present effort could cause participants to regard the option involving minimal effort as impulsive as the do-it-yourself option.

5.2. Manipulation check

As a manipulation check for the construal priming, we coded the number of concrete construals from the thought listing that participants provided. A thought or descriptor was coded as a concrete construal if it dealt with production process, shapes, perfection/imperfection, and other artistic details of the painting. An ANOVA test showed that the number of concrete construals in the concrete priming group was much larger than that of the abstract priming group ($M = 7.20$ versus 3.25; $F(1, 39) = 57.6$, $p < .001$), indicating a successful manipulation of the construal priming. The following are two typical excerpts from participants' protocols.

(From a "concrete priming" participant) *The picture is drawn on the silky like paper in the gold frame space. On the top of the picture, there are some strong styled Chinese characters. The highest peak of the picture is located at the center of the painting and two valleys with small ponds on the left side. On the left there is a guy studying or reading in the shrine, and an elder guy is leading the young boy to the top though the narrow mount road. There is also a three-story stone tower and a lake with a flowing boat on it...*

(From an "abstract priming" participant) *A countryside image with natural scenery (i.e., trees and waterfalls) with houses as well as mountains. It is painted in a traditional Asian style of painting with exquisite detail and capped by Asian writing on the top. I find it pleasing to look at. I especially like the colors which gently accentuate the natural beauty of the scene depicted. I have no special feelings of the painting and might not buy it...*

In terms of the level of future effort manipulation, it might be argued that participants perceived that the "minimum effort" option was still highly effortful. However, a manipulation check conducted with a different group of participants

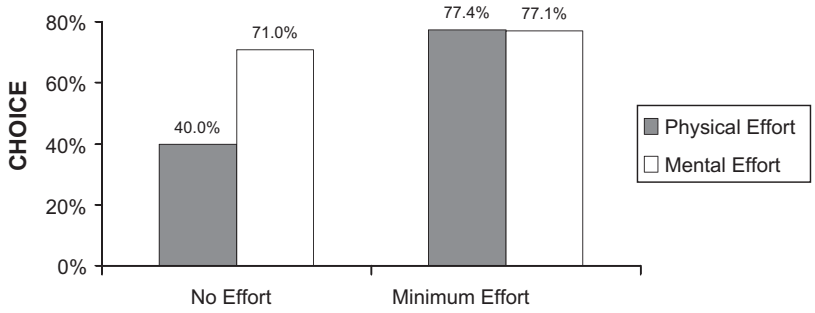

Fig. 2. Choice as a function of current effort and level of future effort in experiment 2.

($N = 16$) confirmed that this was not the case. These participants read the information in both the do-it-yourself option and minimum effort option and wrote down their estimation of work time needed for each option. The ratio of time estimation for "minimum effort" option to that of the do-it-yourself option was .23, with a range of .11–.33. This simple test suggested that the participants indeed regard the "minimum effort" option as involving little effort, as compared to the do-it-yourself option.

5.3. Data analysis and discussion

We used the percent of participants choosing the effort option (CHOICE) as the dependent variable, and analyzed the data using a logistic regression model with current effort, construal priming, and level of future effort as independent variables. Results indicated a significant interaction between current effort and level of future effort ($X^2(1) = 3.94$, $p < .05$) and significant main effects of current effort ($X^2(1) = 7.42$, $p < .01$) and level of future effort ($X^2(1) = 3.91$, $p < .05$), respectively. There were no significant interactions or main effects involving construal priming, hence we collapsed the data from the abstract priming group and concrete priming group in later analysis. The means of CHOICE as a function of current effort and level of future effort are plotted in Fig. 2.

The null effect of the construal hypothesis seemed to indicate that construal level changed by current effort was not the underlying process here. A chi-square test showed that participants were less likely to choose the effort option only when they spent physical effort in the "no-effort" condition, but not when they spent mental effort in the same condition ($M = 40\%$ versus 71%; $X^2(1) = 5.45$, $p < .05$). For the "minimum effort" condition, there was no significant difference in participants' CHOICE with physical or mental effort ($M = 77.4\%$ versus 77.1%; $X^2(1) = 1.60$, p = NS). This indicated that this correcting strategy only worked when the current effort was congruent with future effort, and when the "no-effort heuristics" could be applied to one of the options. The heuristics hypothesis is supported as the specific underlying mechanism for this correcting strategy.

5.4. Follow-up study

To investigate whether the learning hypothesis was antecedent to the success of the corrective strategy, we conducted a follow-up study to experiment 2. Seventy-three participants were asked to imagine that they were planning to order a do-it-yourself chair now. However they would not pay for, or get the chair for another 50 days. They were told that the chair need 1 h of assembly work, and that a ready-to-use version of the same chair was available for $45. Participants were then asked to write down their maximum willingness-to-pay (WTP) for the do-it-yourself chair. The monetary difference between the WTP and $45 was used as the dependent variable as a proxy for participants' evaluation for 1-h future effort. There are three conditions in the follow-up study: participants either performed physical effort, mental effort, or no-effort at all prior to responding to the questions about the chair.

A one-way ANOVA suggested that participants' dollar evaluation of future effort was not influenced by current physical effort ($M = \$16.4$) or mental effort ($M = \$16$) compared to doing no-effort at all ($M = \$16.5$; $F(2, 73) = .67$, p = NS). This result suggests that spending current effort might not result in consumers learning of the cost of future effort, and that the learning hypothesis is not antecedent to the correction of the bias in this study. An alternative explanation is that the pricing task in this study can give more weight to the money attribute over the effort attribute than asking a choice question, i.e., scale compatibility (Tversky, Sattah, & Slovic, 1988). However, since all three groups completed the same pricing task, it is remarkable that the types and amount of current effort failed to affect participants' evaluation of future effort.

In our second experiment, we show that (a) the corrective strategy works only when current effort is congruent with future effort and when there is a "no-effort option" available, (b) two debiasing strategies—the construal hypothesis and the learning hypothesis are not supported by our results, and (c) one rebiasing strategy—the heuristics hypothesis is supported as the antecedent to bias correction.

6. Conclusion

The extent to which cognitive strategies can improve reasoning and correct biases has been recently debated in an insightful book chapter (Larrick, 2004). Although people recognize and correct their bias, others have raised questions about whether people can truly debias themselves (Kahneman, 2003). One goal of studying biases is not only to demonstrate irrationality, but to help consumers make better decisions (Larrick, 2004). This paper offers a first step of corrective strategies for intertemporal preference reversals arising out of different discounting of effort and money. The present research shows that when consumers expend effort just prior to making a choice between options that differ in effort and price, the illusion of delayed incentive weakens and their choices are more in line with their actual future preferences.

We note that our paper used one of many potential correcting strategies to correct intertemporal preference reversals. For this particular strategy, the heuristics hypothesis is shown as the underlying process. Although two debiasing strategies – the construal hypothesis and the learning hypothesis – were not supported as underlying processes by the data in our study, there might be other correcting strategies based on these two mechanisms. For example, in our study we have shown that a very general learning about physical effort might not correct consumers' bias. However, there are many types of physical

effort. If consumers were asked to expend effort that was not only congruent, but also involved the same physical tasks (for example, assembling a chair before making a choice involving an assembly-required desk), we expect that this could actually debias consumers. On the other hand, asking consumers to list specific details of furniture assembling before their choice (or reviewing the assembly instructions) could also debias them by changing their construal level of future effort from abstract to concrete. Future research could continue to explore other debiasing and rebiasing strategies for differential discounting of money, time, and effort.

It is worth noting that in experiment 2 the only strategy that successful alleviated the bias was the no-effort heuristics. When there was only minimum effort in the future, all the debiasing strategies seemed futile. Future research may investigate how individual mentally represent the amount of future effort and how it will affect individual decision.

While our research answered some questions on how to attenuate the illusion of delayed incentives, it was obviously not without limitations. For one, we restricted ourselves to situations in which effort is considered to be a chore and hence carries a negative value. However, many consumers buy do-it-yourself products because they view the consumer effort as a recreational activity, a manner of learning, or an accomplishment of satisfaction. Our framework does not encompass this "positive value" view of effort. Another limitation is that there is no existing division or measurement of how similar or congruent efforts could be such that they belong to the same type.

The concrete/abstract priming did not help to correct the bias in experiment 2. It might be that the manipulation was too weak. Future research can use stronger manipulation, such as asking participants to think about each step of the future task, to examine how different amount of effort (zero/little/much) is mentally represented."

Another avenue for future research relates to a better understanding of effort and its properties. Unlike money, which is a one-dimensional quantity (i.e., it can be measured by a single scalar), effort is multi-dimensional and not as easy to quantify. More generally, there are two components of effort – the number of different tasks to be done, and the magnitude of each task. For example, in the context of mail-in rebates, a person may need to do different things to claim a rebate (e.g., write a slogan, collect product packages), and the magnitude of each task may also differ (e.g., collect three packages versus ten packages). Will consumers heavily discount future effort if the number of tasks is high? Is future effort always heavily discounted irrespective of the magnitude? More research is needed for a better understanding of the effort attribute, and its various facets that influence discounting.

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