

The Psychology of Marginal Utility

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That wealth has diminishing marginal utility is a fact of life, and that people be sensitive to their current level of wealth when deciding whether to pursue additional wealth is a requirement of rational choice. A series of experiments, spanning diverse contexts, reveal *marginal-utility neglect*—that people are rather insensitive to their current wealth when deciding how much effort to expend to acquire a monetary reward (e.g., how long to walk to claim a voucher). Moreover, the experiments demonstrate that a *marginal-utility-prompting* manipulation, which prompts people to consider their current wealth and their need for the reward given their current wealth, produces a significant sensitization effect—making financially richer (vs. less rich) individuals less (vs. more) willing to seek the reward. This manipulation is more effective than either prompting people to consider their current wealth alone or consider their need for the reward alone, suggesting that marginal-utility prompting does not merely draw people's attention to their current wealth or merely draw their attention to their need for the reward, but *links* the two elements. This research elucidates the psychology of marginal utility and yields implications beyond the pursuit of monetary rewards.

Keywords: diminishing marginal utility, narrow bracketing, scope insensitivity, decision bias, nudge

Imagine the following: it is 9 o'clock on a Saturday morning. You have been out of town for a few days and have a ticket to take a two-hour flight home today. You are now at the departure gate, about to board the aircraft. However, the flight is oversold. An airline representative says that you can get a \$200 voucher if you are willing to

give up your seat on this flight and wait to take the next flight. You can use the voucher for any tickets from the airlines you buy in the next two years. The airport is good and comfortable with many shops and restaurants, but you feel a bit tired and wish to go home soon. What is the maximum number of hours you would be willing to wait for the next flight in order to earn the \$200?

When making the decision, you should consider not the nominal value of the voucher, but its *marginal utility* given your *current level of wealth*. (According to the permanent income hypothesis (Friedman 1957), one should also consider future wealth; but for simplicity, we focus on current wealth.) The marginal utility of a given amount of money is smaller (larger) if one is richer (less rich) (Gossen 1854; Layard, Mayraz, and Nickell 2008; Walras 1954). See figure 1 for an illustration. This principle—referred to as diminishing marginal utility—is a foundation of rational choice. As a rational decision-maker, when deciding whether to wait for the next flight to earn the \$200 voucher, you should be sensitive to your current level of wealth—the richer (less rich) you are, the less (more) willing you should be to wait.

That money has diminishing marginal utility is not just an academic postulation; it has important real-life

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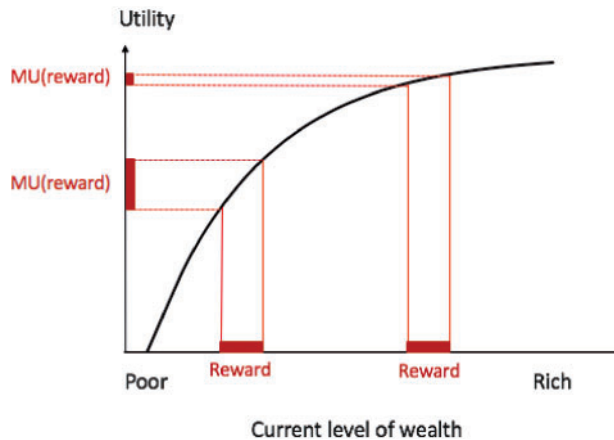
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FIGURE 1

AN ILLUSTRATION OF DIMINISHING MARGINAL UTILITY



The x-axis is current level of wealth; the y-axis is utility. The figure shows that the same monetary reward has a smaller marginal utility (MU) when the current level of wealth is high than when it is low.

implications. Just as an additional piece of bread is more useful for someone who has eaten only one piece of bread than for someone who has already eaten five, an additional dollar is more useful for a less rich person than for a richer person. For someone with little money, the presence or absence of \$100 might determine whether there is enough food to eat for the next month; for a rich individual, the presence or absence of \$100 might determine whether there is good wine to drink with the next meal.

Although the notion of marginal utility is important theoretically and practically, we propose that when deciding whether to pursue a monetary reward, people tend to focus on the nominal value of the reward rather than on its marginal utility given their current wealth. We refer to this phenomenon as *marginal-utility neglect*.

The idea of marginal-utility neglect is rooted in extensive existing research showing narrow bracketing, focusing on salient foreground information, and neglecting non-salient (albeit important) background information (Isaac and Schindler 2013; Kahneman and Frederick 2002; Leclerc, Hsee, and Nunes 2005; Leclerc et al. 2005; Morewedge, Holtzman, and Epley 2007; Read et al. 1999; Sela and LeBoeuf 2017; Slovic 1972; Thaler 1985; Tversky and Kahneman 1992). For example, when choosing between a risky option and a sure option, people focus on the stated gains and losses of the options and overlook the final wealth consequences of their choice (Kahneman and Tversky 1979; Rabin and Thaler 2001). When judging the likelihood of an event, people focus on resemblance features and neglect the event's base rate (Tversky and Kahneman 1974). When deciding whether to purchase a

product, consumers focus on the cost and benefit of the focal product and overlook the opportunity cost of purchasing it (Frederick et al. 2009; Greenberg and Spiller 2016; Spiller 2011). When choosing between two tasks, people focus on the immediate rewards (the “media”) and ignore the ultimate rewards for which the media could be exchanged (Hsee et al. 2003). This extensive body of literature suggests that when deciding how much effort to expend to pursue a monetary reward, people will likely focus on the nominal value of the reward, and overlook its marginal utility relative to their current wealth.

Our research not only demonstrates marginal-utility neglect but also elucidates why it occurs and how to help consumers better incorporate marginal utility into their decisions. We propose that marginal-utility neglect occurs not because people forget about their current level of wealth, nor because they fail to think about their need for the target reward, but because they fail to *link* the two—namely, they fail to consider their need for the target item *given* their current level of wealth. Accordingly, we posit that in order to help people think in terms of marginal utility and be sensitive to their current level of wealth, we need to help them establish this link.

Inspired by prior research (not about marginal utility) showing that a simple prompt can change people's behaviors (Frederick et al. 2009; Friedman and Dhar 2019; Gunasti and Ross 2008; Hsee et al. 2013; Milkman et al. 2011; Sela and LeBoeuf 2017), we propose that a *marginal-utility-prompting* manipulation has the potential to sensitize decision-makers to their current level of wealth. Marginal-utility prompting consists of two components: one asks decision-makers about their current level of wealth, and the other asks them about their need for the target reward given their current level of wealth. In terms of figure 1, the first component helps the decision-maker identify the location of the reward on the x-axis and the second component helps them identify the corresponding marginal utility on the y-axis.

We predict that marginal-utility prompting can effectively sensitize people to their current level of wealth, making financially richer (vs. less rich) individuals less (vs. more) willing to pursue the target reward. This is our primary hypothesis:

H1: Relative to no prompting, marginal-utility prompting will sensitize decision-makers to their current level of wealth.

Note that while many prompting effects in the literature are only *main* effects (e.g., always decreasing purchasing intention), the prompting effect proposed in hypothesis 1 is an *interaction* between current level of wealth (low vs. high) and prompting manipulation (marginal-utility prompting vs. no prompting).

Three clarifications: First, marginal-utility prompting provides no new information; it simply helps decision-

makers integrate the knowledge and information they already have. Second, the marginal-utility-prompting effect proposed in hypothesis 1 is not obvious because it goes against a strong alternative hypothesis—no effect. Normatively speaking, decision-makers should already think in terms of marginal utility relative to their current wealth without the prompt, and so the manipulation should have no additional effect. Third, as noted earlier, we only expect marginal-utility prompting to produce an interaction effect and are agnostic about whether it would also produce a main effect. Even if it produces a main effect, we still expect it to produce an interaction effect, and the interaction effect—not the main effect—is what we theorize and test in this research.

Because marginal-utility prompting consists of two components, a natural question is whether either of these components alone would produce the same sensitization effect. Specifically, would the same sensitization effect occur with only a *current-level-prompting* manipulation, which merely asks people about their current level of wealth, or with only a *need-prompting* manipulation, which merely asks people how much they need the reward? We predict that neither current-level prompting alone nor need-prompting alone will produce the same sensitization effect as the combination (marginal-utility prompting) because, according to our theory, marginal-utility neglect is neither due to mere ignorance of current level of wealth nor mere ignorance of need for the target item, but rather, due to a failure to link the two. Because current-level prompting draws people's attention only to their current level of wealth, need prompting draws people's attention only to their need for the target item, and only marginal-utility prompting links the two, we predict that marginal-utility prompting has a unique sensitization effect above and beyond current-level prompting alone or need prompting alone. These are our next two hypotheses:

H2: Marginal-utility prompting has a greater sensitization effect than current-level prompting.

H3: Marginal-utility prompting has a greater sensitization effect than need prompting.

STUDY OVERVIEW

We tested our propositions in 10 studies; we report seven of them in the main text and the remaining three in web [appendix A](#). All studies tested hypothesis 1; studies 3, 5, 6, and 7 also tested hypothesis 2; studies 4–6 also tested hypothesis 3. For generalizability, these studies adopted different methods. Some operationalized current level of wealth as the participants' actual current financial situation, while other studies empirically manipulated current level. In some studies, the dependent variables were hypothetical responses and in other studies, the dependent

variables were incentive-compatible decisions. While most of our studies concerned monetary resources, two studies reported in web [appendix A](#) concerned other types of resources (see [table 1](#)).

STUDY 1 (FLIGHT COMPENSATION)

This study tested our theory in the aforementioned flight compensation context. We manipulated the type of prompting in two between-participants conditions: control (no prompting) and marginal-utility prompting. We operationalized current level as participants' monthly income. Theoretically, current level should be total net worth, calculated as assets minus liabilities from all sources, but we worried that our participants would be unable or unwilling to do these calculations. Because income is highly correlated with wealth ([Azpitarte 2011](#)) and often used to reflect wealth (e.g., <https://www.cnbc.com/2019/01/23/how-much-money-americans-think-you-need-to-make-to-be-rich.html>), we used income as a proxy for current level of wealth.

Method

Participants were 406 workers recruited from Prime Panel, a US-based CloudResearch service (251 females, $M_{\text{age}} = 42.21$). They read one of two versions of a questionnaire, which represented the two manipulated conditions: control (no prompting) and marginal-utility prompting.

In the control condition, participants first read, "When you do the following survey, assume that the 'you' in the survey is actually yourself, with all of your current situations and status. The only difference is the decision scenario described below, which is imaginary." Participants then read the flight compensation scenario described at the beginning of this article. To check if the participants had paid attention, we asked them to recall the value of the voucher they would earn if they waited for the next flight. Then, participants were asked about their willingness to wait (the main dependent variable): "What is the most number of hours you are willing to wait to take the next flight in order to get this amount of money?" The participants answered by choosing one of 10 options ranging from "0 hours" to "9 hours" (with 1-hour steps). After answering the questions, participants went to a separate page and reported their actual monthly after-tax income; they answered by choosing one of 10 options ranging from "\$500 or less" to "\$5000 or more" (with \$500 steps). In the analyses, "\$500 or less" was treated as \$500 and "\$5000 or more" was treated as \$5000. Finally, participants reported their gender and age.

The marginal-utility-prompting condition was identical to the control condition except that the participants answered two additional questions, corresponding to the two

TABLE 1
STUDY OVERVIEW

Study	Target item	Current level	Dependent variable	Hypotheses tested	Prompting manipulation
1 N = 406	Flight compensation	Income (measured)	Willingness to wait	H1	Control vs. marginal-utility prompting
2 N = 405	Refrigerator savings	Income (measured)	Willingness to buy	H1	Control vs. marginal-utility prompting
3 N = 747	Survey payment	Perceived richness (measured)	Willingness to work (real consequence)	H1 and H2	Control vs. marginal-utility prompting vs. current-level prompting
4 N = 614	Shoe discount	Income (measured)	Willingness to buy	H1 and H3	Control vs. marginal-utility prompting vs. need prompting
5 N = 796	Jacket discount	Income (manipulated)	Willingness to walk	H1, H2, and H3	Control vs. marginal-utility prompting vs. current-level prompting vs. need prompting
6 N = 902	Prize money	Net wealth (manipulated)	Willingness to walk	H1, H2, and H3	Control vs. marginal-utility prompting vs. current-level prompting vs. need prompting vs. joint evaluation
7 N = 599	Extra winning chance	Winning chance (manipulated)	Willingness to work (real consequence)	H1 and H2	Control vs. marginal-utility prompting vs. current-level prompting
A1 N = 801	Flight compensation	Income (measured)	Willingness to wait	H1	Control vs. wealth-focused marginal-utility prompting vs. time-focused marginal-utility prompting vs. time-plus-wealth-focused marginal-utility prompting
A2 N = 401	Another pair of jeans	Number of Jeans (measured)	Willingness to purchase	H1	Control vs. marginal-utility prompting
A3 N = 407	Additional support rate	Support rate (manipulated)	Willingness to pay	H1	Control vs. marginal-utility prompting

components of marginal-utility prompting, one right before and one right after the attention check question. The first question asked about their after-tax monthly income; the second question asked, “Given your monthly income, how much do you need this amount of money?” and they answered on a 6-point scale ranging from “1 (I don’t need it)” to “6 (I need it badly).”

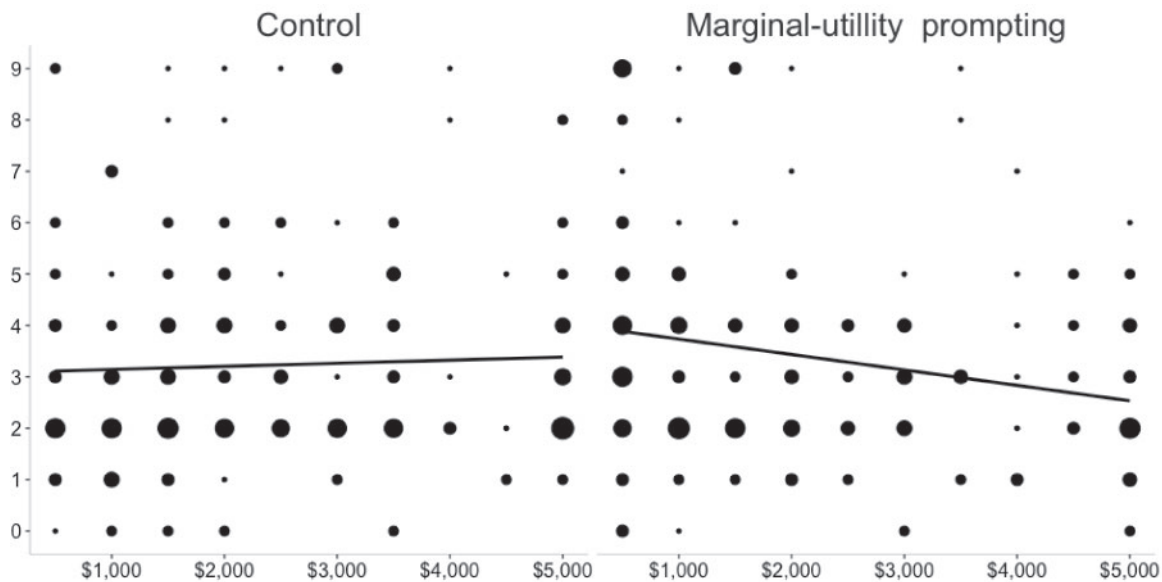
Results and Discussion

The results reported below are based on all participants. Excluding participants who did not correctly recall the value of the voucher did not meaningfully change the results (see web [appendix B](#)). Among all participants, 31.8% reported a monthly income of \$1000 or less, 24.4% between \$1000 and \$2000 (inclusive), 23.2% between

\$2000 and \$4000, and 20.6% of \$4000 or more. Even though our sample probably did not include the wealthiest tier of individuals in the US, it still spanned a wide income range; the monthly income of the richest 14.0% of the sample (\$5000 or more) was more than 10 times that of the least rich 17.7% (\$500 or less).

Figure 2 shows the main results. Because current level of wealth was measured, not manipulated, we analyzed the data using a linear regression with willingness to wait (in hours) as the dependent variable and with current level, prompting, and their interaction as predictors. We mean-centered current level and coded prompting as $-.5$ for the control condition and $+0.5$ for the marginal-utility-prompting condition. The analysis yielded a marginally significant current-level main effect, $\beta = -.09$, $t = -1.74$, $p = .083$, and no prompting main effect, $p = .599$. Most

FIGURE 2
STUDY 1 (FLIGHT COMPENSATION) RESULTS



The x-axis is measured current monthly income (in \$); the y-axis is willingness to wait (in hours) for a \$200 voucher. The dots represent observations, with bigger dots representing more observations. The results (trend lines) show that participants in the marginal-utility-prompting condition were more sensitive to their current income than were participants in the control condition.

importantly, the analysis found a significant interaction, $\beta = -.13$, $t = -2.61$, $p = .009$, which showed the sensitization effect of marginal-utility prompting (hypothesis 1).

Further analyses revealed the following: in the control condition, willingness to wait was not correlated with income ($r = 0.04$, $n = 208$, $p = .540$), suggesting that participants were insensitive to their current wealth, but in the marginal-utility-prompting condition, there was a significant negative correlation ($r = -.22$, $n = 198$, $p = .002$), suggesting that participants were sensitive: as wealth increased, willingness to wait for the voucher decreased. Using the Johnson–Neyman test, we found that marginal-utility prompting had a significant positive effect on willingness to wait among participants whose income was below \$1215.60, and a significant negative effect on willingness to wait among participants whose income was above \$4866.71. This study provides initial evidence for our theory.

Note that the decision in this study involved a tradeoff between money and time. Because marginal-utility prompting focuses on money (wealth), one may wonder whether a similar prompt with a focus on either time alone or on both wealth and time would produce the same sensitization effect. To address the question, we conducted a variant of study 1 that included not only the control and the standard (i.e., wealth-focused) marginal-prompting conditions, but also a time-focused-marginal-utility-prompting

condition and a time-plus-wealth-focused-marginal-utility-prompting condition. We found that, relative to the control condition, both wealth-focused marginal-utility prompting and time-plus-wealth-focused marginal-utility prompting sensitized people to their current wealth, but time-focused marginal-utility prompting did not. These findings suggest that in order to sensitize people to their current wealth, the marginal-utility prompting must mention wealth. See study A1 in web [appendix A](#) for details.

STUDY 2 (REFRIGERATOR SAVINGS)

Study 2 was a conceptual replication of study 1 that did not involve time. It examined whether consumers were willing to buy a refurbished refrigerator instead of a new one in order to save a certain amount of money. Besides, study 2 used participants whose incomes were distributed more evenly across a wide range than the incomes of the participants in study 1.

Method

Participants were 405 workers recruited from Prime Panel (203 females, $M_{\text{age}} = 47.62$); they were evenly distributed across five annual income brackets ($< \$20,000$, $\$20,000$ – $\$39,999$, $\$40,000$ – $\$69,999$, $\$70,000$ – $\$124,999$, and $> \$125,000$). This wealth stratum has been used in previous

related research (Davidai 2018) and is recommended by Prime Panel. Participants read one of two versions of a questionnaire, which represented the two manipulated conditions: control (no prompting) and marginal-utility prompting.

In the control condition, as in study 1, participants first read, “When you do the following survey, assume that the ‘you’ in the survey is actually yourself, with all of your current situations and status. The only difference is the decision scenario described below, which is imaginary.” Then, they read the following scenario: “You have just moved to a new house and plan to buy some new household appliances, including a new refrigerator. You are in a large appliance store now. After careful research, you decide to purchase a certain model of refrigerator. Its price is \$800. You ask the salesperson whether you can get a discount. The salesperson says no, but tells you that they have a refurbished version of this refrigerator. If you buy the refurbished version, you can save \$200. The refurbished version has the same warranty as a new one. You are debating whether to buy the refurbished version to save money.” As an attention check, we asked participants to recall the amount of money they would save if they bought the refurbished refrigerator. Then, participants indicated their willingness to buy the refurbished refrigerator instead of a new one on a seven-point scale ranging from “1 (Not at all)” to “7 (Very much).” After they answered the questions, participants went to a separate page and answered a question about income as adopted from the World Values Survey (2012)—“Below is an income scale on which 1 indicates the lowest income group and 10 the highest income group in the US. We would like to know in what group your household is. Please specify the appropriate number, counting all wages, salaries, pensions, and other incomes that come in”; participants reported their current income on a 10-point scale ranging from “1 (Lowest group)” to “10 (Highest group).” Finally, participants reported their gender and age.

The marginal-utility-prompting condition was identical to the control condition except that participants answered the two component questions of marginal-utility prompting before they indicated their willingness to buy the refurbished refrigerator. Specifically, right before the attention check question, participants answered the question about income (as described above), and right after the attention check question, they were asked, “Given your income group as you indicated above, how badly do you need to save this amount of money?”; they answered on a 7-point scale ranging from “1 (I don’t really need to save this amount of money)” to “7 (I desperately need to save this amount of money).”

Results and Discussion

The results reported below are based on all participants. Excluding participants who did not correctly recall the

amount of potential savings did not meaningfully change the results (see web appendix B). Figure 3 shows the results. We analyzed the data using a linear regression with willingness to buy as the dependent variable and with current wealth, prompting, and their interaction as predictors. We mean-centered current level and coded prompting as -0.5 for the control condition and $+0.5$ for the marginal-utility-prompting condition. The analysis found a significant current-level main effect, $\beta = -0.13$, $t = -2.58$, $p = .010$, and no prompting main effect, $p = .222$. Consistent with hypothesis 1, the analysis also found a marginally significant interaction, $\beta = -0.09$, $t = -1.81$, $p = .071$, suggesting that marginal-utility prompting sensitized participants to their current wealth.

Further analyses found that in the control condition, no correlation existed between income and willingness to buy ($r = -0.04$, $n = 205$, $p = .614$), suggesting that higher-income and lower-income participants were equally willing to buy the refurbished model to save \$200. In the marginal-utility-prompting condition, however, a significant negative correlation emerged ($r = -0.24$, $n = 200$, $p = .001$), revealing that lower-income participants were more willing than higher-income participants to buy the refurbished model. Using the Johnson–Neyman test, we found that marginal-utility prompting had a significant positive effect on willingness to buy among participants whose income was lower than 3.52 on the aforementioned classification. Study 2 replicated the results of study 1 in a context that did not involve time, using a participant sample with a more balanced income distribution.

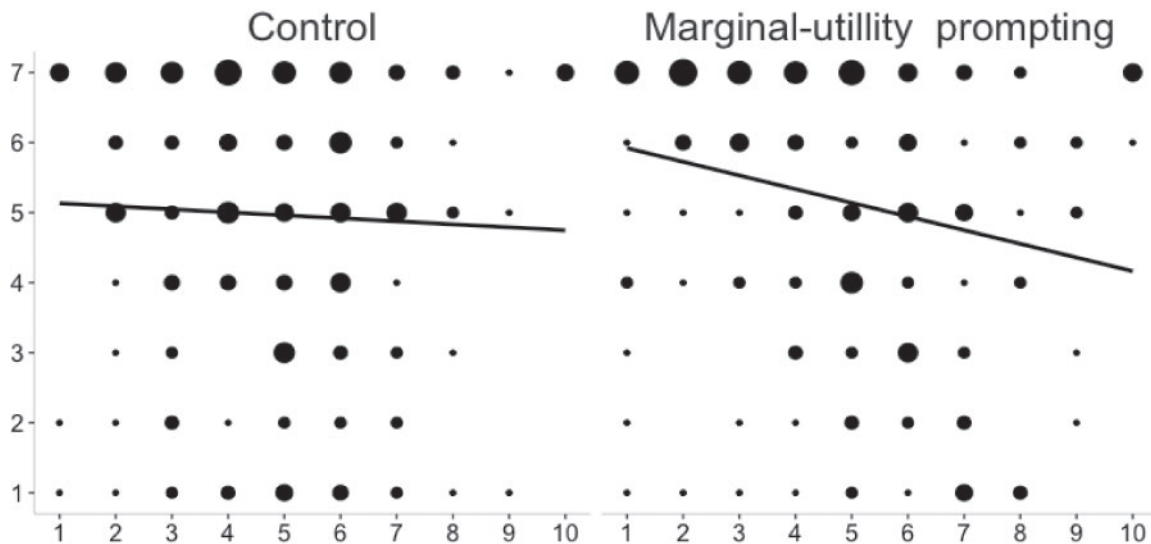
STUDY 3 (SURVEY PAYMENT)

Study 3 extended studies 1 and 2 in three aspects. First, study 3 included three prompting conditions—control (no prompting), marginal-utility prompting, and current-level prompting—and tested hypotheses 1 and 2. Second, while the previous studies relied on hypothetical scenarios, study 3 tested our theory in a natural setting with potential real consequences for the participants. We offered MTurkers the opportunity to participate in an hours-long survey to earn \$25 (the reward)—a substantial amount for online workers—and elicited their willingness to participate. Third, while the previous studies operationalized current level as participants’ income, study 3 used self-perceived richness instead, to enhance the generalizability of our findings.

Method

Participants were 747 workers recruited from MTurk in the US (410 females, $M_{\text{age}} = 36.97$). They first completed a survey on color judgment (unrelated to this study), and then were asked whether they would be willing to do another survey in the future. They were randomized into one

FIGURE 3
STUDY 2 (REFRIGERATOR SAVINGS) RESULTS



The x-axis is measured income (1 = lowest; 10 = highest); the y-axis is willingness to buy a refurbished model to save \$200 (on a 1–7 scale). The dots represent observations, with bigger dots representing more observations. The results (trend lines) show that participants in the marginal-utility-prompting condition were more sensitive to their current wealth than were participants in the control condition.

of three conditions: control, marginal-utility prompting, and current-level prompting.

In the control condition, participants were first informed about the future survey: “We are recruiting participants to do a comprehensive consumer survey that will take hours to complete. We have yet to finalize the survey. For now, we want to know whether you want to do the survey and, if so, how many hours you are willing to spend on it. The more hours you are willing to spend on the survey, the more likely you will be selected to do it. If you are selected, you promise you will actually do the survey. Upon completing the survey, you will receive a fixed payment of \$25.” Then, participants were asked about their willingness to do the survey: “Given that the payment is \$25, how much do you want to do the survey? The more you want to do it, the more hours you should choose below”; they answered by choosing one of 7 options ranging from “0 hours (I don’t want to do the survey)” to “6 or more hours (I want to do the survey very much)” (with 1-hour steps). Afterward, on a separate page, participants reported their location, gender, age, education level, and current financial situation; the final item was elicited with the question, “How would you characterize your current financial situation among MTurkers?” Participants answered by choosing one of two options: “Rich (including slightly rich)” or “Poor (including slightly poor).”

The current-level-prompting condition was identical to the control condition except that participants reported their location, gender, age, education level, and current financial situation *before* they indicated their willingness to participate.

The marginal-utility-prompting condition was identical to the current-level-prompting condition except that, after indicating their financial situation but before indicating their willingness to participate, participants were asked, “Given your current financial situation, how much do you need this \$25?”; they answered on a 6-point scale ranging from “1 (I don’t need it very much)” to “6 (I need it badly).”

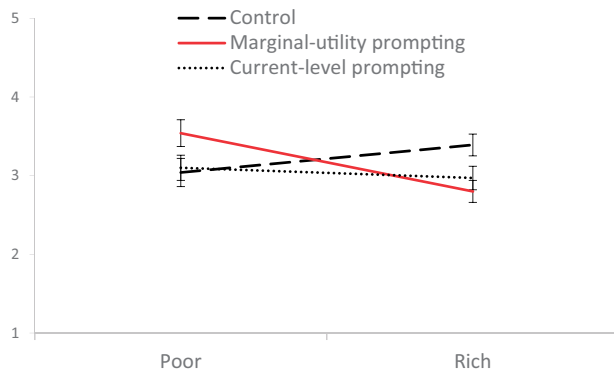
At the end of the experiment, we randomly selected 25 participants from those who were most willing to participate in the future survey, asked them to do an hours-long survey (unrelated to this study), and actually paid each of them \$25.

Results and Discussion

Among our participants, 58% considered themselves “poor (including slightly poor)” among MTurkers and 42% considered themselves “rich (including slightly rich)” among MTurkers. We categorized the former as low-current-level participants and the latter as high-current-level participants.

FIGURE 4

STUDY 3 (SURVEY PAYMENT) RESULTS



Detailed means (SDs) are as follows:

Prompting manipulation	Poor	Rich
Control (no prompting)	3.04 (1.71)	3.39 (1.77)
Marginal-utility prompting	3.54 (1.63)	2.80 (1.71)
Current-level prompting	3.10 (1.72)	2.97 (1.76)

The x-axis is self-perceived current financial situation (rich or poor); the y-axis is willingness (in hours) to do a survey to earn \$25; the error bars represent $\pm$ one SE. The results show that participants in the marginal-utility-prompting condition were more sensitive to their current level of richness than were participants in the other conditions.

Figure 4 presents the results. Although current level of wealth was measured rather than manipulated in this study, it had only two levels, hence allowing us to use ANOVAs to analyze the data. A 2 (current level: low vs. high) $\times$ 3 (prompting: control vs. marginal-utility vs. current-level) ANOVA found no current-level main effect, $p = .172$, no prompting main effect, $p = .496$, and a significant interaction, $F(2, 741) = 6.17$, $p = .002$, $\eta^2 = .016$.

To test hypothesis 1, we included only the control and the marginal-utility-prompting conditions and conducted a 2 (current level: low vs. high) $\times$ 2 (prompting: control vs. marginal-utility) ANOVA. We found no current-level main effect, $p = .207$, no prompting main effect, $p = .765$, and, most importantly, a significant interaction, $F(1, 493) = 12.47$, $p < .001$, $\eta^2 = .025$, which demonstrated the sensitization effect of marginal-utility prompting as postulated in hypothesis 1. Specifically, participants in the control condition were insensitive to their current financial status, $p = .111$, but participants in the marginal-utility-prompting condition were sensitive: the self-identified rich participants were less willing to do the survey than the self-identified poor participants, $F(1, 493) = 11.56$, $p = .001$. We also separately analyzed the results of the poor and rich groups and found that marginal-utility prompting increased the willingness of the poor participants to do the survey, $F(1, 493) = 6.49$, $p = .011$, and decreased the

willingness of the rich participants, $F(1, 493) = 6.14$, $p = .014$.

To test hypothesis 2, we included only the marginal-utility-prompting and the current-level-prompting conditions and conducted a 2 (current level: low vs. high) $\times$ 2 (prompting: marginal-utility vs. current-level) ANOVA. The analysis found a significant current-level main effect, $F(1, 493) = 8.05$, $p = .005$, $\eta^2 = .016$, no prompting main effect, $p = .397$, and, most importantly, a significant interaction, $F(1, 493) = 4.00$, $p = .046$, $\eta^2 = .008$. The interaction supported hypothesis 2, indicating that marginal-utility prompting was more effective than current-level prompting at sensitizing participants to their current level of wealth. For additional analyses of simple effects, see web appendix C.

We also compared the control and current-level-prompting conditions by conducting a 2 (current level: low vs. high) $\times$ 2 (prompting: control vs. current-level) ANOVA. The analysis found no current-level main effect, $p = .479$, no prompting main effect, $p = .262$, and no interaction, $p = .127$. The lack of an interaction suggests that simply drawing participants' attention to their current wealth did not produce a sensitization effect relative to the control (no prompting).

Study 3 replicated the marginal-utility-prompting effect proposed in hypothesis 1 in a natural setting with potential real consequences, and it also lent support to the effect proposed in hypothesis 2 regarding the differential sensitization effect of marginal-utility prompting versus current-level prompting. The latter result highlighted the importance of prompting participants to *link* their current wealth with their need for the target reward, and it ruled out focalism (Wilson et al. 2000) as an alternative explanation for the effect of marginal-utility prompting. In other words, marginal-utility prompting worked not by merely drawing participants' attention to their current wealth—as current-level prompting also did, without effective sensitization—but by helping participants relate their current wealth to their need for the additional \$25.

STUDY 4 (SHOE DISCOUNT)

While study 3 tested hypotheses 1 and 2, study 4 tested hypotheses 1 and 3, and included three prompting conditions—control (no prompting), marginal-utility prompting, and need prompting. To ensure a diversity of samples, this study used participants from a different population than did the first three studies.

Method

Participants were 614 workers recruited from Wenjuanxing, an online labor market in China (313 females, $M_{\text{age}} = 30.30$). They read one of three versions of a questionnaire, which represented the three manipulated

conditions: control (no prompting), marginal-utility prompting, and need prompting. The questionnaire was originally presented in Chinese, and we translated it into English below.

In the control condition, participants first read, “When you do the following survey, assume that the ‘you’ in the survey is actually yourself, with all of your current situations and status. The only difference is the decision scenario described below, which is imaginary.” Then, they read the following scenario: “You want to buy a pair of sneakers. You go to a shopping mall. After browsing and comparing, you set your eyes on a certain pair of sneakers that costs ¥500. You ask the salesperson whether you can get a discount. The salesperson says no, because the sneakers are new arrivals. At this time, another salesperson comes and tells you that there is a pair of such shoes on display. If you buy the display shoes, you can get 20% off. The salesperson also tells you that the display shoes have been on the shelf most of the time, that they are like new, and that few people have ever tried them on. You take a look at the display shoes and do not find any obvious flaws.” As an attention check, we asked participants to recall the size of the discount for the display shoes. Then, we asked the participants how willing they were to buy the display shoes instead of brand new ones; they answered on a 6-point scale ranging from “1 (Not really)” to “7 (Definitely will).” Next, participants were directed to a separate page to report their actual monthly income; they answered by choosing one of 10 options ranging from “¥1000 or less” to “¥10,000 or more” (with ¥1000 steps). In the analyses, “¥1000 or less” was treated as ¥1000, and “¥10,000 or more” was treated as ¥10,000. Finally, participants reported their gender and age.

The need-prompting condition was identical to the control condition except that before indicating their willingness to buy the display shoes, participants were asked, “How much do you need this discount?” and they answered on a 7-point scale ranging from “1 (I don’t need it very much)” to “7 (I need it badly).”

The marginal-utility-prompting condition was identical to the control condition except that before indicating their willingness to buy the display shoes, they were first asked to report their actual monthly income (as described above) and also asked, “Given your monthly income, how much do you need this discount?” on the same seven-point scale as in the need-prompting condition.

Results and Discussion

The results reported below are based on all participants. Excluding participants who did not correctly recall the size of the discount for the display shoes did not meaningfully

change the results (see web [appendix B](#)). Among all participants, 21.8% reported a monthly income of ¥3000 or less, 30.9% between ¥3000 and ¥6000 (inclusive), 32.3% between ¥6000 and ¥9000 (inclusive), and 15.1% of ¥10,000 or more.

[Figure 5](#) shows the main results. To test hypothesis 1, we included only the control and marginal-utility-prompting conditions and conducted a linear regression with willingness to buy the display shoes as the dependent variable and with current level, prompting, and their interaction as predictors. We mean-centered current level and coded prompting as -0.5 for the control condition and $+0.5$ for the marginal-utility-prompting condition. The analysis found a marginally significant current-level main effect, $\beta = -.09$, $t = -1.85$, $p = .065$, no prompting main effect, $p = .673$, and, most importantly, a significant interaction, $\beta = -.15$, $t = -3.02$, $p = .003$. The interaction demonstrated the sensitization effect of marginal-utility prompting as predicted by hypothesis 1. Further analyses showed that participants in the control condition were insensitive to their income ($r = 0.06$, $n = 207$, $p = .401$), but participants in the marginal-utility-prompting condition were highly sensitive ($r = -.24$, $n = 198$, $p = .001$). Using the Johnson–Neyman test, we found that marginal-utility prompting had a significant positive effect on willingness to buy among participants whose income was below ¥4301.49, and a significant negative effect on willingness to buy among participants whose income was above ¥9191.87.

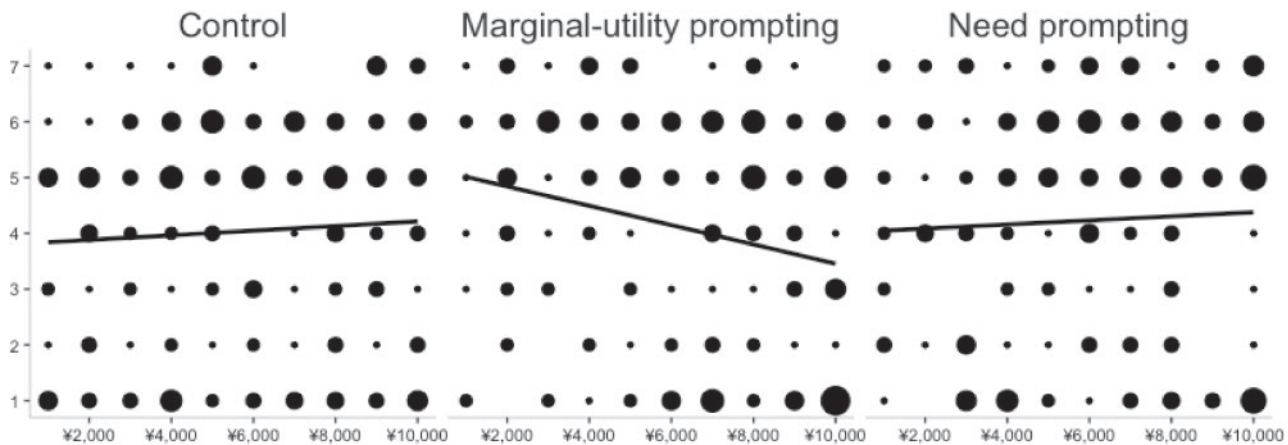
To test hypothesis 3, we included only the need-prompting and marginal-utility-prompting conditions and conducted a similar regression. We found a marginally significant current-level main effect, $\beta = -.09$, $t = -1.88$, $p = .060$, no prompting main effect, $p = .623$, and, most importantly, a significant interaction as predicted by hypothesis 3, $\beta = -.14$, $t = -2.89$, $p = .004$. For additional analyses of hypothesis 3 (see web [appendix C](#)).

We also conducted a regression including only the control and need-prompting conditions and found no current-level main effect, $p = .274$, no prompting main effect, $p = .358$, and no interaction, $p = .943$. The lack of an interaction suggests that simply drawing participants’ attention to their need for the reward was not enough to sensitize them to their current level.

Study 4 replicated the marginal-utility-prompting effect found in the other studies in a different scenario with a different sample. It also demonstrated the differential sensitization effect of marginal-utility prompting versus need prompting proposed in hypothesis 3, which suggests that marginal-utility neglect happens not because people do not think about their need for the target reward, but because people fail to link their current level to their need for the target reward.

FIGURE 5

STUDY 4 (SHOE DISCOUNT) RESULTS



The x-axis is measured current monthly income (in ¥); the y-axis is willingness to buy the display shoes instead of the new ones to save 20% (on a 1 – 7 scale). The dots represent observations, with bigger dots representing more observations. The results (trend lines) show that participants in the marginal-utility-prompting condition were more sensitive to their current income than were participants in the control and need-prompting conditions.

STUDY 5 (JACKET DISCOUNT)

In the previous studies, the current level of wealth was measured participants' *real* financial status. As such, rich and less rich participants may have differed not only in their current level of wealth, but also in other aspects, such as education level and value of time. To control for such potential confounds, study 5 *manipulated* current level of wealth. Besides, study 5 included four prompting conditions—control (no prompting), marginal-utility prompting, current-level prompting, and need prompting—and tested all our hypotheses—Hypotheses 1, 2, and 3.

Method

Participants were 796 workers recruited from MTurk in the US (387 females, $M_{\text{age}} = 35.41$). They read one of eight versions of a questionnaire, which constituted a 2 (current level: low vs. high) $\times$ 4 (prompting: control vs. marginal-utility vs. current-level vs. need) design.

In the control condition within the low-current-level condition, participants read, "You just graduated from college and work as an IT consultant in Chicago. You are single. You don't have any assets (e.g., savings) or any liabilities (e.g., loans). Your monthly income is \$1500. It is a Saturday in October. To prepare for the cold winter in Chicago, you plan to buy a winter jacket. You are at a clothing store near where you live; you fall in love with a particular winter jacket and decide to buy it. The jacket

costs \$150 at the store. However, you find out that the same jacket is on sale today at another store for only \$100. You don't have a car. In order to go to the other store to save \$50, you must walk 3 hours (round trip)." As an attention check, participants recalled their city as stated in the instructions. Then, participants were asked, "Are you willing to walk 3 hours (round trip) to save \$50?"; they indicated their willingness on a 6-point scale ranging from "1 (Not at all)" to "6 (Very much)." At last, they reported their gender and age.

The need-prompting condition was identical to the control condition except that, after recalling their city but before indicating their willingness to walk, participants were asked, "How much do you need to save \$50?"; they answered on a 6-point scale ranging from "1 (I don't really need to save \$50)" to "6 (I badly need to save \$50)." The current-level-prompting condition was identical to the control condition except that, after recalling their city but before indicating their willingness to walk, participants recalled their monthly income as stated in the scenario. The marginal-utility-prompting condition was identical to the current-level-prompting condition except that the monthly income question was followed by a need question: "Given your monthly income as stated above, how much do you need to save \$50?"; they answered on the same six-point scale as in the need-prompting condition.

The four high-current-level conditions were identical to the respective low-current-level conditions except that

participants were told that their monthly income was \$7500 instead of \$1500.

Results and Discussion

The results reported below are based on all participants. Excluding participants who did not correctly recall their city did not meaningfully change the results (see web appendix B). Figure 6 and the accompanying table show the results. A 2 (current level: low vs. high) × 4 (prompting: control vs. marginal-utility vs. current-level vs. need) between-subjects ANOVA found a significant current-level main effect, $F(1, 788) = 30.62, p < .001, \eta^2 = .037$, a significant prompting main effect, $F(3, 788) = 2.87, p = .036, \eta^2 = .011$, and, most importantly, a significant interaction, $F(3, 788) = 4.57, p = .004, \eta^2 = .017$.

To test hypothesis 1, we included only the control and marginal-utility-prompting conditions and conducted a 2 (current level: low vs. high) × 2 (prompting: control vs. marginal-utility) ANOVA. The analysis found a significant current-level main effect, $F(1, 398) = 24.12, p < .001, \eta^2 = .057$, no prompting main effect, $p = .214$, and, most importantly, a significant interaction as predicted by hypothesis 1, $F(1, 398) = 9.15, p = .003, \eta^2 = .022$. More specifically, participants in the control condition were insensitive to their income; those earning \$7500 a month were nearly as willing to walk to the other store to save \$50 as were those earning \$1500, $p = .185$. In contrast, participants in the marginal-utility-prompting condition were sensitive to their income; those earning \$7500 a month were less willing to make the effort than were those earning \$1500 a month, $F(1, 398) = 31.80, p < .001$.

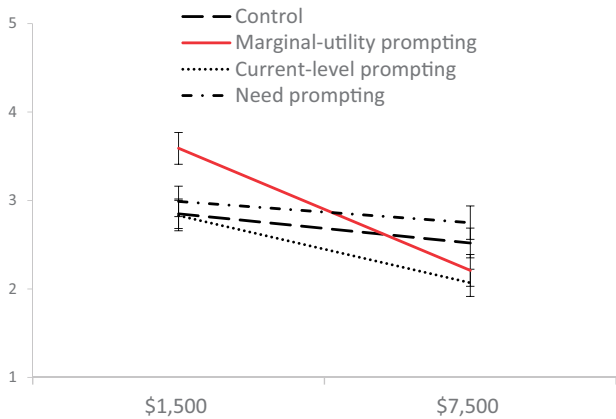
We also separately analyzed the results of the low-current-level and high-current-level groups. Among the low-current-level (low-income) participants, marginal-utility prompting significantly increased their willingness to walk, $F(1, 398) = 9.16, p = .003$; among the high-current-level (high-income) participants, marginal-utility prompting directionally but not significantly decreased their willingness to walk, $p = .210$.

To test hypothesis 2, we included only the marginal-utility-prompting and current-level-prompting conditions and conducted a 2 (current level: low vs. high) × 2 (prompting: marginal-utility vs. current-level) ANOVA. We found a significant current-level main effect, $F(1, 399) = 38.30, p < .001, \eta^2 = .088$, a significant prompting main effect, $F(1, 399) = 6.79, p = .010, \eta^2 = .017$, and, most importantly, a marginally significant interaction as hypothesis 2 predicted, $F(1, 399) = 3.30, p = .070, \eta^2 = .008$, suggesting that marginal-utility prompting was somewhat more effective than simply drawing people's attention to their current level at sensitizing people to their current level.

To test hypothesis 3, we included only the marginal-utility-prompting and need-prompting conditions and

FIGURE 6

STUDY 5 (JACKET DISCOUNT) RESULTS



Detailed means (SDs) are as follows:

Prompting manipulation	\$1,500	\$7,500
Control (no prompting)	2.85 (1.66)	2.52 (1.69)
Marginal-utility prompting	3.59 (1.84)	2.21 (1.79)
Current-level prompting	2.83 (1.76)	2.07 (1.50)
Need prompting	2.99 (1.68)	2.75 (1.84)

The x-axis is manipulated monthly income (in \$); the y-axis is willingness to walk 3 hours to save \$50 (on a 1–6 scale); the error bars represent ± one SE. The results show that participants in the marginal-utility-prompting condition were more sensitive to their current income than were participants in the other conditions.

conducted a 2 (current level: low vs. high) × 2 (prompting: marginal-utility vs. need) ANOVA. The analysis found a significant current-level main effect, $F(1, 393) = 20.38, p < .001, \eta^2 = .049$, no prompting main effect, $p = .856$, and, most importantly, a significant interaction as hypothesis 3 predicted, $F(1, 393) = 10.04, p = .002, \eta^2 = .025$, indicating that participants in the marginal-utility-prompting condition were more sensitive to their current level than were participants in the need-prompting condition. For additional analyses of hypotheses 2 and 3 (see web appendix C).

We also compared the control and current-level-prompting conditions by conducting a 2 (current level: low vs. high) × 2 (prompting: control vs. current-level) ANOVA. The analysis found a significant current-level main effect, $F(1, 395) = 10.66, p = .001$, no prompting main effect, $p = .161$, and no interaction, $p = .200$. The lack of a significant interaction suggests that simply drawing participants' attention to their current level—without prompting them to link their current level with their need to save \$50—was not sufficient to increase their sensitivity.

Finally, we compared the control and need-prompting conditions by conducting a 2 (current level: low vs. high) × 2 (prompting: control vs. need) ANOVA. The analysis found no current-level main effect, $p = .101$, no prompting

TABLE 2
STIMULI IN STUDY 6

	Low-current-level/low-reward	High-current-level/high-reward
Current level	\$100 net wealth	\$50,000 net wealth
Reward	\$100 cash prize	\$500 cash prize
Marginal utility	Higher	Lower

main effect, $p = .288$, and, most importantly, no interaction, $p = .803$. The lack of a significant interaction suggests that simply asking participants about their need to save \$50—without prompting them to link their need with their current level—was not sufficient to increase their sensitivity.

Study 5 provided further support for our theory and replicated the results of the previous studies by manipulating (instead of measuring) the current level of wealth. Participants who were not prompted to consider marginal utility were insensitive to their current income when deciding whether to walk three hours to save \$50. Simply drawing participants' attention to their income (i.e., current-level prompting) without linking it with their need to save \$50 did not significantly increase their sensitivity. Likewise, simply asking participants to consider their need to save \$50 (i.e., need prompting) without linking their need to their income did not significantly increase their sensitivity. Only participants who were prompted to *link* their income with their need to save \$50 (i.e., marginal-utility prompting) demonstrated sensitivity to their current income—such that those with the lower income (i.e., \$1500/month) were more willing to expend effort to save \$50 than were those with the higher income (i.e., \$7500/month).

We note in passing that in studies 1 and 3, we measured willingness to pursue the reward by asking participants to quantify the amount of time they were willing to spend, whereas in study 5, the reward required a fixed amount of time (three hours), and we asked participants to rate their willingness to spend that time. Even though previous research suggests that these two types of measures reflect different motivations (Dai, Brendl, and Ariely 2010; Litt, Khan, and Shiv 2010), our results show that the marginal-utility-prompting effect is robust to these differences.

STUDY 6 (PRIZE MONEY)

In all previous studies, we kept the reward constant and varied (or measured) the current level. In this study, we varied the reward along with the current level to create a low-current-level/low-reward condition and a high-current-level/high-reward condition. We were curious whether participants' responses in the control (no prompting) condition were in the opposite direction of marginal utility and

whether marginal-utility prompting would be powerful enough to reverse that direction. Specifically, in the low-current-level/low-reward condition, the current level of wealth was \$100 and the reward was also \$100; in the high-current-level/high-reward condition, the current level of wealth was \$50,000 and the reward was \$500. We assumed—and we verified in a separate test (see below)—that the marginal utility of \$100 for someone with only \$100 was higher than the marginal utility of \$500 for someone with \$50,000, as shown in table 2.

We expected that participants in the control condition would focus on the nominal value of the reward and be more willing to seek \$500 (despite already having \$50,000) than to seek \$100 (despite having only \$100). Moreover, we expected marginal-utility prompting to reverse the responses so that they would align with the direction of the marginal utility of the reward.

Besides the control and marginal-utility-prompting conditions, study 6 included current-level-prompting and need-prompting conditions, thereby testing hypotheses 2 and 3 as well as hypothesis 1. Thus, study 6 adopted a 2 (current-level/reward: low/low vs. high/high) $\times$ 4 (prompting: control vs. marginal-utility vs. current-level vs. need) factorial design.

In addition to these eight conditions, we also included a joint-evaluation condition in which we presented participants with both the low-current-level/low-reward scenario and the high-current-level/high-reward scenario without any prompting and asked them to select the scenario in which they would be more willing to seek the reward. We were curious whether their responses would align more closely with the nominal value of the reward or with the marginal utility of the reward.

Method

Participants were 902 workers recruited from MTurk in the US (455 females, $M_{\text{age}} = 36.58$). They were assigned to nine conditions, of which, eight constituted a 2 (current-level/reward: low/low vs. high/high) $\times$ 4 (prompting: control vs. marginal-utility vs. current-level vs. need) design, and the remaining condition was a joint-evaluation condition.

In the control condition within the low-current-level/low-reward condition, participants read, "You are 35 years

old and single. You own a small store near where you live. Your current net wealth (the value of all your assets minus the total of your liabilities) is \$100. When you visited a large mall last weekend, you bought a lottery ticket. You are informed today that you have won \$100 cash. To claim the money, you must go there yourself within one week; otherwise, you will lose the right to claim the money. You don't have a car, and there is no public transportation. The only way for you to go to the mall is to walk. That will take time, and time is valuable to you." Then, participants indicated the most amount of time (round trip) they were willing to walk to claim the cash, and they answered by choosing one of six options ranging from "1 hour" to "6 hours" (with 1-hour steps).

The need-prompting condition was identical to the control condition except that before participants indicated their willingness to walk, they were asked, "How much do you need the amount of cash you have won?"; they answered on a six-point scale ranging from "1 (I don't need it very much)" to "6 (I need it badly)." The current-level-prompting condition was identical to the control condition except that before participants indicated their willingness to walk, they recalled their current net wealth in the scenario. The marginal-utility-prompting condition was identical to the current-level-prompting condition except that after participants recalled their current net wealth but before they indicated their willingness to walk, they were asked, "Given your current net wealth, how much do you need the amount of cash you have won?"; they answered on the same 6-point scale as in the need-prompting condition.

The four high-current-level/high-reward conditions were identical to the respective low-current-level/low-reward conditions except that participants were told that their current net wealth was \$50,000 and they had won \$500.

In the joint-evaluation condition, participants read, "Consider two unrelated persons, Paul and Rick. Both of them are 35 years old and single. They each own a small store near where they live. Paul's net wealth (the value of all his assets minus the total of his liabilities) is \$100. Rick's net wealth (the value of all his assets minus the total of his liabilities) is \$50,000. When they each visited a large mall last weekend, they each bought a lottery ticket. They are informed today that they have each won a cash prize. Paul has won \$100. Rick has won \$500. To claim the money, they each must go there themselves within one week; otherwise, they will lose the right to claim the money. They don't have cars, and there is no public transportation. The only way for them to go to the mall is to walk. That will take time, and time is valuable to them." Then, participants indicated whether they were more willing to walk to claim the cash if they were Paul or if you were Rick; they indicated the most amount of time (round trip) they were willing to walk to claim the cash if they

were Paul versus Rick. At last, participants in all conditions reported their gender and age.

Results and Discussion

Assumption Verification. To test our assumption that the marginal utility of the reward was greater in the low-current-level/low-reward condition than in the high-current-level/high-reward condition, we asked a group of MTurkers ($N = 100$) whether \$100 for someone with \$100 net wealth is more useful than, less useful than, or equally useful as \$500 for someone with \$50,000 net wealth. Confirming our assumption, a majority (90.0%) of the participants responded that the former is more useful, $\chi^2(1, N = 100) = 64.96, p < .001$.

Main Results. Figure 7 presents the results. For the eight main conditions, a 2 (current-level/reward: low/low vs. high/high) $\times$ 4 (prompting: control vs. marginal-utility vs. current-level vs. need) ANOVA found no current-level main effect, $p = .214$, no prompting main effect, $p = .764$, and, most importantly, a significant interaction, $F(3, 796) = 7.94, p < .001, \eta^2 = .029$.

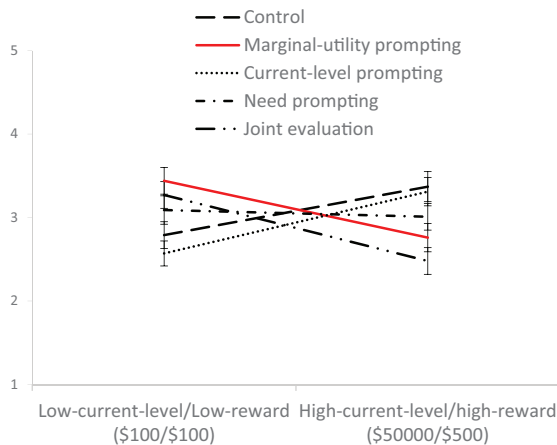
To test hypothesis 1, we included only the control and marginal-utility-prompting conditions and conducted a 2 (current-level/reward: low/low vs. high/high) $\times$ 2 (prompting: control vs. marginal-utility) ANOVA. The analysis yielded no current-level/reward main effect, $p = .786$, no prompting main effect, $p = .914$, and, most importantly, a significant interaction, $F(1, 395) = 14.36, p < .001, \eta^2 = .035$. The interaction revealed a "preference reversal" between the control and the marginal-utility-prompting condition. Specifically, in the control condition, participants were willing to walk more hours to claim \$500 when their net wealth was \$50,000 than to claim \$100 when their net wealth was \$100, $F(1, 395) = 6.17, p = .013$, aligning with the nominal value of the reward. By contrast, in the marginal-utility-prompting condition, participants were willing to walk more hours to claim \$100 when their net wealth was \$100 than to claim \$500 when their net wealth was \$50,000, $F(1, 395) = 8.26, p = .004$, aligning with the marginal utility of the reward.

We also separately analyzed the results of the low-current-level/low-reward and high-current-level/high-reward conditions. Among participants in the low-current-level/low-reward condition, marginal-utility prompting significantly increased their willingness to walk, $F(1, 395) = 7.73, p = .006$; among participants in the high-current-level/high-reward condition, marginal-utility prompting significantly decreased their willingness to walk, $F(1, 395) = 6.66, p = .010$.

To test hypothesis 2, we included only the marginal-utility-prompting and current-level-prompting conditions and conducted a 2 (current-level/reward: low/low vs. high/high) $\times$ 2 (prompting: marginal-utility vs. current-level)

FIGURE 7

STUDY 6 (PRIZE MONEY) RESULTS



The x-axis is manipulated net wealth and reward (in \$); the y-axis is willingness to walk (in hours) to claim the reward; the error bars represent $\pm$ one SE. The results show that the participants in the marginal-utility-prompting condition and in the joint-evaluation condition gave responses that were more consistent with the marginal utility of the reward than did participants in the other conditions.

ANOVA. We found no current-level/reward main effect, $p = .824$, no prompting main effect, $p = .324$, and, most importantly, a significant interaction as hypothesis 2 predicted, $F(1, 399) = 19.25$, $p < .001$, $\eta^2 = .046$, suggesting that marginal-utility prompting was more effective than simply drawing participants' attention to their current level.

To test hypothesis 3, we included only the marginal-utility-prompting and need-prompting conditions and conducted a 2 (current-level/reward: low/low vs. high/high) $\times$ 2 (prompting: marginal-utility vs. need) ANOVA. The analysis found a significant current-level/reward main effect, $F(1, 398) = 5.45$, $p = .020$, $\eta^2 = .013$, no prompting main effect, $p = .757$, and, most importantly, a marginally significant interaction as hypothesis 3 predicted, $F(1, 398) = 3.38$, $p = .067$, $\eta^2 = .008$; participants in the marginal-utility-prompting condition were somewhat more sensitive to their current level than were participants in the need-prompting condition. For additional analyses of hypotheses 2 and 3 (see web appendix C).

We also compared the current-level-prompting and control conditions by conducting a 2 (current-level/reward:

low/low vs. high/high) $\times$ 2 (prompting: control vs. current-level) ANOVA. The analysis found a significant current-level/reward main effect, $F(1, 398) = 16.14$, $p < .001$, no prompting main effect, $p = .392$, and, most importantly, no interaction, $p = .625$. The lack of a significant interaction suggests that simply drawing participants' attention to their current level was not sufficient to increase their sensitivity.

We also compared the need-prompting and control conditions by conducting a 2 (current-level/reward: low/low vs. high/high) $\times$ 2 (prompting: control vs. need) ANOVA. The analysis found no current-level/reward main effect, $p = .128$, no prompting main effect, $p = .847$, and, most importantly, a significant interaction, $F(1, 397) = 4.04$, $p = .045$. The interaction means that participants in the need-prompting condition were more sensitive to their current level than were participants in the control condition, but even within the need-prompting condition, the low-current-level/low-reward participants were still no more willing to claim the reward than the high-current-level/high-reward participants, $p = .731$.

Finally, we turn to the joint-evaluation condition. Most participants (77.6%; $\chi^2(1, N = 98) = 29.76$, $p < .001$) were more willing to walk to claim \$100 if their net wealth was \$100 than to claim \$500 if their net wealth was \$50,000, and they also were willing to walk more hours in the former scenario than in the latter, $t(97) = 3.87$, $p < .001$. These results were aligned with the marginal utility (as opposed to the nominal value) of the reward, and were consistent with extant research showing that, relative to people in single evaluation (as in the control condition), people in joint evaluation are more likely to behave in a way consistent with normative prescriptions (Bazerman, Tenbrunsel, and Wade-Benzoni 1998; Caruso, Gilbert, and Wilson 2008; Hsee 1998; Hsee et al. 1999; Hsee and Zhang 2010; Li and Hsee 2019).

STUDY 7 (WINNING CHANCE)

Study 7 was a conceptual replication of study 6 with real financial consequences attached to participants' decisions. Like study 6, study 7 also consisted of a low-current-level/low-reward condition and a high-current-level/high-reward condition, but unlike study 6, which operationalized the current level and the reward with monetary values, study 7 used winning probabilities in a game. An advantage of this design was that we did not need to assume—nor did we need to use a separate group of participants to verify—that the marginal utility of the reward was greater in the low-current-level/low-reward condition than in the high-current-level/high-reward condition. Instead, we could objectively calculate the marginal utility of the reward in each condition and show the difference quantitatively.

Specifically, participants played an online ball-drawing game in which they could draw one ball from a virtual bag

TABLE 3
STIMULI IN STUDY 7

	Low-current-level/low-reward	High-current-level/high-reward
Current level	2 winning balls	35 winning balls
Reward	1 extra winning ball	65 extra winning balls
Marginal utility (i.e., increase in winning probability)	8.33% (an increase from 2/3 to 3/4)	1.78% (an increase from 35/36 to 100/101)

that always contained one non-winning ball and a certain number of winning balls. If the participant drew a winning ball, they would get 50¢. Before they drew, participants had the option of doing a 6-minute boring survey to add a certain number of winning balls to the bag, thereby increasing their chance of winning. We manipulated the default number of winning balls in the bag (current level) and the number of extra winning balls (the reward) that participants could add if they did the survey.

In the low-current-level/low-reward condition, the current level was two winning balls and the reward was one extra winning ball. In the high-current-level/high-reward condition, the current level was 35 winning balls and the reward was 65 extra winning balls. Because there was only one non-winning ball in both conditions, the marginal utility of the extra ball(s)—operationalized here as the increase in the winning probability with the extra ball(s)—was objectively greater in the low-current-level/low-reward condition than in the high-current-level/high-reward condition, as shown in table 3.

(Strictly speaking, the marginal utility of the extra ball(s) is $\Delta p \times u(50¢)$, where Δp is the increase in winning probability and $u(50¢)$ is the marginal utility of winning 50¢. Because participants were randomized to the two conditions, $u(50¢)$ was constant. Thus, the marginal utility of the extra ball(s) depended only on Δp , which was greater in the low-current-level/low-reward condition than in the high-current-level/high-reward condition.)

Note that participants in the low-current-level/low-reward condition were analogous to less rich people, who start out with few winning balls and stand to gain a great deal by adding only one extra winning ball, while participants in the high-current-level/high-reward condition were analogous to richer people, who start out with many winning balls and stand to gain comparatively little by adding more (even as many as 65 more).

We predicted that without marginal-utility prompting, participants in the high-current-level/high-reward condition would be as willing as or more willing than participants in the low-current-level/low-reward condition to do the boring survey, because they would base their decisions on the nominal number of extra winning balls, which was higher in the high-current-level/high-reward condition than in the low-current-level/low-reward condition.

The design of this study also allowed us to distinguish ratio thinking from marginal-utility thinking. In the previous studies, the reward-to-current-level ratio was always higher in the low-current-level condition than in the high-current-level condition. For example, in study 5, the ratio of reward (savings) to current level (monthly income) was $\$50/\$1500 = 0.033$ in the low-current-level condition and $\$50/\$7500 = 0.007$ in the high-current-level condition. Therefore, one possible explanation for the sensitization effect is that marginal-utility prompting caused participants to calculate and base their decision on the ratio of the reward to their current level. In study 7, we designed the stimuli so that marginal utility and ratio were in the opposite direction: the marginal utility of the extra ball(s) was higher in the low-current-level/low-reward condition (8.33%) than in the high-current-level/high-reward (1.78%) condition, but the reward-to-current-level ratio was higher in the high-current-level/high-reward condition (i.e., $65/35 = 1.86$) than in the low-current-level/low-reward condition (i.e., $1/2 = 0.50$). Therefore, if participants in the low-current-level/low-reward condition were more willing to seek the reward than participants in the high-current-level/high-reward condition with marginal-utility prompting, as we predicted, it could not be attributed to the ratio thinking.

Method

Participants were 599 workers recruited from MTurk in the US (258 females, $M_{\text{age}} = 36.05$). They were randomly assigned to six conditions that constituted a 2 (current-level/reward: low/low vs. high/high) $\times$ 3 (prompting: control vs. marginal-utility vs. current-level) design.

In the control (no prompting) condition within the low-current-level/low-reward condition, participants read, “You are playing a ball-drawing game. You have only ONE chance to draw only ONE ball from a virtual bag as follows. The bag contains two winning balls and one non-winning ball. If the ball you draw is a winning ball, you will get 50¢; otherwise, you won’t. Before the game begins, you can add extra winning ball(s) to the bag so as to increase your chance of winning. To do so, you must do a 6-minute boring survey. Specifically, if you do the 6-minute boring survey, you can add 1 extra winning ball to the bag so that you can have a total of 3

winning balls before you draw.” Then, participants were asked, “Would you do the 6-minute boring survey in order to add the extra winning ball(s)?” and answered “yes” or “no.” Those who said “no” proceeded to draw a ball immediately, and their winning probability was as described, namely, 2/3. Those who said “yes” first did a survey (unrelated to the current study) before drawing a ball, and their winning probability increased to 3/4. In all conditions, those who won were paid the extra money. At last, they reported their gender and age.

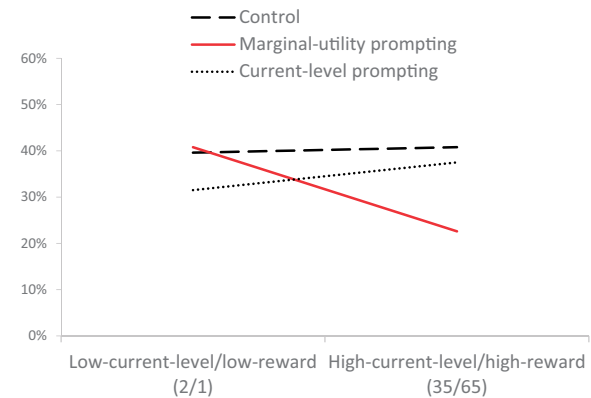
The current-level-prompting condition was identical to the control condition except that before participants indicated whether they wanted to do the survey, they recalled the default number of winning balls in the bag and the number of extra winning balls they would add to the bag by doing the survey. The marginal-utility-prompting condition was identical to the current-level-prompting condition except that after participants recalled the numbers of balls but before they indicated whether they wanted to do the survey, they were asked, “Given the number of winning balls in the bag now, how much do you need to add the extra winning ball(s)?”; they answered on a 6-point scale ranging from “1 (I don’t need to add the extra winning ball(s) to win)” to “6 (I badly need to add the extra winning ball(s) to win).”

The three high-current-level/high-reward conditions were identical to the respective low-current-level/low-reward conditions except that the default number of winning balls in the bag (current level) was 35 instead of 2, and the number of extra winning balls that would be added to the bag (reward) was 65 instead of 1.

To make sure MTurkers would understand the instructions, we described the ball-drawing scenario to a pretest sample ($N = 57$) that was similar to the sample in the main study. We asked participants to estimate the winning probabilities of drawing from a bag with 2 winning balls and 1 non-winning ball, from a bag with 3 winning balls and 1 non-winning ball, from a bag with 35 winning balls and 1 non-winning ball, and from a bag with 100 winning balls and 1 non-winning ball. Participants indicated the winning probabilities by dragging a slider from 0% to 100%. Their mean (median) estimates in the four scenarios were 68.7% (67.0%), 76.1% (75.0%), 92.9% (97.0%), and 95.1% (99.0%), respectively. Though not perfect, these estimates were largely correct, and, importantly, the difference in estimated probability between the 2-winning-balls and the 3-winning-balls scenarios ($M = 7.35$, $SD = 4.56$) was greater than that between the 35-winning-balls and the 100-winning-balls scenarios ($M = 2.16$, $SD = 2.47$), $t(56) = 8.63$, $p < .001$, indicating that MTurkers had the ability to figure out that the marginal benefit of increasing the number of winning balls from 2 to 3 was greater than the marginal benefit of increasing the number of winning balls from 35 to 100.

FIGURE 8

STUDY 7 (WINNING CHANCE) RESULTS



Detailed proportions are as follows:

Prompting manipulation	Low-current-level/low-reward	High-current-level/high-reward
Control (no prompting)	39.6%	40.8%
Marginal-utility prompting	40.8%	22.6%
Current-level prompting	31.5%	37.5%

The x-axis is the manipulated number of winning balls (default/extra); the y-axis is the percentage of participants who chose to do the boring survey to earn the extra winning ball(s). The results show that participants in the marginal-utility-prompting condition were more sensitive to the marginal utility of the extra ball(s) than were participants in the other conditions.

Results and Discussion

Figure 8 presents the results. Because the dependent variable in this study was dichotomous, we analyzed the data using logistic regressions. To test hypothesis 1, we included only the control and the marginal-utility-prompting conditions and conducted a logistic regression with the decision about whether to do the survey as the dependent variable and with current-level/reward, prompting, and their interaction as predictors. The analysis yielded a significant current-level/reward main effect, $\exp\beta = 2.36$, $z = 2.76$, $p = .006$, a significant prompting main effect, $\exp\beta = 2.36$, $z = 2.76$, $p = .006$, and, most importantly, a significant interaction as hypothesis 1 predicted, $\exp\beta = 0.40$, $z = -2.14$, $p = .032$, suggesting that marginal-utility prompting helped participants better incorporate their current level into their decisions. Specifically, in the control condition, participants were largely insensitive to the default number of winning balls; about the same proportion of participants chose to do the survey in the low-current-level/low-reward condition as in the high-current-level/high-reward condition, $p = .862$. In contrast, in the marginal-utility-prompting condition, participants were sensitive to the default number of winning balls; a larger proportion of

participants chose to do the survey in the low-current-level/low-reward condition than in the high-current-level/high-reward condition, $\chi^2(1, N=204) = 7.81, p = .005$. Note that these responses were in the same direction as the marginal utility of the extra ball(s) and in the opposite direction of the reward-to-current-level ratio, hence supporting our hypothesis and ruling out ratio thinking as an alternative explanation.

We also separately analyzed the results of the low-current-level/low-reward and high-current-level/high-reward groups. In the low-current-level/low-reward condition, marginal-utility prompting did not produce a significant effect, $p = .862$, but in the high-current-level/high-reward condition, marginal-utility prompting significantly decreased the participants' willingness to do the survey, $\chi^2(1, N=204) = 7.81, p = .005$.

To test hypothesis 2, we included only the marginal-utility-prompting and current-level-prompting conditions and conducted a logistic regression like the one described above. The analysis found a significant current-level/reward main effect, $\exp\beta = 2.36, z = 2.76, p = .006$, a significant prompting main effect, $\exp\beta = 2.05, z = 2.33, p = .020$, and, most importantly, a significant interaction as predicted by hypothesis 2, $\exp\beta = 0.33, z = -2.59, p = .010$, indicating that marginal-utility prompting was more effective than current-level prompting at sensitizing participants to their default number of winning balls. For additional analysis about simple effects of hypothesis 2 (see web [appendix C](#)).

We also conducted a logistic regression with only the current-level-prompting and control conditions, and we found no current-level/reward main effect, $p = .381$, no prompting main effect, $p = .629$, and, most importantly, no interaction, $p = .608$. As in the other studies, the lack of a significant interaction suggests that current-level prompting alone was not sufficient to sensitize participants to their current level.

To recapitulate, study 7 tested our theory in a ball-drawing game with real consequences; the stimulus in the study was designed such that the marginal utility of the extra ball(s) was objectively greater when the current level (the default number of winning balls) was low than when it was high. The results showed that without any prompting (control), participants were not sensitive to their current level. Simply drawing participants' attention to the default number of winning balls (current-level prompting) was not sufficient to increase participants' sensitivity. Sensitivity increased only with marginal-utility prompting, which explicitly related the default number of winning balls to the participants' need for the extra winning ball(s). These results lend further support to our theory and cast doubt upon ratio thinking as an alternative explanation.

GENERAL DISCUSSION

When deciding how much effort to expend to pursue a monetary reward, rational decision makers should consider their current level of wealth and the reward's marginal utility relative to their current wealth. A series of studies adopting different methods and covering diverse contexts show that people are rather insensitive to their current wealth. We investigate the effect of marginal-utility prompting that nudges people to link their current wealth with their need for the reward, and find that the prompt effectively sensitizes people to their current wealth and that this prompt is more effective than merely drawing people's attention to their current wealth or merely drawing their attention to their need for the reward. We devote the rest of the paper to a discussion of open issues, and implications.

Open Questions

Does Marginal-Utility Prompting Apply to Resources Other Than Money? While this article focuses on monetary resources, we expect our theory to extend to other types of resources. Studies A2 and A3 in web [appendix A](#) tested this extension. Study A2 examined the relationship between how many pairs of jeans one currently has (current level) and their willingness to buy another pair of jeans (target item), and found that marginal-utility prompting sensitized potential buyers to their current quantity of jeans in the same way that it sensitizes money-seekers to their current level of wealth: potential buyers with more pairs of jeans were less likely to buy another pair. Notably, study A2 adopted a more subtle marginal-utility-prompting manipulation than did the other studies by embedding the marginal-utility-prompting questions in an advertisement and asking potential buyers to merely *think about* these questions without requiring them to submit their answers. The fact that this subtle manipulation had a significant sensitization effect suggests the potential of using marginal-utility prompting in actual commercials.

Study A3 examined the relationship between a political candidate's current support rate (current level) and their willingness to run a TV campaign to garner additional support (target reward), and found that marginal-utility prompting, again, sensitized the candidate to their current support rate.

Does Marginal-Utility Prompting Apply to Resources with Increasing Marginal Utility? Marginal utility does not diminish for all resources—in some cases, it increases. In the aforementioned study A3, participants imagined that they were running against another candidate for the office of town mayor in an upcoming election. Whoever got a majority of the votes would win. The election was in two months, and participants had the option to run a TV campaign before the election, expected to increase their support rate by 4% (target reward). In this case, the marginal

utility of the additional 4% actually *increased* in a certain range; for example, it was higher if the current support rate was high (e.g., 48%) than if the current level was low (e.g., 43%). We predicted and found that marginal-utility prompting increased participants' sensitivity to their current level of support and the direction of this sensitization effect was *opposite* to what we found in the other studies: marginal-utility prompting made participants *more* willing to seek the additional 4% when their current support rate was high (48%) than when it was low (43%). The results of study A3 suggest that marginal-utility prompting works not only for resources with diminishing marginal utility but also for resources with increasing marginal utility.

Is Marginal-Utility Prompting Beneficial? We believe so, and argue that relative to no prompting, marginal-utility prompting leads to better decisions for at least three reasons. First, in the control condition of every study except study 6, we found no significant relationship between current level of wealth and willingness to pursue additional wealth, suggesting that people are insensitive to their current wealth. Although we do not know whether the marginal-utility-prompting manipulation made people *too* sensitive to their current wealth, it at least shifted people's decisions in the "right" direction—the direction of marginal utility.

Second, in the control condition of study 6 (the only study that revealed a significant relationship between current wealth and willingness to pursue additional wealth), the relationship was in the wrong direction—the direction of nominal value, not marginal utility. Marginal-utility prompting corrected that direction.

Third, study 7 was designed with an objective marginal utility of the reward (i.e., increase in winning probability), and the responses of the participants in the marginal-utility-prompting condition were more consistent with the direction of this objective marginal utility than were the responses of the participants in the control condition. These three reasons converge to indicate that marginal-utility prompting improves decisions.

Does Marginal-Utility Prompting Carry Any Costs? It is possible. For examples, marginal-utility prompting may lead people to focus too much on the factors the prompt asks about, and overlook other important factors, such as the marginal disutility of effort or time. The prompt might also remind low-income people of their financial deficit and lead them to engage in compensatory consumption, which could worsen their financial situation (Mandel et al. 2017; Sharma and Alter 2012). We expect future research to assess whether the net effect of marginal-utility prompting on consumer welfare is positive or negative.

Is the Marginal-Utility-Prompting Effect a Demand Effect? We do not believe our finding is a demand effect in the sense that participants figured out our hypothesis and

responded accordingly to please us, since there is no good reason for participants to try to impress the anonymous experimenter in survey experiments, especially when their responses are incentive-compatible, as in some of our studies (Mummolo and Peterson 2019). On the other hand, our marginal-utility-prompting effect can be considered a "demand effect" in the sense that the prompt makes people realize that to decide whether to seek an additional gain, they need to consider how much they already have. In this sense, the "demand effect" is not an experimental artifact, but our theorized effect.

Are There Individual Differences? The present research is concerned with the "average" consumer and leaves questions about individual differences unanswered. Some research suggests that richer people are more prone to decision biases (Shah et al. 2015) while other research suggests the opposite (Haushofer and Fehr 2014; Mani et al. 2013). Because the existing results are mixed, we do not know whether individuals with different levels of wealth show different degrees of marginal-utility neglect. Even if richer and less rich people show similar levels of marginal-utility neglect, they might do so for different reasons. For example, less rich people may overlook their current wealth because considering it arouses negative feelings while richer people may overlook their current wealth because they have strong reward responsiveness (Carver and White 1994) or they are less likely to do trade-off thinking (Shah et al. 2015). Future research is needed to investigate these individual differences and thus inform the development of different interventions accordingly.

IMPLICATIONS

This research supports and extends existing research showing that decision-makers overlook important non-salient information. Take Frederick et al.'s (2009) opportunity-cost-neglect work, for example. The present research extends Frederick et al.'s work in three ways. First, the construct of marginal utility is distinct from that of opportunity cost, and is important in and of itself. Second, while Frederick et al. focus on the main effect of prompting people to think about opportunity cost (i.e., making everyone less likely to buy the target product), we propose and find an interaction effect of prompting people to think in terms of marginal utility (i.e., having different effects on different people depending on their current wealth). Finally, while Frederick et al.'s work shows that simply drawing people's attention to the opportunity cost can change their decision, our research suggests that simply drawing people's attention to their current wealth is not sufficient and that it is important to help people link their current wealth to their need for the target reward.

More broadly, this research joins an emerging body of literature revealing that many psychological biases stem

from insufficient sensitivity to situational variables (Hsee, Yang, and Li 2019; Yang, Hsee, and Li forthcoming). For example, people are not always over-confident (Moore and Healy 2008); rather, they are insufficiently sensitive to the difficulty of the task, being over-confident in difficult tasks and under-confident in easy tasks (Juslin, Winman, and Olsson 2000). People do not always fall prey to the sunk cost bias; rather, they are insufficiently sensitive to whether a past cost is predictive of a potential future cost; they exhibit the classic sunk cost fallacy when the past cost is not predictive of future costs and exhibit the reverse of the sunk cost fallacy when the past cost is highly predictive of future costs (Hsee et al. 2019). In the same spirit, the present research suggests that when deciding whether to seek additional resources, people are insufficiently sensitive to how much of the resources they already have.

Our research yields applied implications other than willingness to pursue monetary gains (as we have already discussed throughout this article). One such implication is willingness to incur monetary losses. For example, we suspect that video game players would not be highly sensitive to their current level of wealth when deciding whether to spend money to buy an attractive new game, and predict that a prompt highlighting the marginal disutility of spending the money will sensitize them to their current wealth, making richer (less rich) game players more (less) willing to buy the new game.

Another applied implication concerns fundraising. Fundraisers could use a marginal-utility-prompting strategy to encourage rich people to donate more. Like a purchase decision, a donation decision involves a trade-off between the benefits of helping others and the cost of spending the money. Most fundraisers focus on the benefit of helping others. However, a marginal-utility-prompting strategy could focus on the cost. For example, suppose that a fundraiser in an upscale community is asking each prospective donor to contribute \$50 to help orphans in Africa. The fundraiser could first encourage the potential donors to think about how rich they are and how much they need that \$50 given their current wealth, before soliciting the donation. We predict that this strategy will enable the potential donors to realize that \$50 has little marginal utility to them, and increase their willingness to donate.

We hope that this research alerts both the research community and the general public to the importance of thinking in terms of marginal utility, and we believe that this research has a positive marginal utility in helping people make better decisions.

DATA COLLECTION INFORMATION

The first author collected all the data by using Qualtrics on different online platforms as described in the methods section from winter of 2018 until spring of 2020. The first

author analyzed all the data by discussing with the second author. The data are currently stored in a UChicago Box folder under the management of the first author.

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