

# Unrelated Efforts Trigger Wishful Winning?

## The Impact of Extraneous Efforts on Judgment of Winning Probability for Chinese Consumers

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## **Unrelated Efforts Trigger Wishful Winning?**

### **The Impact of Extraneous Effort on Judgments of Winning Probability among Chinese Consumers**

**Abstract** Through three sets of studies of Chinese consumers, we demonstrate that effort expenditure motivates consumers to obtain rewards, which in turn induces wishful thinking in unrelated domains and events and increases their judgments of winning probability. Moreover, we found that effort significantly affected consumers' judgments of winning probability when it was not rewarded, but that this effect disappeared when effort was rewarded. In this paper, we discuss the theoretical and practical implications of these findings.

**Key words** Effort Effect, Uncertainty Judgment, Wishful Thinking, Financial Risk Preference

## **1 Introduction**

Imagine the following scenario: Ming has spent the morning working hard on a report and, after submitting the report to his manager, he decides to go to a nearby electronics store to purchase some merchandise. As Ming's purchase is being checked out, the cashier informs him that the store is running a lottery promotion with a laptop computer valued at \$900 as the grand prize. How likely is it that Ming will participate in the lottery, and how will he estimate his chances of winning the computer? Will his hard work prior to visiting the store affect his likelihood of participating in the lottery? Put another way, will the effort expended by people in one context affect how they assess their chances of winning in another, unrelated context? Answering questions like these is the aim of the research reported here.

The emerging work on motivation and judgment suggests that people have greater levels of optimism in relation to domains where they have expended effort (Reczek, Haws, & Summers, 2014). In this line of work,

effort is defined as a resource investment, be it cognitive, physical, time, or money resource investment (Huang, Dong & Mukhopadhyay, 2014). People usually invest effort to fulfill some goal that comes along with specific rewards. Prior work demonstrates that after expending effort, people are motivated to get more rewards (Kivetz, 2005). As well, effort invested in a previous activity will influence people's motivation in subsequent activities (Zhang et al., 2011).

Wishful Thinking Theory (Bruner, 1957; Kunda, 1990; Eichelberger, 2007; Krizan & Windschitl, 2007, 2009; Vosgerau, 2010; Dai & Hsee, 2013) argues that desiring an outcome will bias people's perceptions and judgment about the likelihood of achieving that outcome. Simply stated, if people are highly motivated to get something (i.e. they strongly desire it), they will be more optimistic about their chances of getting it. Wishful Thinking Theory helps to explain why effort often leads people to be more optimistic about winning probabilities. However, in prior research, the effort expenditure and judgments of winning probability have been examined in the same domain (Reczek et al., 2014). In our opening scenario about Ming, the existing work on effort and judgment cannot help us determine how Ming views his chances of winning the lottery, nor can it help us make a prediction about whether or not he will enter at all. This is because there is no prior information about whether he expended any effort with respect to this lottery (i.e., there is no effort expenditure in the same domain of judgment and behavior). We address this gap in the literature by investigating how effort expenditure in one domain influences effort expenditure in an unrelated domain, and how this relationship affects judgments about the probability of winning.

Effort and hard work are important values in Chinese culture. Most people in China and other East Asian countries believe in the Confucian work ethic, which promotes the virtues of working hard, saving money, and achieving success (Chinese Culture Connection, 1987; Liu, 1994; Lim, 2003; Oppen & Nee, 2015; Shapiro et al., 2017; Fang et al., 2018). A famous Chinese proverb advises that "Only by eating the bitterest of the bitter can

you become the head of the pack.” The fundamental message expressed in this proverb is that hard work (enduring and persevering through the uttermost hardship) is required in order to attain future rewards (becoming more successful than anyone else). This causal relationship between effort and reward seems to be a key defining characteristic of Chinese values. Indeed, the attainment of wealth or success through hard work has become almost a religion in modern Chinese culture (Zhao, 2005), and social critics have noted how this has created a heavily pragmatic and results-driven cultural milieu (Wan and Gu, 2009; Wang, 2018). Pragmatism, which may promote utilitarianism and materialism, emphasizes the outcome or rewards of one’s efforts; therefore, if one’s efforts do not result in a positive outcome or a reward, one may be more inclined to devalue the worth of their efforts (Kolstad & Gjesvik, 2014; Peng & Li, 2019).

Given this relationship, we argue that, within the Chinese context, the expenditure of effort is motivated by the expectation of success or rewards. If this is indeed the case, Wishful Thinking Theory would suggest that Ming’s hard work at his job might lead him to believe that he is more likely to win the lottery, thus increasing his chances of buying a lottery ticket.

This is an interesting notion, but virtually no empirical research has been conducted to test the causal linkage between extraneous effort (effort in one domain) and judgments of winning probability (rewards in a different domain). Our research will be one of the first to investigate this linkage. Our work contributes to the existing literature on effort and judgment (e.g., Reczek et al., 2014) by providing an alternative perspective of effort. Specifically, we examine how effort expended in one domain influences judgments of winning probability in another (unrelated) domain. To this end, we empirically test and observe the novel effect of extraneous efforts on wishful thinking, and the novel mediating effect of wishful thinking on the relationship between the extraneous effort and judgments of winning probability. While prior work has demonstrated that efforts related to a goal can be a trigger of motivation for fulfilling it (Kivetz 2003, 2005; Zhang et al., 2011), we provide a

unique effect and theorization that efforts that are not related to the focal goal (expended in an irrelevant goal domain), can affect judgements of winning probability related to a focal goal. Our work uncovers the new property of the efforts of goal pursuits; that is, even if efforts are irrelevant to the focal goal, they will still enhance the wishful thinking (desire and motivation) of the focal goal, therefore influence the relevant judgment related to the focal goal. This enriches the existing knowledge of effort effect in judgments (Kivetz 2003, 2005; Zhang et al., 2011; Reczek et al., 2014). This new effect of effort is robust, and it was clearly observed across a multitude of contexts and judgment tasks throughout this research.

In this paper, we first develop the conceptual linkage between extraneous effort and wishful thinking, which subsequently affects judgments of winning probabilities. We propose that the increased motivation to getting rewards caused by the expenditure of effort will influence subsequent judgments of winning probability through enhanced wishful thinking, even in different domains. Moreover, we propose that effort's effect on judgements of winning probability will disappear if it is rewarded. Through three experimental studies, we tested our hypotheses in different settings in order to develop a theoretical rationale for how effort influences consumers' perceptions of winning likelihood and financial risk preference.

## **2 Literature Review and Hypotheses**

### **Incidental Factors Influencing Uncertainty Judgment**

In this paper, we test how incidental factors such as extraneous effort affect uncertainty judgment. Most prior research on uncertainty judgment assumes that people are rational, and that they estimate probability by performing meticulous calculations using existing information (Suppes, 1975; Zadeh, 1978; Wallsten & Budescu, 1983). Tversky and Kahneman (1974) are pioneers in the field, arguing that probability judgments are subjective. Subsequent researchers have built upon this conceptualization, finding that subjective probability judgments can be influenced by a number of incidental factors, such as emotion (Wright & Bower, 1992), semantic priming of

lucky numbers (Jiang, Cho, & Adaval, 2009), consumption of lucky product (Hamerman & Johar, 2013), money spent (Reczek et al., 2014), and spatial distance (Yan, 2014). The following table summarizes the existing work on this topic.

Table 1

Some of these incidental factors are in the same domain with the dependent variables (e.g., money spent, spatial distance), which means that their effect on the outcome resides in a single context. For example, money spent only affects winning probability judgment in a lottery when the lottery is held by the store in which the money was spent (Reczek et al., 2014). However, some effects of incidental factors on outcomes are cross-domain (e.g., emotion, lucky number, lucky product), which means the effect can spill over into other contexts. For example, happy emotion induced by one event can influence people's judgements of winning probability in another event (Wright & Bower, 1992). Similarly, exposing people to lucky numbers in one context can make them feel lucky in a subsequent, but unrelated context (Jiang et al., 2009).

Inspired by research on effort as values and principles, we conceptualize that effort and rewards are linked in the deep culture knowledge (Chinese Culture Connection, 1987; Liu, 1994; Lim, 2003; Oppen & Nee, 2015; Shapiro et al., 2017; Fang et al., 2018). In contemporary Chinese culture, hard work and effort are expended for the sole purpose of achieving success and material rewards (Wan & Gu, 2009; Kolstad & Gjesvik, 2014; Wang, 2018; Peng & Li, 2019). In the Chinese cultural context, we seize a unique opportunity to examine whether unrelated efforts and their expenditure instantly trigger the reward motivation, and then influence uncertainty judgment. In our research, we uncovered a novel incidental factor that predicts uncertainty judgment: effort expended in a domain that is unrelated to the judgement domain.

#### **Effect of Unrelated Efforts on Uncertainty Judgment via Wishful Thinking**

The expenditure of effort has been defined as resource investment (Huang et al., 2014), and prior research has demonstrated that it can influence motivation. For example, Zhang et al. (2011) found that, when consumers perceive themselves as voluntarily pursuing a goal, their initial effort will both increase the perceived value of the goal, as well as their motivation to achieve it. Kivetz (2003) found that effort can sensitize consumers to the presence or absence of rewards and create an expectation of rewards. When the effort requirement is small, it enhanced people's preference for small (but certain) rewards over large (but uncertain) rewards. However, when the effort requirement is high, it created high expectations for rewards and enhanced people's preference for large (but uncertain) rewards over small (but certain) rewards. But the existing work on efforts and motivation is mute on whether effort can influence uncertainty judgment in addition to its effect on motivation. Our work addresses this research gap.

Research on motivated reasoning suggests that when people are motivated to work toward a salient goal or desired outcome, they will process information in a way that increases the likelihood that the goal will be achieved (Krizan & Windschitl, 2007). In the judgment context, this motivated reasoning is called Wishful Thinking, meaning that desire for an outcome inflates the optimism about the occurrence of that outcome (Eichelberger, 2007). Wishful thinking essentially is that the desirability of, or motivation for, a good outcome (i.e., getting rewards) is so strong that the judgment about the feasibility of getting that outcome becomes biased (Krizan & Windschitl, 2009). However, no prior work has demonstrated that extraneous effort is capable of triggering wishful thinking and, by extension, affecting a person's judgments of winning probability. The present work seeks to address this gap.

Effort motivates people to pursue a goal (Zhang et al., 2011) and sensitizes them to rewards (Kivetz, 2003; 2005). We argue that extraneous effort can activate the expectation of rewards, and we further argue that this connection will be particularly prominent among Chinese participants, as their pragmatic cultural values strongly

link effort to rewards and successes (Wan & Gu, 2009; Kolstad & Gjessvik, 2014; Wang, 2018; Peng & Li, 2019).

As the motivated reasoning research suggests, the expectation of rewards can function as a motivator (Kunda, 1990; Krizan & Windschitl, 2007, 2009; Eichelberger, 2007); therefore, the expectation of rewards should also be effective for inducing wishful thinking. We further argue that wishful thinking will induce optimism and lead people to overestimate the probability of a winning outcome. We hypothesize that:

**Hypothesis 1:** Effort will increase judgments of winning probability. That is, high effort (unlike low effort) in a prior, unrelated task will lead individuals to judge that a positive outcome is more likely to occur in a current task.

**Hypothesis 2:** Wishful thinking mediates the effect of effort on judgments of winning probability.

#### **Boundary Condition of the Effort Effect on Judgments of Winning Probability**

We conceptualize effort as a mechanism that triggers one's motivation to attain a given reward. As noted in the motivation literature, one of motivation's key properties is that the effect of a goal will persist if the goal is not fulfilled, while it will decrease if the goal is fulfilled (Bargh et al., 2001; Sela & Shiv, 2009). Therefore, we argue that motivation for a reward will be activated when effort is expended, which will in turn trigger wishful thinking. This causes the subject to overestimate their winning probability and thus increases their preference for risky financial decisions (Rigotti & Shannon, 2005). However, if we satiate the reward motivation by providing an immediate reward, we would expect that extraneous effort will not affect wishful thinking and preference for financial risk. Thus, we hypothesize that effort will affect financial risk preference as follows:



**Hypothesis 3:** When effort is *not* rewarded, high effort will increase financial risk preferences because of enhanced wishful thinking; conversely, when effort *is* rewarded, high effort will not influence subsequent financial risk because of the absence of wishful thinking.

We tested the above hypotheses through three sets of studies. Experiments 1A to 1D in Study 1 tested the main effect of effort on probability judgments in four different contexts (which demonstrated the robustness of the findings). Study 2 examined the mediating role of wishful thinking in a real lottery context. Finally, Study 3 tested the moderated mediation effect of the reward condition and wishful thinking in a stock market context.

### **3 Study 1: Effect of effort on judgment of winning probability**

#### **3.1 Experiment 1A: Imagined effort and lottery**

##### *3.1.1 Method*

A total of 77 students (41 males,  $M_{\text{age}} = 21.25$ ) at the Tsinghua University participated in this study. The participants were randomly assigned to one of two effort-cue conditions: high effort or low effort. Participants in both groups read a passage that asked them to imagine they were going to a store to buy a new pair of glasses, and that the store is holding a lottery promotion that gives each customer a chance to receive a discount: 0% off (customer pays full price), 10% off, 20% off, 30% off, 40% off, and 50% off. The different discount amounts were put on a lottery wheel (see Appendix A). Participants were then asked to imagine that they had spun the wheel and got a result. Since higher discounts meant more money saved, the discount values served as cash prizes of varying amounts.

The effort-cue manipulation was adapted from Kim and Labroo (2011). Participants in the high-effort condition were told that the eyeglasses store required a two-hour trip to get to, while those in the low-effort condition were told that the store only required a fifteen-minute trip.

To measure their judgments of winning probability, we asked the participants to indicate which discount they felt they were most likely to get. The higher the discount selected by the participants, the greater their perceived likelihood of “winning.” All participants provided certain demographic information at this point.

### *3.1.2 Results and Discussion*

*Manipulation check.* We first checked whether the manipulation effectively triggered different effort perceptions.

Participants in both groups self-reported how much effort they had expended to get to the store (1 = very little effort, 7 = a lot of effort). The analysis showed that the participants in the high-effort condition felt they had expended significantly more effort than those in the low-effort condition ( $M_{\text{high-effort}} = 5.31$ ,  $SD = 1.151$  vs.

$M_{\text{low-effort}} = 3.34$ ,  $SD = 1.169$ ,  $t(75) = 7.436$ ,  $p < .001$ ).

*Judgments of winning probability.* We predicted that participants in the high-effort condition would express higher judgments of winning probability than those in the low-effort condition. Analyses showed that, compared to participants in the low-effort condition ( $M_{\text{low-effort}} = 1.42$ ,  $SD = 0.948$ ), participants in the high-effort condition expected to get a bigger discount ( $M_{\text{high-effort}} = 2.03$ ,  $SD = 1.495$ ,  $t(75) = 2.112$ ,  $p < .05$ ), thus supporting

Hypothesis 1.

In this experiment, simply imagining high (vs. low) effort led to different outcomes, clearly demonstrating effort’s significant effect on judgements of winning probability. However, we used imagined travel time to manipulate effort in this study. This may be a weaker operational definition of the “extraneous” effort because the effort of getting to the eyeglass store may make participants link the effort to the potential or expected lottery outcome (the context of the judgment). Therefore, in the next experiment, we break the potential link between the effort cue and the lottery context.

## **3.2 Experiment 1B: Real effort and imagined lottery**

### *3.2.1 Method*

One hundred and eighteen students (60 males,  $M_{\text{age}} = 22.8$ ) from Peking University participated in this experiment. The participants were randomly assigned to one of two effort-cue conditions: high effort or low effort. Following Kivetz and Zheng (2006), we manipulated effort by asking participants to solve six anagrams. Before beginning, the participants were given an example of one anagram (e.g., IRENFD; the correct solution was either FRIEND or FINDER, and an invalid solution was FIEND). Students in the low-effort condition were asked to find one correct word per anagram (which was easy for most students), while those in the high-effort condition were asked to find two correct words per anagram (which is rather difficult for most students; see Appendix B).

After the anagram task, participants were told to “move on to the next unrelated study.” In this subsequent study, the participants were asked to read a paragraph that explained that they were at an electronics store to buy a headset, and that this store was offering a promotion whereby customers could receive a discount of varying amounts (as in Experiment 1A). The participants were then asked to estimate which discount they would be most likely to get (0% off (pay full price), 10% off, 20% off, 30% off, 40% off, or 50% off), and to indicate the likelihood of getting the largest discount (i.e., 50% off) (1 = very unlikely, 7 = very likely).

According to Wright and Bower (1992), emotion may impact judgments of winning probability. When people are happy, they are "optimistic" and they view positive outcomes as more likely to occur than negative ones. Conversely, sad people are "pessimistic" and tend to view negative outcomes as being more likely than positive ones. Our manipulation may have impacted participants' moods; those in the high-effort condition may have felt sad, angry, or frustrated if they could not find two correct answers quickly, and those in the low-effort condition may have felt happy if they could find a correct answer quickly. As such, we asked participants to complete the Positive and Negative Affect Schedule (PANAS; Watson & Clark, 1988) after the manipulation

check in order to tease out the effect of mood on judgments of winning probability. All participants also provided certain demographic information.

### 3.2.2 Results and Discussion

*Manipulation check.* Analysis showed that participants in the high-effort condition perceived higher effort expenditure than participants in the low-effort condition ( $M_{\text{high-effort}} = 4.98$ ,  $SD = 0.956$  vs.  $M_{\text{low-effort}} = 3.53$ ,  $SD = 1.410$ ,  $t(116) = 6.241$ ,  $p < .001$ ).

*Judgment of winning probability.* As predicted, participants in the high-effort condition thought they would get a bigger discount ( $M_{\text{high-effort}} = 2.06$ ,  $SD = 1.390$  vs.  $M_{\text{low-effort}} = 1.54$ ,  $SD = 1.151$ ,  $t(116) = 2.213$ ,  $p < .05$ ), and that they had a greater chance to get the highest discount ( $M_{\text{high-effort}} = 3.29$ ,  $SD = 1.557$  vs.  $M_{\text{low-effort}} = 2.77$ ,  $SD = 1.276$ ,  $t(116) = 1.988$ ,  $p < .05$ ). These results support Hypothesis 1.

While the participants in both groups showed no significant difference in *positive* affect ( $M_{\text{high-effort}} = 3.81$ ,  $SD = 1.169$  vs.  $M_{\text{low-effort}} = 3.53$ ,  $SD = 1.232$ ,  $t(116) = 1.231$ ,  $p > .05$ ), *negative* affect was higher for those in the high-effort condition than it was for those in the low-effort condition ( $M_{\text{high-effort}} = 2.70$ ,  $SD = 1.094$  vs.  $M_{\text{low-effort}} = 1.86$ ,  $SD = 1.002$ ,  $t(116) = 4.318$ ,  $p < .001$ ). In order to exclude the confounding effect of the negative affect, we conducted a covariance analysis with negative affect as a covariate. This analysis showed that the main effect of effort on judgments of winning probability remained significant ( $F(1, 115) = 4.588$ ,  $p < .05$ ), while the negative affect did not significantly impact judgments of winning probability ( $F(1, 115) = 0.649$ ,  $p > .10$ ).

This experiment supported our hypothesis that extraneous effort influences judgments of winning probability. However, judgments of winning probability were measured using an *imagined scenario*, which may not reflect how the participants would respond in reality. In the next experiment, we use a real lottery to test the effect of effort on judgments of winning probability.

### 3.3 Experiment 1C: Real effort and real lottery

#### 3.3.1 Method

A total of 58 students (26 males,  $M_{\text{age}} = 21.36$ ) at Tsinghua University participated in this study. They were randomly assigned to one of two conditions: high effort or low effort. As with the previous experiment, the effort manipulation was adapted from Kivetz and Zheng (2006). Participants were asked to construct grammatically correct sentences by unscrambling a set of five words that contained exactly four words that made up a grammatically correct sentence. Participants were given an example of one set of words (“feeds he the cat they”) and its correct solution (“he feeds the cat”). Participants in the high-effort condition were required to construct 9 sentences, while participants in the low-effort condition were required to construct just 2 sentences (see Appendix C).

After the sentence construction task, all participants were directed to a real lottery draw where they were asked to select one of ten boxes (only one box contained a 5 yuan reward). Participants were then required to make a judgment about their likelihood of winning the reward (1 = very unlikely, 7 = very likely) (see Appendix C).

As a manipulation check, the participants were asked to report how much effort they expended in the sentence construction task. They also provided some demographic information. Finally, we paid 5 yuan to all participants who won in the lottery, and thanked all of them for their participation.

#### 3.3.2 Results and Discussion

*Manipulation check.* Participants in the high (vs. low) effort condition perceived the task as being more (vs. less) effort intensive ( $M_{\text{high effort}} = 4.18$ ,  $SD = 1.389$  vs.  $M_{\text{low effort}} = 3.13$ ,  $SD = 1.167$ ,  $t(56) = -3.113$ ,  $p < .001$ ).

*Judgments of winning probability.* As predicted, participants in the high-effort condition felt they had a greater chance of winning than those in the low-effort condition ( $M_{\text{low effort}} = 2.77$ ,  $SD = 1.223$  vs.  $M_{\text{high effort}} = 3.54$ ,  $SD = 1.105$ ,  $t(56) = -2.507$ ,  $p < .05$ ).

This experiment replicated the findings of the previous experiments, namely, that extraneous effort positively impacts judgments of winning probability. However, it may be the case that the significant differences in effort level may have led to resource depletion (i.e., the high-effort group's fatigue) and resulted in less rational judgments (Pocheptsova et al., 2009). To rule out the possibility that the high-effort-condition participants' higher judgments of winning probability were driven by resource depletion, we manipulated the relative difference of effort in Experiment 1D instead of the objective amount of efforts.

### **3.4 Experiment 1D: Real effort with relative difference and real lottery**

#### *3.4.1 Method*

We recruited 64 students (31 males,  $M_{\text{age}} = 21.53$ ) at Peking University to participate in this study. The students were randomly assigned to one of two conditions: high effort or low effort. Once again, the effort manipulation was adapted from Kivetz and Zheng (2006). In the relatively-high-effort condition, participants were told that they would be required to construct anywhere from 2 to 10 sentences, while those in the relatively-low-effort condition were told that they would be required to construct anywhere from 8 to 16 sentences. In reality, however, the participants in both conditions were required to construct 9 sentences, which fell near the upper end of the range in the relatively-high-effort condition and near the lower end of the range in the relatively-low-effort condition. Thus, the participants in both conditions invested the same amount of effort, but they were led to believe they had invested a different amount of effort compared to the "other participants" (see Appendix D).

After the sentence construction task, the participants were directed to a lottery draw, which was the same as the one used in Experiment 1C. They were asked to make a judgement regarding their chances of winning (1 = very unlikely, 7 = very likely) and to select one out of ten boxes. As with Experiment 1C, only one box contained a 5 yuan reward.

As a manipulation check, the participants were asked to report how much effort they had expended in the sentence construction task and to provide some demographic information. Finally, we paid the lottery winners 5 yuan, and thanked all of the participants for their participation.

### *3.4.2 Results and Discussion*

*Manipulation check.* The analysis showed that participants in the high (vs. low) effort conditions perceived the task to be more (vs. less) effort intensive ( $M_{\text{high effort}}=4.44$ ,  $SD=1.190$  vs.  $M_{\text{low effort}}=3.88$ ,  $SD=1.129$ ,  $t(62)=-1.940$ ,  $p=0.057$ ). We adopted our effort manipulation from Kivetz and Zheng (2006), but we observed a marginal significant manipulation effect.

*Judgments of winning probability.* As predicted, participants in the high-effort condition made higher judgments of winning probability than participants in the low-effort condition ( $M_{\text{high effort}}=3.19$ ,  $SD=1.176$  vs.  $M_{\text{low effort}}=2.56$ ,  $SD=1.216$ ,  $t(62)=-2.090$ ,  $p<.05$ ).

In sum, the above results are consistent with our hypothesis that extraneous effort will influence judgments of winning probability. This effect remained consistent in both the imagined lottery context (Experiment 1A and 1B) and the real lottery context (Experiment 1C and 1D), and regardless of whether effort was expended in real endeavors or in perceptions.

## **4 Study 2: Mediating role of wishful thinking**

#### 4.1 Method

A total of 101 students (68 males,  $M_{\text{age}} = 21.92$ ) were recruited at the Beijing Jiaotong University and randomly assigned to one of two conditions: high effort or low effort. The effort manipulation used in this study was the sentence construction task that was used in Experiment 1C. Those in the high-effort condition were required to construct 9 sentences, while those in the low-effort condition were required to construct just 2 sentences.

Following the sentence construction exercise, participants were directed to the lottery component wherein they were asked to select one of ten boxes (only one box contained a 5 yuan reward). The participants were then asked to make a judgment about their likelihood of winning the lottery (1 = very unlikely, 7 = very likely). After they had made their judgment, the participants were asked to answer two questions (adapted from Eichelberger, 2007) regarding their situational wishful thinking: 1) “At this very moment, to what extent do you think things will get better?”; and 2) “At this very moment, to what extent do you think good things will happen to you?” (1 = very small, 7 = very big).

After the manipulation check and demographic information report, participants who had won the lottery were paid 5 yuan.

#### 4.2 Results and Discussion

*Manipulation check.* Participants in the high-effort condition reported greater effort expenditure than those in the low-effort condition ( $M_{\text{high-effort}} = 4.54$ ,  $SD = 1.460$  vs.  $M_{\text{low-effort}} = 3.10$ ,  $SD = 1.285$ ,  $t(99) = 5.273$ ,  $p < .001$ ).

*Judgments of winning probability.* As predicted, participants in the high-effort condition thought they were more likely to win the reward than those in the low-effort condition ( $M_{\text{high-effort}} = 3.44$ ,  $SD = 1.431$  vs.  $M_{\text{low-effort}} = 2.88$ ,  $SD = 1.107$ ,  $t(99) = 2.193$ ,  $p < .05$ ).



*Situational wishful thinking.* The average score of the two situational wishful thinking items ( $\alpha=0.676$ ) was used as the index. Participants in the high-effort condition indicated higher situational wishful thinking ( $M_{\text{high-effort}} = 4.49, SD = 1.131$  vs.  $M_{\text{low-effort}} = 4.00, SD = 0.949, t(99) = 2.360, p < .05$ ).

*Mediation Analysis.* Bootstrapping analysis (Preacher & Hayes, 2008) revealed that wishful thinking had a significant (CI [0.0242, 0.5164]) and positive (coefficient = 0.1943) indirect effect on judgments of winning probability. This suggests that higher levels of wishful thinking increased judgments of winning probability and mediated the effect of effort on judgments of winning probability (See Figure 1). This supports Hypothesis 2.

Figure 1

### 5 Study 3: Moderating role of reward condition

#### 5.1 Method

One hundred thirty-eight students (87 males,  $M_{\text{age}} = 23.62$ ) at the Renmin University of China were randomly assigned to one of four conditions as part of a 2 (high effort vs. low effort)  $\times$  2 (rewarded vs. unrewarded) between-subjects design. The effort manipulation used in this study was similar to the one used in Experiment 1C. The participants were told that they would be assigned to a task that either required them to construct 16 sentences (high-effort condition) or one that required them to construct 6 sentences (low-effort condition).

Participants in the *rewarded* condition were told that they would receive an additional 2 yuan upon completing the survey as a reward for their effort in the sentence construction task. In the *unrewarded* condition, participants were asked to move on to the next task, which was a financial decision-making task. All participants were then presented with a financial decision-making scenario (Duclos, Wan, & Jiang, 2013) wherein they were told they had \$100,000 to invest for 12 months in one of two possible stock portfolios. Option A offered a 50% chance of returning \$50K and a 50% chance of losing \$25K, while Option B offered a 90% chance of returning \$18K and a 10% chance of losing \$37K. These two investment plans offered the same expected utility (\$12.5K),

but with different risks (A is riskier than B). In an independent pretest, we asked participants to compare the risk for Option A and Option B separately on a 7-point Likert Scale, with “1” meaning “Option B has higher risk” and “7” meaning “Option A has higher risk.” The mean level of the responses was 5.75, indicating that participants perceived Option A as the higher risk portfolio. In the main study, the participants were asked to indicate their relative preference between the two plans on a 7-point Likert scale, with “1” anchored with “strongly prefer Option B” and “7” anchored with “strongly prefer Option A.” The higher the number, the more preference for Option A, which is riskier than Option B.

In order to measure situational wishful thinking, participants were asked “To what extent do you think returns rather than losses will happen in this investment?” (1 = very unlikely, 7 = very likely). This question was adapted from Eichelberger (2007) to specifically fit this scenario. Finally, all participants completed the manipulation check and provided demographic information.

## 5.2 Results and Discussion

*Manipulation check.* Analysis showed that the effort perception was higher in the high-effort condition than in the low-effort condition ( $M_{\text{high-effort}} = 5.68$ ,  $SD = 1.312$  vs.  $M_{\text{low-effort}} = 4.10$ ,  $SD = 2.161$ ,  $t(121) = 2.515$ ,  $p < .01$ ).

*Financial risk preference.* A 2 (effort)  $\times$  2 (reward) ANOVA on financial risk preference revealed a significant interaction between effort and reward condition ( $F(1,134) = 4.347$ ,  $p < .05$ ). Effort increased financial risk preference in the unrewarded condition ( $M_{\text{high-effort}} = 4.94$ ,  $SD = 1.603$  vs.  $M_{\text{low-effort}} = 4.21$ ,  $SD = 1.013$ ;  $F(1,63) = 4.639$ ,  $p < .05$ ), but it did not have a significant effect on it in the rewarded condition ( $M_{\text{high-effort}} = 4.72$ ,  $SD = 1.032$  vs.  $M_{\text{low-effort}} = 4.84$ ,  $SD = 0.963$ ;  $F(1,71) = 0.243$ ,  $p > 0.05$ ) (See Figure 2).

Figure 2

*Moderated mediation analysis.* Following Preacher et al. (2007) and Hayes (2013), we used Model 8 in Bootstrap to test the moderated mediation of the reward condition. We submitted the data to the model with

effort as the independent variable, financial risk preference as the dependent variable, situational wishful thinking as the mediator, and the reward condition as the moderator. Our analysis revealed that the moderated mediation effect was significant (CI [-0.5953, -0.0085]). When participants were not rewarded, the conditional indirect effect of situational wishful thinking was significant (CI [0.0764, 0.6536]); however, when participants were rewarded, the conditional indirect effect of situational wishful thinking was not significant (CI [-0.0537, 0.2771]) (See Figure 3). These findings support Hypothesis 3.

Figure 3

## 6 General Discussion

In this research, we examined how the expenditure of effort affects individuals' subjective uncertainty judgments in an different, unrelated context. We found that consumers were more likely to view their chances of winning as being higher in a given domain (e.g. lotteries, financial risk options) when they *actually* expended more effort (Experiment 1B and 1C in Study 1, as well as Study 2 and Study 3), or *perceived* themselves as having expended more effort (Experiment 1A and 1D in Study 1), in an unrelated domain. We validated the effect of unrelated effort expenditure on the judgments of winning probability using both real and imaginary situations (Study 1), investigating the plausibility of wishful thinking as the mechanism of the effort effect (Study 2), and identifying reward as the boundary condition for the effort effect (Study 3).

Although several studies have explored how effort influences consumer behavior and judgment (Kivetz & Simonson, 2002; Kivetz & Zheng, 2006; Kim & Labroo, 2011; Zhang et al., 2011), little research has been conducted on the effect of extraneous effort on uncertainty judgments. Indeed, while Reczek et al.'s (2014) findings show that effort impacts uncertainty judgment within one domain, our research is the first to demonstrate that effort exerts a cross-domain effect on uncertainty judgment. Significantly, our findings show that this effect holds across a range of contexts, including lotteries and financial risk options.

Our findings also reveal that wishful thinking mediates the cross-domain effect of effort on uncertainty judgment (Krizan & Windschitl, 2007, 2009; Eichelberger, 2007). Wishful thinking is a subtype of motivated reasoning, belonging to motivation theory (Kunda, 1990). Study 2 examined the mediating role of wishful thinking in our main effect. Specifically, the expenditure of effort increases consumer motivation due to the prospect of getting a reward, which in turn enhances wishful thinking, thus causing an increase in consumers' judgments of winning probability in lotteries and financial risk choices. This research contributes to the literature in motivated reasoning, and it makes a particularly useful contribution to wishful thinking theory by uncovering how wishful thinking functions within the context of extraneous effort and judgments of winning probability.

Finally, we showed the boundary condition of effort's effect on uncertainty judgment, namely, that this effect depends on an increase in motivation that occurs in response to the prospect of attaining a reward after effort expenditure. According to Sela and Shiv (2009), goal-oriented motivation will temporally increase if the goal/reward remains unattained, and it will wane once the goal/reward is attained. Thus, we designed Study 3 such that the reward condition (in which effort was rewarded vs. unrewarded) functioned as a moderator of effort's effect on financial risk preference. In the reward condition, effort increased financial risk preference via situational wishful thinking; in contrast, this effect was not observed in the unrewarded condition. We further demonstrated that extraneous effort triggers wishful thinking and that its effect is similar to that of a reward or goal. This finding enriches the literature related to motivation and goal priming (Bargh et al., 2001; Sela & Shiv, 2009).

Future research may be conducted to further explore how effort affects consumer behavior or judgment. The influence of effort is particularly relevant for Chinese consumers due to the prevalence of the Confucian work ethic, the rising tide of pragmatism, and the outcome-driven nature of contemporary Chinese culture. In addition to motivation, effort may function along other paths that affect consumers, which is another area that

might be fruitfully explored in future research (Kivetz & Simonson, 2002; Kivetz & Zheng, 2006; Kim & Labroo, 2011; Zhang et al., 2011).

### **Practical Implications**

Our findings provide some suggestions for managers. First, managers in industries that deal with financial products can try to use effort as a cue to intensify consumers' preferences for risky products. This approach is based on the idea that effort induces situational wishful thinking, which enhances consumers' judgments of winning probability. Second, marketers can use effort as a cue in advertising to increase consumers' willingness to participate in their lottery promotion activities. In the field of experience marketing, this is a commonly used method to enhance consumer involvement. However, managers must be careful to ensure that the consumer does not perceive their effort as being rewarded, as this will render the effort manipulation ineffective.

For individuals, this research demonstrates that the expenditure or investment of effort or investment will likely lead to a perceived winning probability that is much higher than would be justified based on a purely rational analysis. To some extent, it is beneficial for individuals to expend effort, since our research suggests that such effort will lead to wishful thinking, which in turn will make people more confident when facing uncertainties or predicting outcomes related to things like exams, races, or tournaments. However, a healthy dose of reality is also important when making important decisions, such as financial investments, as not all efforts will produce the desired result.

### **Limitations and Future Research**

One limitation in our findings (and indeed in much of behavioral research) is that the experimental effect may be short-lived. One way of mitigating this issue is to conduct an experiment at two different points in time with the same subject pool (Ward & Dahl, 2014). However, this strategy is difficult to execute because any event that happens between the two time points could be rewarding to participants, which may influence the results of the

second experiment. These events are beyond experimenter control. In this research, we argue that the timing of rewarding the participant's efforts prior to exposing them to a subsequent task is of the utmost importance.

Additional research is also needed to further test the effort effect. For example, we can change the reward from a tangible prize to a more spiritual one (such as praise or compliments). If the rewards in Study 3 were positive feedback (i.e., praise) instead of money, the results might change. Furthermore, more lab experiments should be designed to test the robustness of the effort effect. In this research, we have focused mainly on the first half of the uncertainty judgment issue, leaving the second half to be explored. The second half means observing how consumers behave after the outcome of the uncertain event is known. Much remains to be discovered about this "second half of uncertainty judgment."

Since the background of this research is based on the Confucian work ethic in China, we can argue that the effects of effort will be moderated by cultural values. That is, in a Western cultural context, effort effects may be weaker, as the observed effects in this research were rooted in the unique Confucian work ethic and outcome-driven values that characterize Chinese culture. This could prove to be a highly fascinating avenue of future research.

Another potential avenue of future research to explore the role of unique Eastern culture values would be in explaining the effects of efforts. For example, it is possible that superstition, which is common in Eastern cultures, may be another moderator of the effort effect. Indeed, superstitious beliefs such as Feng Shui, which focuses on increasing luck through optimally arranging one's environment, are still deeply embedded in Chinese culture (Shaffert, 2002). We argue that those who hold superstitious beliefs related to luck will be more likely and ready to attribute outcomes to unrelated factors, such as expending effort. We would expect that, compared to people who do not hold superstitious beliefs about luck, those who do will demonstrate effort effects in a more pronounced manner. Future research can also explore this novel yet relevant culture variable.

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Table 1 Incidental Factors Influencing Uncertainty Judgment

<i>Incidental Factors</i>	<i>Source</i>	<i>Dependent Variables</i>	<i>Effect and Mechanism</i>
Emotion	Wright and Bower (1992)	Subjective probability judgment of positive and negative events	Happy emotion induced by a recall task makes people more optimistic about the probabilities of positive events, while sad emotion makes people more pessimistic; the underlying mechanism may be information processing that is congruent with mood.
Lucky Number	Jiang et al. (2009)	Winning likelihood in a lottery; the amount of money willing to invest in financial options	Semantic priming of lucky number increases consumer's judgment of winning probability in a lottery, because the priming momentarily changes their self-concept about how lucky they are.
Lucky Product	Hamerman and Johar (2013)	Winning likelihood of the team they support in the match	Using lucky products will make consumer generate illusion of control over future outcomes, thus increasing the judgment of winning probability to achieve the desired result.
Money Spent	Reczek et al., 2014	Likelihood of winning a gift in lottery	The amount of money consumers spent in a store increases their probability judgment that they will win a gift in the lottery held by the store, because they think they deserve to win in the lottery.
Spatial Distance	Yan (2014)	Perceived winning likelihood in lottery	Sitting closer to the lottery table will make people feel more likely to win the lottery, based on construal level theory.

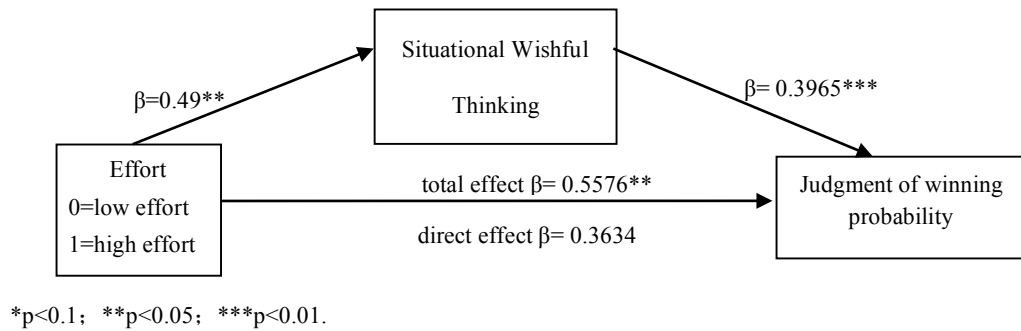


Figure 1: Mediation analysis of situational wishful thinking (Study2)

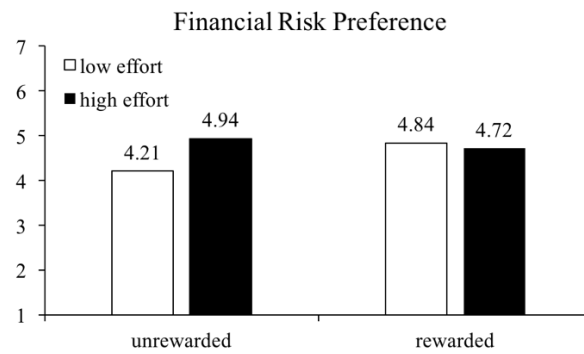


Figure 2: Moderating role of reward condition on the effect of effort on financial risk preference (Study3)

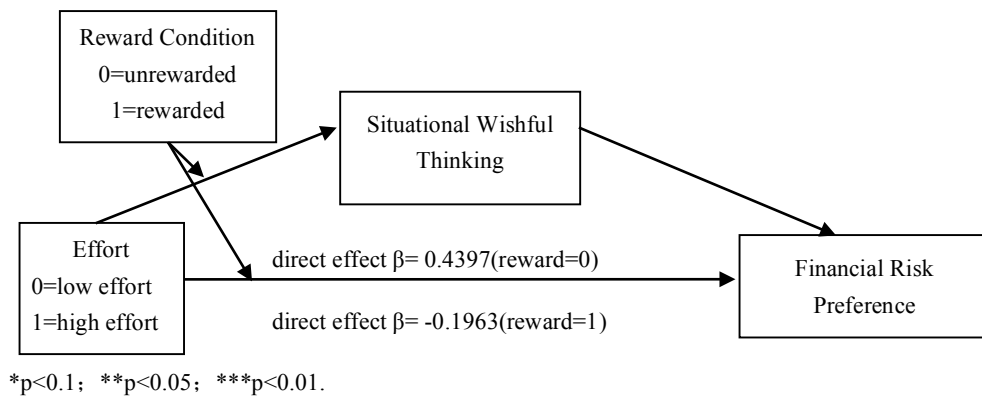
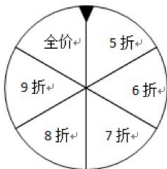
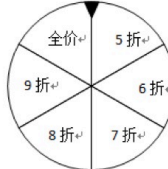


Figure 3: Moderating role of reward condition on the mediating effect of situational wishful

thinking(Study3)

## Appendix A

Manipulation and winning probability measures in Experiment 1A:

Low-effort condition	High-effort condition
<p>假想您打算购买一副新的眼镜，根据之前的计划，今天来到<u>离学校不远的五道口</u>的一家眼镜店，路上一共花费了<u>15分钟左右</u>，比较轻松。</p> <p>在该眼镜店内挑选眼镜之后，店员告诉您“店内正在搞回馈新老顾客的<u>抽奖活动</u>，可以通过<u>幸运转盘</u>抽取一定的折扣”（如下图），您决定试一试。</p>  <p>1. 花费 15 分钟来到这家店购买眼镜，请问您认为自己<u>最有可能</u>抽到几折？（请在相应选项上打“√”）</p> <p>A. 全价      B. 9 折      C. 8 折      D. 7 折      E. 6 折      F. 5 折</p>	<p>假想您打算购买一副新的眼镜，根据之前的计划，今天来到<u>离学校较远的潘家园</u>的一家眼镜店，路上一共花费了<u>2个小时左右</u>，比较辛苦。</p> <p>在该眼镜店内挑选眼镜之后，店员告诉您“店内正在搞回馈新老顾客的<u>抽奖活动</u>，可以通过<u>幸运转盘</u>抽取一定的折扣”（如下图），您决定试一试。</p>  <p>1. 花费 2 个小时来到这家店购买眼镜，请问您认为自己<u>最有可能</u>抽到几折？（请在相应选项上打“√”）</p> <p>A. 全价      B. 9 折      C. 8 折      D. 7 折      E. 6 折      F. 5 折</p>

## Appendix B

Manipulation in Experiment 1B:

Low-effort condition	High-effort condition
<p>在本研究中，所有参与者都将参加一个组词任务，该任务要求将如下被打乱顺序的字母重新排列组合成<u>1个英文单词</u>。</p> <p>例子：irenfed → <u>friend</u> 或 <u>finder</u></p> <p>请完成如下6个组词任务：</p> <ol style="list-style-type: none"> <li>tereh → _____</li> <li>ihntng → _____</li> <li>haicn → _____</li> <li>ivle → _____</li> <li>aroadb → _____</li> <li>drrerwa → _____</li> </ol>	<p>在本研究中，所有参与者都将参加一个组词任务，该任务要求将如下被打乱顺序的字母重新排列组合成<u>2个不同的英文单词</u>。</p> <p>例子：irenfed → <u>friend</u> 或 <u>finder</u></p> <p>请完成如下6个组词任务：</p> <ol style="list-style-type: none"> <li>tereh → _____</li> <li>ihntng → _____</li> <li>haicn → _____</li> <li>ivle → _____</li> <li>aroadb → _____</li> <li>drrerwa → _____</li> </ol>

## Appendix C


### Manipulation in Experiment 1C, Study 2, and Study 3:

Low-effort condition	High-effort condition
<p>请仔细阅读说明：在本研究中，所有参与者都将参加一个造句任务。每个人会被<u>随机分配</u>一个特定的造句练习工作量，随机分配的工作量范围是<u>2-9个造句练习</u>。</p> <p>范例：请在以下每行的五个词中选择<u>四个词组成语法正确</u>的一句话。</p> <p>例子：feeds he the cat they = <u>He feeds the cat</u></p> <p>根据本问卷的随机序号，您被随机分配造<u>9个</u>句子（其他同学<u>最少做2个，最多做9个</u>）。</p> <p>1. painted the they are house</p> <p>_____</p> <p>2. besides she rides the bus</p> <p>_____</p> <p>3. feels sometimes Chris thirsty takes</p> <p>_____</p> <p>4. you are something coming when</p> <p>_____</p> <p>5. parked is his Brian car</p> <p>_____</p> <p>6. briskly they does walking were</p> <p>_____</p> <p>7. this he often we experiences</p> <p>_____</p> <p>8. we the itself movie watched</p> <p>_____</p> <p>9. was he homework were doing</p> <p>_____</p>	<p>请仔细阅读说明：在本研究中，所有参与者都将参加一个造句任务。每个人会被<u>随机分配</u>一个特定的造句练习工作量，随机分配的工作量范围是<u>2-9个造句练习</u>。</p> <p>范例：请在以下每行的五个词中选择<u>四个词组成语法正确</u>的一句话。</p> <p>例子：feeds he the cat they = <u>He feeds the cat</u></p> <p>根据本问卷的随机序号，您被随机分配造<u>2个</u>句子（其他同学<u>最少做2个，最多做9个</u>）。</p> <p>1. painted the they are house</p> <p>_____</p> <p>2. besides she rides the bus</p> <p>_____</p>

### Winning probability measure in experiment 1C:

Low-effort condition

接下来，您可以免费参与我们的一次抽奖活动，具体活动规则是：10个被编号为1~10的箱子（如下图）中只有1个是代表有奖金的。



您可以选择一个自己认为最有可能代表有奖金的箱子并写下它的编号（1~10），对于所写编号正好是代表有奖金卡片的参与者，我们将发放5元钱的奖金。

写有中奖号码的信封将被提前放在桌子上方，我们会在您完成问卷时向您当面打开信封，确定中奖与否，以保证抽奖活动的真实客观。


1. 请写下您认为最有可能代表有奖金的一个箱子的编号：\_\_\_\_\_（1~10）

2. 在完成2个造句任务（其他同学最少做2个，最多做9个）之后，请问您认为自己中奖的可能性是？（在相应的数字上打“√”）

非常不可能	比较不可能	有点不可能	一般	有点可能	比较可能	非常可能
1	2	3	4	5	6	7

High-effort condition

接下来，您可以免费参与我们的一次抽奖活动，具体活动规则是：10个被编号为1~10的箱子（如下图）中只有1个是代表有奖金的。



您可以选择一个自己认为最有可能代表有奖金的箱子并写下它的编号（1~10），对于所写编号正好是代表有奖金卡片的参与者，我们将发放5元钱的奖金。

写有中奖号码的信封将被提前放在桌子上方，我们会在您完成问卷时向您当面打开信封，确定中奖与否，以保证抽奖活动的真实客观。

1. 请写下您认为最有可能代表有奖金的一个箱子的编号：\_\_\_\_\_（1~10）

2. 在完成9个造句任务（其他同学最少做2个，最多做9个）之后，请问您认为自己中奖的可能性是？（在相应的数字上打“√”）

非常不可能	比较不可能	有点不可能	一般	有点可能	比较可能	非常可能
1	2	3	4	5	6	7

## Appendix D

### Manipulation in Experiment 1D:

Low-effort condition	High-effort condition
<p>请仔细阅读说明：在本研究中，所有参与者都将参加一个造句任务。每个人会被<u>随机分配</u>一个特定的造句练习工作量，随机分配的工作量范围是<u>8-16 个造句练习</u>。</p> <p>范例：请在以下每行的五个词中选择<u>四个词</u>组成<u>语法正确</u>的一句话。</p> <p>例子：feeds he the cat they = <u>He feeds the cat.</u></p> <p>根据本问卷的随机序号，您被随机分配造 <u>9 个</u> 句子（其他同学<u>最少做8 个，最多做 16 个</u>）。</p> <ol style="list-style-type: none"> <li>1. painted the they are house</li> <li>2. besides she rides the bus</li> <li>3. feels sometimes Chris thirsty takes</li> <li>4. you are something coming when</li> <li>5. parked is his Brian car</li> <li>6. briskly they does walking were</li> <li>7. this he often we experiences</li> <li>8. we the itself movie watched</li> <li>9. was he homework were doing</li> </ol>	<p>请仔细阅读说明：在本研究中，所有参与者都将参加一个造句任务。每个人会被<u>随机分配</u>一个特定的造句练习工作量，随机分配的工作量范围是<u>2-10 个造句练习</u>。</p> <p>范例：请在以下每行的五个词中选择<u>四个词</u>组成<u>语法正确</u>的一句话。</p> <p>例子：feeds he the cat they = <u>He feeds the cat.</u></p> <p>根据本问卷的随机序号，您被随机分配造 <u>9 个</u> 句子（其他同学<u>最少做2 个，最多做 10 个</u>）。</p> <ol style="list-style-type: none"> <li>1. painted the they are house</li> <li>2. besides she rides the bus</li> <li>3. feels sometimes Chris thirsty takes</li> <li>4. you are something coming when</li> <li>5. parked is his Brian car</li> <li>6. briskly they does walking were</li> <li>7. this he often we experiences</li> <li>8. we the itself movie watched</li> <li>9. was he homework were doing</li> </ol>

## Appendix E

### Stimulation and dependent variable measurement in Study 2:


假若您最近需要购买一台小音响，来到商场之后售货员向您推荐了一款新产品，如下图所示：

无线音响

新品

该款新产品采用USB和蓝牙技术，简洁便携，并且可以避免其他无线设备的干扰。

- 该款产品以其创新的无线技术和伟大的设计，颠覆了现有行业标准
- 有8%的可能性会出现信号传递失败



1. 请问您愿意购买该产品的程度是？（在相应数字上打“√”）

非常不愿意	比较不愿意	有点不愿意	一般	有点愿意	比较愿意	非常愿意
1	2	3	4	5	6	7

2. 假如您决定购买该产品，您认为自己购买之后在使用过程中出现信号传递失败的可能性是？（在相应的数字上打“√”）

非常不可能	比较不可能	有点不可能	一般	有点可能	比较可能	非常可能
1	2	3	4	5	6	7