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Why Choose Tangible Rewards over Cash?

*An Examination of Reward Type on Employees' Performance
in a Multidimensional Task Environment*

BY

Ke Xu

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree

Of

Doctor of Philosophy

In the Robinson College of Business

Of

Georgia State University

GEORGIA STATE UNIVERSITY

ROBINSON COLLEGE OF BUSINESS

2021

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Ke Xu

2021

ACCEPTANCE

This dissertation was prepared under the direction of the *Ke Xu's* Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Business Administration in the J. Mack Robinson College of Business of Georgia State University.

Richard Phillips, Dean

DISSERTATION COMMITTEE

Dr. Ivo Tafkov (Co-Chair)

Dr. Michael Majerczyk (Co-Chair)

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ABSTRACT

Why Choose Tangible Rewards over Cash?

*An Examination of Reward Type on Employees' Performance
in a Multidimensional Task Environment*

BY

Ke Xu

April 15, 2021

Committee Chair: *Dr. Ivo Tafkov and Dr. Michael Majerczyk*

Major Academic Unit: *School of Accountancy*

In today's business environment, organizations have increased the use of tangible rewards in their reward and recognition systems. The purpose of my study is to examine the extent to which tangible rewards affect performance in multidimensional task environments, especially the performance on the *uncompensated* task dimension. Based on economic theory and prior research on tangible rewards, I do not make an ex-ante prediction on the relative efficacy of tangible rewards and cash rewards on the *compensated* task dimension performance. However, I rely on affect valuation theory to predict that tangible rewards motivate a higher level of performance compared to cash rewards on the *uncompensated* task dimension. Using an experiment, I find that even though cash and tangible rewards motivate similar levels of performance on the *compensated* task dimension, the *uncompensated* task dimension performance is higher under tangible rewards than cash rewards. Thus, my study reveals a positive effect of tangible rewards in multidimensional task environments. The findings of my study provide meaningful insights that can help firms make more informed decisions when designing their performance management and reward systems for multidimensional tasks.

Keywords: tangible rewards, partial incentives, compensated and uncompensated task dimension performance

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I. INTRODUCTION

In today's business environment, organizations have diversified their reward choice toward greater reliance on tangible non-cash rewards (hereafter tangible rewards) to motivate their employees. Tangible rewards are non-cash incentives that can easily be assigned a financial value, such as gift cards, merchandise, travel vouchers, etc. (Presslee, Vance, and Webb 2013; Kelly, Presslee, and Webb 2017; Mitchell, Presslee, Schulz, and Webb 2019; Newman, Tafkov, Waddoups, and Xiong 2021). Evidence from practice shows that 84% of organizations choose to use tangible rewards in their reward and recognition systems (Incentive Foundation 2019). Despite that there is a lack of clear economic theory to support their use and the inconclusive findings of prior research regarding their effectiveness, the prevalence use of tangible rewards in practice makes it important for academic research to understand the full range of motivational and performance effects they produce. The purpose of my study is to examine the extent to which tangible rewards affect performance in multidimensional task environments, especially performance on the *uncompensated* task dimension(s).

Despite growing research on tangible rewards, prior studies examining their motivational effects focus extensively on the performance of a single task dimension (e.g., Shaffer and Arkes 2009; Jeffrey 2009; Presslee et al. 2013; Kelly et al. 2017; Choi and Presslee 2019). However, in practice, employees often perform tasks involving multiple dimensions, in which employees are not provided incentives on all performance dimensions (Williamson 1985; Choi, Hecht, and Tayler 2012; Hecht, Tafkov, and Towry 2012; Kachelmeier, Thornock, and Williamson 2016). For example, employees working in a factory are responsible for maximizing quantity and quality of produced output, but they may not receive separate incentives for both quantity and

quality dimensions.¹ Thus, there is a lack of evidence on the effect of reward type (cash vs. tangible rewards) on performance in these multidimensional task environments. In multidimensional task environments, employees typically receive performance-based compensation for only a subset of task dimensions, known as *partial incentives* (Holmstrom and Milgrom 1991; Christ, Emmett, Summers, and Wood 2012; Hecht et al. 2012; Hannan, McPhee, Newman, and Tafkov 2013; Christ, Emmett, Tayler, and Wood 2016). Prior research shows the presence of such partial incentives not only affect the performance on the compensated task dimension but may also affect the performance on the uncompensated task dimension – known as a *spillover effect* (Holmstrom and Milgrom 1991; Christ et al. 2012; Hecht et al. 2012; Hannan, McPhee, Newman, and Tafkov 2013; Christ et al. 2016). While prior literature on partial incentives focuses exclusively on cash-based incentives (Holmstrom and Milgrom 1991; Hecht et al. 2012; Harris, Majerczyk, and Newman 2018), my study examines the extent to which reward type tied to partial incentives influences the spillover effect on the uncompensated dimension performance.

I do not make an *ex-ante* prediction on the relative efficacy of cash rewards and tangible rewards on the compensated task dimension performance due to conflicting directional predictions from economic and psychology theory as well as mixed empirical research findings. However, I draw upon affect valuation theory to argue that the effect of partial incentives on the uncompensated task dimension(s) may depend on the reward type (cash vs. tangible) tied to the partial incentives (Hsee and Rottenstreich 2004; Hsee, Rottenstreich, and Xiao 2005).

¹ Multidimensional task environments are different from multitask environments. Whereas multitask environments, they involve multiple separable tasks, in multidimensional task environments, a single task involves multiple characteristics (dimensions), and those dimensions are performed simultaneously (Hecht et al. 2012; Kachelmeier et al. 2016). Since the goal of my study is to examine the spillover effect of reward type and prior literature provides evidence that performance spillover effect is most likely to occur in multidimensional tasks (Bonner and Sprinkle 2002; Hecht et al. 2012), I restrict my study to multidimensional task environments.

Affect valuation theory explains that the nature of the reward can affect employees' psychological processes when they value the reward (Hsee and Rottenstreich 2004; Hsee, Rottenstreich, and Xiao 2005). While individuals view cash rewards as more utilitarian than hedonic due to their greater fungibility, individuals tend to view tangible rewards as more hedonic than utilitarian, triggering affective feelings. The theory further suggests that affective mindset is more likely to dominate if an individual is incentivized with tangible rewards, whereas a calculative mindset is more likely to dominate if an individual is incentivized with cash rewards (Hsee and Rottenstreich 2004, Hsee, Rottenstreich, and Xiao 2005). In a multidimensional task environment, since cash rewards are expected to elicit a higher level of calculative mindset than tangible rewards, individuals who receive partial incentives tied to cash rewards are then more likely to engage in self-interested behavior. This translates into a focus on the compensated task dimension and less willingness to exert effort on the uncompensated task dimension. Thus, I predict that the uncompensated task dimension performance is higher under tangible rewards than cash rewards.

To test my prediction, I use an experiment and manipulate between-subjects reward type at two levels (tangible reward or cash reward). The experimental task is modified from the Gill and Prowse (2011) slider task, in which participants are required to adjust the position of a slider on a scrollbar to a specific number for 10 minutes. There is an acceptable range for each slider, which is plus or minus 50 from the given number. The modified slider task has both a quantity dimension (number of sliders positioned) and a quality dimension (accuracy of the positioned sliders). Accuracy is determined by how close the adjusted slider is to the given number. In addition to a fixed wage, I provide participants with performance-based pay. Specifically, participants are provided with a reward in the form of a piece rate based upon the number of

successfully positioned sliders, which is the quantity dimension of the task. The accuracy of the positioned sliders (quality dimension of the task) serves as the uncompensated task dimension in the experiment. I manipulate reward type by incentivizing participants with either cash or tangible rewards in the form of a Starbucks gift card for the same monetary value.

I find that in my experiment, cash and tangible rewards motivate similar levels of performance on the compensated task dimension (number of positioned sliders). More importantly, consistent with my prediction, I find that the uncompensated task dimension performance (accuracy of positioned sliders) is higher under tangible rewards than cash rewards. The supplemental analysis provides directional evidence showing that compared with the participants under the tangible rewards incentive, those under the cash rewards incentive tend to have a higher level of calculative mindset.

The findings of my study make several contributions to accounting research and practice. First, the study contributes to the growing stream of research on tangible rewards. While this stream of research focuses predominantly on the relative efficacy of tangible rewards and cash rewards on the compensated task dimension performance (Shaffer and Arkes 2009; Jeffrey 2009; Presslee et al. 2013; Kelly et al. 2017; Mitchell et al. 2019), my study extends the understanding of tangible rewards to a multidimensional task environment by highlighting its impact on the uncompensated task dimension performance. In doing so, the study contributes to the tangible rewards literature by showing that the impact of reward type on performance might be greater than previously documented because it can carry over beyond the incentivized task dimensions (Shaffer and Arkes 2009; Jeffrey 2009; Presslee et al. 2013; Kelly et al. 2017; Mitchell et al. 2019). Specifically, my study shows an unintended positive effect of providing tangible rewards over cash rewards, which is the higher performance on the uncompensated task dimension.

The study also contributes to research examining spillover effects of incentive compensation (Holmstrom and Milgrom 1991; Hecht et al. 2012; Harris et al. 2018). Prior research that investigates spillover effects of partial incentives on uncompensated task dimension(s) focuses on partial incentives in the form of cash rewards (Hecht et al. 2012; Kachelmeier et al. 2016; Harris et al. 2018). My study extends this literature by showing that reward type is an important factor that can potentially affect the strength of the spillover effect. While Holmstrom and Milgrom (1991) document the negative spillover effect of providing partial incentives, my study provides a way to mitigate such negative spillover effect on the uncompensated task dimension performance, which involves providing partial incentives in the form of tangible rewards.

From a practical perspective, my study provides insights to organizations, helping them consider how to best motivate employees' effort and performance in a multidimensional task environment. In particular, the study suggests that firms need to take into consideration the nature of the reward type when designing their performance management and reward systems in a multidimensional task environment. Especially for tasks with dimension(s) that are important but difficult to measure, firms could consider offering non-cash incentives for the task. The study also provides empirical evidence to better understand organizations' significant investment in non-cash rewards in practice.

The remainder of this paper is organized as follows. In the next section, I describe the background and hypotheses development. In Section III, I describe the experimental method, followed by a discussion on the results in Section IV. Finally, I conclude in Section V.

II. BACKGROUND AND HYPOTHESES DEVELOPMENT

Reward Type

In practice, organizations have increased their investment in tangible rewards. A recent survey showed that in 2018, 84% of firms in North America used tangible rewards to motivate employees, spending more than \$100 billion annually on rewards such as gift cards, merchandise, and travel, compared to \$46 billion in 2007 (Incentive Federation Inc. 2007, 2018a). Unlike using cash rewards, using tangible rewards can provide organizations with additional economic benefits since the organizations may receive discounts from a bulk purchase or use the company's own products or services to incentivize its employees (Jeffrey and Shaffer 2007). For example, Goodyear Tire realized a 31% return on investment (ROI) from the implementation of a non-cash incentive program, compared to a -20% ROI from the implementation of a cash incentive program (Quality Incentive Company 2020). Thus, practitioners commonly advocate the use of tangible rewards to motivate employees (Ford and Fina 2006).

Despite the widespread use of tangible rewards in practice, academic research has produced mixed evidence of their effectiveness in motivating effort and performance (e.g., Shaffer and Arkes 2009; Jeffrey 2009; Presslee et al. 2013; Choi and Presslee 2019; Kelly et al. 2017; Newman et al. 2021). Some studies find that tangible rewards lead to better performance than cash rewards. Specifically, Jeffrey (2009) examines the justifiability and motivational power of tangible noncash incentives and offers the first empirical evidence that tangible rewards lead to greater performance improvement than cash rewards. The finding indicates that people feel receiving tangible rewards can help to justify spending. Also, a field study by Kelly et al. (2017) examines the relative efficacy of tangible rewards and cash rewards on performance in a wholesale company. The study finds that tangible rewards can motivate more effort than cash rewards for bottom performers in the

subsequent round of a repeated tournament through mitigating bottom performers' decreased motivation.

However, other studies fail to find such motivational advantage of tangible rewards. Specifically, in Shaffer and Arkes (2009), even though the study indicates employees who received tangible rewards are more likely to enjoy the reward and tell their friends about it, there are no performance differences between tangible rewards and cash rewards. Additionally, Presslee et al. (2013) find tangible rewards lead to lower performance than cash in a setting where employees can self-select their performance goals.

My study does not aim to reconcile the mixed prior findings, but rather to examine the effectiveness of tangible rewards in a broader context. Prior studies examining the motivational effects of tangible rewards tend to focus only on a single task dimension performance (e.g., Shaffer and Arkes 2009; Jeffrey 2009; Presslee et al. 2013; Kelly et al. 2017; Choi and Presslee 2019). However, employees in practice frequently engage in tasks that involve multiple dimensions. In such task environments, employees often receive partial incentives for reasons including (1) managers' lack of ability to foresee all important task dimensions and incentivize them in the contract; (2) some of the task dimensions are difficult to measure precisely; and (3) it is not cost-effective to monitor and incentivize every single task dimension (Holmstrom and Milgrom 1991; Choi et al. 2012; Hecht et al. 2012; Harris et al. 2018).² Despite the growing research on tangible rewards, there is a lack of evidence on the effect of reward type (cash vs. tangible rewards) on performance in such multidimensional task environments, especially on the uncompensated task dimension performance.

² The study does not aim to distinguish the underlying reasons for firms to provide partial incentives, but rather uses partial incentives as the setting to examine the spillover effect of different rewards.

Hypotheses Development

Effect of Reward Type on the Compensated Task Dimension Performance

Even though the primary focus of my study is to examine the effect of reward type on the uncompensated task dimension performance, it is worthwhile to discuss how reward type affects the compensated task dimension performance first. Prior literature on partial incentives suggests that providing partial incentives can have a positive effect on the compensated task dimension through both motivation and attention-directing mechanisms (Bonner and Sprinkle 2002; Hecht et al. 2012; Christ et al. 2016; Harris et al. 2018). Based on prior research on tangible rewards, I do not expect that such a positive effect depends on the reward type.

According to traditional economic theory, if the compensated task dimension is incentivized in the form of cash, employees are likely to find cash rewards more attractive and motivating than tangible rewards. The reason is that cash has greater fungibility and can be used in exchange for most goods or services (Shaffer and Arkes 2009; Sandel 2012; Presslee et al. 2013). That is, holding the value of the reward constant, research has shown that individuals indicate a strong preference for cash over tangible when comparing the two reward types (Jeffrey 2009; Shaffer and Arkes 2009). Thus, from an economic theory perspective, cash rewards should lead to higher performance than tangible rewards on the compensated task dimension.

However, psychology theory suggests that tangible rewards can sometimes be more motivating than cash rewards on the compensated task dimension. According to mental accounting theory, individuals tend to categorize different financial outcomes in separate mental accounts based on the characteristics of the outcome (Thaler 1985, 1999). Specifically, individuals are more likely to categorize cash rewards (tangible rewards) in the account similar to (different from) “salary”, which leads to spending for utilitarian (hedonic) purposes. Based on this theory, research

has argued that the hedonic nature of tangible rewards can lead to higher performance compared to cash rewards on the compensated task dimension through the distinctive features of greater social recognition, justification, and memorability (O'Curry and Strahilevitz 2001; Shaffer and Arkes 2009; Jeffrey 2009; Presslee et al. 2013). Specifically, Choi and Presslee (2019) provide evidence that tangible rewards can be perceived as more attractive than cash rewards if they are offered unexpectedly for hedonic use and viewed as separate from the salary.

Based on the conflicting directional predictions from economic and psychology theory as well as mixed empirical research findings (discussed above), I am unable to make a directional prediction about the effectiveness of tangible rewards and cash rewards on the compensated task dimension. Thus, I state my first hypothesis in a null form as follows:

H1(null): In a multidimensional task environment, cash rewards and tangible rewards motivate similar levels of performance on the compensated task dimension.

Effect of Reward Type on the Uncompensated Task Dimension Performance

As mentioned earlier, employees often receive partial incentives in multidimensional task environments. Prior research shows that such partial incentives not only affect the performance on the compensated task dimension but may also affect the performance on the uncompensated task dimension (Holmstrom and Milgrom 1991; Hecht et al. 2012; Christ et al. 2016).

Specifically, Holmstrom and Milgrom (1991) develop a multitask principal-agent model to show that the use of partial incentives can lead to an undesirable shift of employees' attention away from important tasks that are not compensated, resulting in effort distortion. Recent research shows that such a spillover effect depends on task proximity of the incentivized task dimension (Hecht et al. 2012; Harris et al. 2018) and can be potentially mitigated by social incentives

(Bruggen and Moers 2007). Importantly, each of these prior studies examine partial incentives in the form of cash rewards. There is a lack of understanding of how the different reward types tied to partial incentives influence uncompensated task dimension performance.

To consider the role that different reward types (cash and tangible) have on performance under a partial incentive scheme, I rely on affect valuation theory to form my arguments (Hsee and Rottenstreich 2004; Hsee, Rottenstreich, and Xiao 2005). Affect valuation theory explains that when there is a reward, the nature of the reward can affect individuals' psychological processes and induce them to value the reward differently (Hsee and Rottenstreich 2004; Hsee, Rottenstreich, and Xiao 2005). Specifically, the theory suggests that different reward natures can influence individuals to engage in more valuation by feeling or valuation by calculation when evaluating the reward. Valuation by feeling occurs when the nature of the reward is more hedonic, and individuals can have an emotional attachment to it, whereas valuation by calculation occurs when the financial perspective of the reward is salient (Hsee, Rottenstreich, and Xiao 2005; Slovic, Finucane, Peters, and MacGregor 2002).³ As mentioned in H1, cash rewards have great fungibility and zero transaction costs and are often used for utilitarian purposes. On the other hand, tangible rewards are relatively more hedonic in nature and can evoke more feelings. Also, compared to tangible rewards, cash rewards activate the concept of money and make the financial perspective of the reward more salient. Based on the affect

³ I do not expect that affect valuation theory affects the compensated task dimension performance. Affect valuation theory suggests that individuals are likely to value the affect-rich tangible rewards based on their feelings and to value the affect-neutral cash rewards based on their calculations. The theory further suggests that for rewards with a lower (higher) scope (i.e., size), individuals with valuation by feeling (calculation) mindset will subjectively value the reward higher than those with valuation by calculation (feeling) mindset (Hsee and Rottenstreich 2004; Hsee, Rottenstreich, and Xiao 2005). That is, until a point of scope that is determined subjectively by an individual, tangible rewards are more motivating than cash rewards. However, once this point is exceeded, cash rewards become more valuable and thereby more motivating compared to tangible rewards. Thus, it is unclear ex-ante whether cash rewards or tangible rewards will lead to higher overall performance on the compensated task dimension.

valuation theory, individuals are likely to value tangible rewards by feelings and to value the cash rewards by calculation. Thus, tangible rewards are more likely to induce a higher level of affective mindset, whereas cash rewards are more likely to induce a higher level of calculative mindset.

Prior study shows that under a higher level of calculative mindset, individuals are more sensitive to reward size and tend to engage in a cost-benefit calculus where the primary goal is to improve one's own economic well-being (Kouchaki et al. 2013; Wang et al. 2014; Belmi and Pfeffer 2015). Also, Erlandsson and Ivan (2015) provide evidence that individuals who are induced with a calculative mindset are less likely to help compared to those who are induced with an affective mindset. Further, Church, Kuang, and Liu (2019) show that, in a moral context, the activation of the concept of money advances an individual's self-interest, leading to a lower level of honesty in reporting. The reason is that the calculative mindset induced from cash rewards will bring individuals' financial interest to the forefront, making such interest dominate. In a multidimensional task environment, I expect the same effect will exist where the higher calculative mindset elicited from cash rewards activates the concept of money and induces employees to behave in a self-serving way by focusing more on their self-interest. In this situation with performance-based partial incentives, such self-interested behavior will translate into focusing on the compensated task dimension and lowering the willingness to exert effort on the uncompensated task dimension since there is no economic incentive tied to it.

In contrast, tangible rewards are less likely to elicit a calculative mindset. Instead, individuals given tangible rewards are likely to value the reward based on their feelings and, thus, are less sensitive to the reward size (Hsee and Rottenstreich 2004; Hsee, Rottenstreich, and Xiao 2005). Since a lower level of calculative mindset would encourage individuals to consider

the consequence of their behavior (Wang et al. 2014), they would acknowledge that being self-interested deviates from the purpose of the task. Thus, individuals with a higher level of affective mindset induced from tangible rewards are less likely to behave in a self-serving way and, thus, are more likely to exert effort on the uncompensated task dimension.

Based on the above arguments, I expect that providing partial incentives in the form of tangible rewards rather than cash rewards will lead to higher performance on the uncompensated task dimension. This leads to my second hypothesis:

H2: In a multidimensional task environment, performance on the uncompensated task dimension will be higher when partial incentives are given in the form of tangible rewards than in the form of cash rewards.

III. METHOD

Experimental Design and Task

To test my hypotheses, I manipulate reward type between subjects at two levels (*tangible reward* or *cash reward*).⁴ In the experiment, participants work individually on a real effort task - the modified slider task (Gill and Prowse 2011) - for 10 minutes. In the modified slider task, each slider is initially positioned at 0 along a scrollbar from 0 to 1000. Participants are required to use the computer mouse to adjust the position of a slider on a scrollbar to a specific number that is given. Appendix A shows an example of the slider task. Each positioned slider is

⁴ I also manipulate value statement between subjects at two levels (*absent* or *present*). About 47% of participants were in the value statement present condition, in which they are provided with the statement “*We value both the number and the accuracy of accepted positioned sliders*” during the slider task. Because value statement has no effect on either compensated or uncompensated task dimension performance, I exclude it from further discussion. Specifically, untabulated results show that there is no difference in *positioned slider* or *range* observed between *Absent* and *Present* value statement conditions ($p = 0.83$ and 0.36 , two-tailed, respectively). Also, compared to a cash reward, a tangible reward leads to a higher level of uncompensated task dimension performance regardless of whether a value statement is present or absent (interaction p -value is 0.76 , two-tailed).

associated with an acceptable range, which is plus or minus fifty from the given number. If the positioned slider is within a range of fifty (plus or minus fifty) from the number that is given, then the slider is accepted and counted as a positioned slider. If the positioned slider is outside of a range of fifty from the number that is given, then the slider is not accepted, and the participants must redo the slider. An accuracy level of each positioned slider is determined by how close the positioned slider is to the given number. Specifically, participants were told that for each positioned slider “*The closer to the given number, the higher the accuracy of the slider*”. Thus, the modified slider task has two performance dimensions – quantity (number of positioned sliders) and quality (accuracy of positioned sliders) that allow me to examine the effect of reward type on performance in a multidimensional task environment.

Experimental Procedures

The experiment is conducted online, using remotely connected participants and the z-Tree software (Fishbacher 2007).⁵ Appendix B shows the experimental timeline. As participants check in at the virtual lab, they are first asked to review and sign an informed consent form. Then, messages appear on the screen and direct participants to join a Zoom meeting session. The purpose of having a Zoom meeting session is to increase the experimental control in an online environment.⁶ Upon joining the Zoom meeting session, participants are muted and assigned a participant ID based on their check-in time at the virtual lab. Doing so ensures anonymity among participants. The general instructions are given verbally in the Zoom meeting room by the experimenter, and then participants receive their unique link at the virtual lab to start the experiment. Participants stay in the Zoom meeting room until they finish the experiment, but

⁵ The experiment is approved by the Institutional Review Board (IRB) of the university where the author collected the data.

⁶ To increase the experimental control, before joining the Zoom meeting session, participants are also informed that they need to use a desktop or laptop, rather than a tablet or phone, to complete the experiment.

they are not allowed to communicate with each other in any form. Participants can communicate with the experimenter if they have questions at any time using the Zoom private chat function. That is, other participants are not able to see the conversations.

Participants are first given the instructions regarding the slider task. To familiarize participants with the slider task, they are required to complete a one-minute practice round. The practice round performance does not associate with any form of incentive. After finishing the practice round, participants are told that they will receive a \$3.00 fixed wage for completing the 10-minute slider task and can also earn a performance-based reward based on the number of accepted positioned sliders. Specifically, I inform the participants that they can receive a piece-rate reward of \$0.10 for each accepted positioned slider either in the form of cash or gift card depending on their reward condition (described later).

Before starting the actual slider task, participants are asked to answer a set of comprehension quiz questions to ensure their understanding of the task instructions. The experiment does not begin until participants have answered all quiz questions correctly. After finishing the 10-minute slider task, participants receive feedback on the number of sliders they successfully positioned and complete post-experimental and demographic questions before learning their earnings from the experiment. Finally, participants are informed that they will receive email(s) for their payment after the experiment. Specifically, the cash payment is distributed via PayPal and the gift card payment is distributed directly through the company's official website.

Reward Type Manipulation

I manipulate the reward type at two levels. In the *cash reward* condition, participants are compensated with \$0.10 for each accepted positioned slider. In the *tangible reward* condition,

participants are compensated with \$0.10 stored in a Starbucks gift card for each accepted positioned slider.⁷ In other words, quantity (number of positioned sliders) is the compensated task dimension and quality (accuracy of the positioned sliders) is the uncompensated task dimension. There are four design choices that warrant discussion.

First, I chose to use a piece-rate incentive instead of a tournament incentive or a goal-based incentive in the study. The reason is that tournament and goal-based incentive schemes are often subject to noise as there are other factors that influence performance besides the reward type. For example, employees' performance under a tournament incentive scheme may be affected by the tournament structure or likelihood of winning the tournament in addition to the reward type (Kelly et al. 2017). Similarly, employees' performance under a goal-based incentive scheme may depend on the goal difficulty or goal attainment in addition to the reward type (Presslee et al. 2013). Therefore, using a piece-rate incentive scheme can provide a direct test of how different reward types affect performance.

Second, in the experiment, the accuracy of the positioned slider serves as the performance of an uncompensated task dimension. Although uncompensated task dimensions are not always objectively measurable in practice, I made this design choice in order to allow for an objective measure of the uncompensated task dimension performance. Having an objective measure of performance is for internal validity purposes since it can reduce measurement error and allow me to draw valid inferences about the effect of reward type on employees' performance on the uncompensated task dimension. This design choice is also consistent with prior accounting research, which uses an objectively measurable task or task dimension in the

⁷ Starbucks' gift card has a similar continuous value function as cash. Every penny earned in cash could contribute towards purchasing the desired product. Similarly, every penny earned in Starbucks' gift card could contribute towards purchasing any number of beverages, sandwiches, or cookies. It is true regardless of whether the accumulated amount in Starbucks' gift card is sufficient for redeeming a beverage, a sandwich, or a cookie.

experiment when the study seeks to generalize to the task environment in which the type of task or task dimension is difficult to measure (e.g., Hecht, Tafkov, and Towry 2012; Hecht, Hobson, and Wang 2020). Furthermore, in the experiment, participants only receive feedback on the compensated task performance. That is, they do not receive any feedback related to the accuracy of the positioned sliders, which somewhat reduces the perceived measurability of the uncompensated task dimension performance.

Third, even though firms providing tangible rewards in the form of gift cards often give employees a menu of choices as to the reward received (Jeffrey and Shaffer 2007; Presslee et al. 2013), in the study, I made the design choice to limit participants' discretion in the selection of the gift card reward. Otherwise, the effect of reward type on performance will confound with reward choice (i.e., no choice (cash) versus choice (tangible)) and, thus, threaten the study's internal validity. Also, evidence from practice shows that restricted use gift cards are increasing in their popularity within firms (Incentive Research Foundation 2018b).

Lastly, in order to identify an appropriate tangible reward, an out-of-sample survey is given to a similar participant pool as my main experiment prior to running the experiment (i.e., undergraduate students recruited from the same university) – see Appendix C. In the survey, I ask participants to assume that they work in a company and can earn gift card rewards for their performance in addition to their fixed wage.⁸ Participants are presented four gift cards and asked to indicate which of the four they find most attractive: (1) AMC movie gift card; (2) Starbucks gift card; (3) GameStop gift card; and (4) Domino's Pizza gift card. For each of the four gift cards, participants are then asked to rate on a scale from 1 to 7 the extent to which the item(s) can

⁸ I chose gift cards as a tangible reward because evidence from practice indicates that gift cards are the most prevalent form of tangible rewards used by organizations and continue to be a popular option within reward and recognition programs (Incentive Research Foundation 2018b).

be purchased with this gift card is fun and exciting, with 1 being strongly disagree and 7 being strongly agree. Among the 93 undergraduate students who completed the survey, 41.94% indicate that a Starbucks gift card is the most attractive option (17.20% AMC movie gift card, 17.20% GameStop, and 23.66% Domino's Pizza). Also, among the four gift cards, the Starbucks gift card receives the highest average rating of 5.35 on the question "*The items(s) can be purchased with this gift card is fun and exciting*". Thus, I use a Starbucks gift card to operationalize my tangible reward.

Dependent Variables

Two dependent variables capture the performance on both the compensated and uncompensated task dimensions. The first dependent variable, *positioned slider*, is used to capture the performance on the quantity (compensated) task dimension. The second dependent variable, *range*, is used to capture the performance on the quality (uncompensated) task dimension. Specifically, *range* is calculated using the formula below:

$$\frac{\sum \text{Abs}(\text{positioned number}_i - \text{given number}_i)}{\text{number of positioned sliders}}$$

*A higher *range* indicates a lower accuracy of the positioned sliders.

IV. RESULTS

One hundred and five students were recruited from a large public university in the United States. I conducted eight sessions online with 10 to 18 participants in each session – four sessions for each condition. Participants were randomly assigned to one of the experimental conditions based on which session they attended. Specifically, there was one condition conducted in each session, and the condition was randomly pre-determined. Nine observations

are removed from the full sample due to technical problems either prior to or during the experiment.⁹ Thus, all analyses are conducted based on 96 observations. On average, participants are 20.3 years old and approximately 26% are male. Experimental sessions lasted approximately 40 minutes. The average pay is \$14.7, including a \$5 show-up fee. There are no significant differences across conditions for age, status, GPA, and number of video games hours played per week (untabulated, all p-values > 0.18, two-tailed). Also, there is no difference in both compensated task dimension performance (*positioned slider*) and uncompensated task dimension performance (*range*) in the practice round (both $p > 0.27$, two-tailed).¹⁰ However, there are significantly more female participants in the tangible reward condition compared to cash reward condition ($p = 0.05$, two-tailed). Also, the ethnicity differs across *cash reward* and *tangible reward* conditions ($p = 0.06$, two-tailed).¹¹

Descriptive Statistics

Table 1 presents descriptive statistics for both dependent variables, *positioned slider*, and *range*, and Figures 1 and 2 show graphical representations. *Positioned slider* is measured by the number of accepted positioned sliders. *Range* is measured by the average distance between the positioned number to the given number for each slider. As mentioned earlier, there is an inverse relationship between *range* and the accuracy level of the positioned sliders. Table 1 shows that the average compensated task dimension performance, *positioned slider*, is 71.51 under the *cash reward* condition and 62.55 under the *tangible reward* condition. Also, consistent with the prediction, *range* is lower in the *tangible reward* condition than in the *cash reward*

⁹ Among the nine participants, two had zero output on the slider task and seven experienced technical problems such as the arrow disappearing, page freezing, or trouble loading the page. Five of them are from the tangible reward condition, and four of them are from the cash reward condition.

¹⁰ Results are inferentially the same after controlling the practice round performance for both H1 and H2.

¹¹ Results are inferentially the same after controlling gender and ethnicity for both H1 and H2.

condition (9.30 versus 11.94 respectively), suggesting the uncompensated task dimension performance of accuracy is higher in the *tangible reward* condition compared with the *cash reward* condition.

---Insert Table 1 about here---

---Insert Figure 1 and Figure 2 about here---

Hypotheses Tests

H1 predicts that in a multidimensional task environment, cash rewards and tangible rewards can motivate similar levels of performance on the compensated task dimension. To test H1, I perform an ANOVA analysis with *positioned slider* as the dependent variable, and *reward type* as the independent variable. As shown in Table 2, there is no significant difference between cash and tangible rewards on the compensated task dimension performance, *positioned slider* ($p = 0.15$, two-tailed).¹² Thus, H1 cannot be rejected, suggesting that reward type does not influence the compensated task dimension performance. The finding is consistent with some prior laboratory experimental research examining the relative efficacy of cash and tangible rewards (Shaffer and Arkes 2009; Kachelmeier, Williamson, and Zhang 2017).

---Insert Table 2 about here---

The main focus of the study is to examine the effect of providing partial incentive in the form of different reward type on the uncompensated task dimension performance. Specifically, H2 predicts that in a multidimensional task environment, tangible rewards can motivate a higher level of performance compared to cash rewards on the uncompensated task dimension. To test the hypothesis, I perform an ANOVA analysis with *range* as the dependent variable, and *reward type* as the independent variable. As shown in Table 3, the result shows that *range* is

¹² p-value equals to 0.29, two-tailed, after controlling for gender and ethnicity.

significantly lower in the *tangible reward* condition compared to the *cash reward* condition ($p = 0.06$, one-tailed).¹³ Since lower *range* indicates a higher accuracy level of the positioned slider, this finding suggests that the uncompensated task dimension performance (accuracy of the positioned slider) is higher when the partial incentive is provided in the form of tangible rewards versus cash rewards. Therefore, H2 is supported.

---Insert Table 3 about here---

Supplemental Analyses

Calculative Mindsets

To shed light on the psychological processes underlying participants' behavior in the multidimensional slider task, I discuss the measure used to capture individuals' calculative mindsets. In developing the hypotheses, affect valuation theory suggests that cash rewards are more likely than tangible rewards to induce a higher level of calculative mindset due the reward nature, and thus can lead to individuals exhibiting self-interested behavior. To capture participants' calculative mindsets, I give participants a post-experimental questionnaire where they respond to the following three questions adapted from the Lay Rationalism Scale used in Hsee et al. (2015) using an 11-point Likert scale, with 1 being strongly disagree and 11 being strongly agree: (1) "*When making decisions, I like to analyze financial costs and benefits and resist the influence of my feelings*", (2) "*When making decisions, I think about what I want to achieve rather than how I feel*", and (3) "*When choosing between two options, one of which is financially superior and the other "feels" better to me. I choose the one that is financially better*".

¹³ p-value equals to 0.045, one-tailed, after controlling for gender and ethnicity.

To measure the consistency of the three questions, I calculate a Cronbach's Alpha score, and it shows that the scale reliability coefficient is 0.77, which exceeds typical reliability thresholds (Peterson 1994). Thus, a *calculative* measure is created by taking the average of participants' response to the three questions, where a higher rating of *calculative* indicates a higher level of calculative mindset. Results show that the measure *calculative* is higher in the *cash reward* condition compared to the *tangible reward* condition (8.58 vs. 8.29, $p = 0.25$ one-tailed).¹⁴ While it provides directional support for the argument that the nature of cash rewards can evoke a higher level of calculative mindset, the difference is not significant.

Motivation

One of the design choices I made is to limit participants' discretion in choosing the gift card reward. Even though this design choice aims to ensure the internal validity, it subjects to the drawback that participants may have a different perception toward the Starbucks gift card. In order to capture participants' attitude toward the rewards, before the 10-minute slider task, participants are asked to rate the statement "*I am very motivated to earn the cash reward (gift card reward)*" on a scale of 1 to 11 with 1 being strongly disagree and 11 being strongly agree. I label this variable as *motivation*. The measure *motivation* is significantly higher in the *cash reward* condition than in the *tangible reward* condition (9.62 versus 7.80 respectively, $p < 0.01$, two-tailed).

To examine whether the uncompensated task dimension performance is still higher in the *tangible reward* condition than in the *cash reward* condition after taking into consideration the participants perception toward the gift card, I rerun the ANOVA analysis with *range* as the dependent variables, *reward type* as the independent variable, and I control for *motivation*.

¹⁴ p-value equals to 0.14, one-tailed, after controlling for gender and ethnicity.

Untabulated result suggests that the accuracy level of the positioned slider (uncompensated task dimension performance) is still significantly higher in the *tangible reward* condition versus in the *cash reward* condition ($p = 0.02$, one-tailed).¹⁵ Thus, the supplemental analysis provides additional support for H2.

V. CONCLUSION

A significant number of organizations are using tangible rewards to motivate their employees. Despite the widespread use of tangible rewards, there is limited understanding of their effectiveness in multidimensional task environments. In multidimensional task environments today, firms often provide employees with partial incentives. This current study examines the effect of reward type on employees' performance under multidimensional task environments, where employees only receive partial incentives. Based on affect valuation theory (Hsee and Rottenstreich 2004, Hsee et al. 2005), I predict and find that even though cash and tangible rewards may motivate similar levels of performance on the compensated task dimension, the performance on the uncompensated task dimension is higher under tangible rewards than cash rewards.

The findings of the study contribute to multiple streams of research. First, the study contributes to the growing stream of research on tangible rewards by providing evidence that their effects might be greater than previously documented since the effect of providing tangible rewards might carry over beyond the compensated task dimensions (Shaffer and Arkes 2009; Jeffrey 2009; Presslee et al. 2013; Kelly et al. 2017; Mitchell et al. 2019). Second, the study contributes to the stream of research on partial incentives by providing insights that the effect of

¹⁵ p-value equals to 0.05, one-tailed, after controlling for gender and ethnicity.

partial incentives on uncompensated task dimension(s) depends on reward type (cash vs. tangible), which is tied to the partial incentives (Holmstrom and Milgrom 1991; Hecht et al., 2012; Harris et al. 2018). Also, the study has important practical implications since it is beneficial for firms to know how to better motivate their employees in a multidimensional task environment. The findings of the study can help firms make more informed decisions when designing their performance management and reward systems.

The study also highlights several important opportunities for future research. First, in my study, I choose to use a piece-rate incentive contract to test my theory because it allows a direct test of how different types of reward influence employees' performance. Future studies can examine whether the findings of the study can generalize to other types of incentives in a multidimensional task environment, such as the goal-based incentive used in Presslee et al. (2013), and the tournament incentive used in Kelly et al. (2017).

Second, I investigate the effect of reward type on a multidimensional task with quantity and quality dimensions. Since there is a natural trade-off between quantity and quality, future research can investigate whether the negative spillover effect of cash rewards on the uncompensated task dimension performance can be mitigated when the multidimensional task is associated with complementary task dimensions. Similarly, even though I have no clear reason to expect the findings would be different in a multi-task setting, understanding the effect of tangible rewards in a multi-task setting warrants future consideration.

Another avenue for future research would examine the interactive effect of reward type and informal controls, such as social norms and organizational culture (Pratt and Beaulieu 1992; Chow, Harrison, McKinnon, and Wu 2002; Tayler and Bloomfield 2011), to see which type of rewards facilitates the effectiveness of informal controls. Also, future studies can further

examine the mindsets induced from different reward types and investigate the effect of providing tangible rewards and cash rewards in a group environment. If, indeed, tangible rewards can induce a lower level of a calculative mindset than cash rewards, then incentivizing employees with tangible rewards may lead to less sabotage behavior in a competitive group environment, or more cooperation in a non-competitive group environment.

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APPENDIX A - Task Example

The image shows a user interface for a task example. It features a central slider control with a range from 0 to 1000. On the left side, the number 215 is circled in blue, with an arrow pointing to a box labeled "Desired number". Below this, the text "Acceptable range: 165 to 265" is displayed. On the right side, the number 248 is circled in blue, with an arrow pointing to a box labeled "Current positioned number". At the bottom center, there is a red button labeled "SUBMIT".

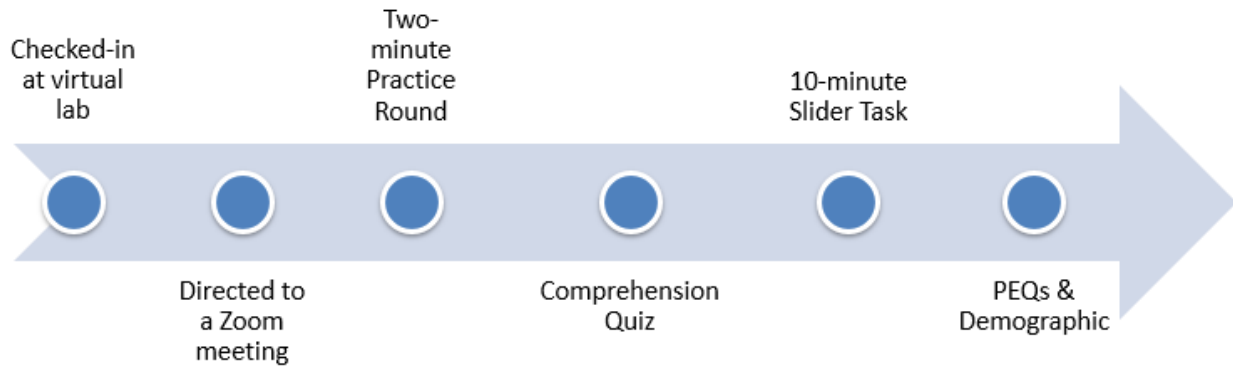
215
Acceptable range: 165 to 265
Desired number

0 1000

248
Current positioned number

SUBMIT

APPENDIX B - Experimental Timeline



Appendix C - Survey

Assume you are working for a company. In addition to your fixed wage, you can earn gift card rewards for your performance. Please answer the following questions:

1. Among the following gift cards, please circle the type of gift card that you find the most attractive.
 - a. AMC movie gift card
 - b. Starbucks gift card
 - c. GameStop gift card
 - d. Domino's Pizza gift card

2. The item (s) that can be purchased with this gift card are fun and exciting to you.



1 2 3 4 5 6 7
Strongly Neither Strongly
Disagree Agree or Agree
Disagree

3. The item (s) that can be purchased with this gift card are fun and exciting to you.



1 2 3 4 5 6 7
Strongly Neither Strongly
Disagree Agree or Agree
Disagree

4. The item (s) that can be purchased with this gift card are fun and exciting to you.



1 2 3 4 5 6 7
Strongly Neither Strongly
Disagree Agree or Agree
Disagree

5. The item (s) that can be purchased with this gift card are fun and exciting to you.



1 2 3 4 5 6 7
Strongly Neither Strongly
Disagree Agree or Agree
Disagree

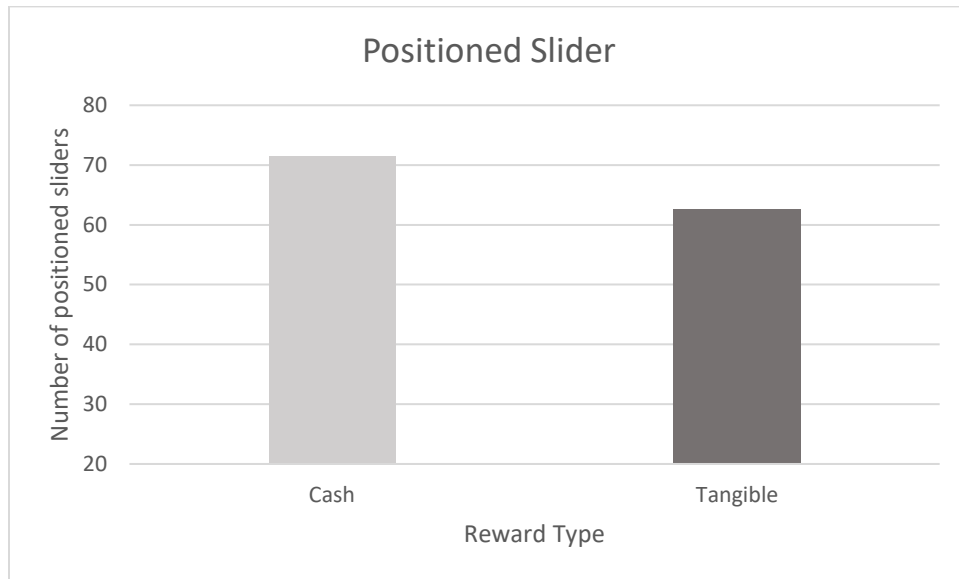
6. If there is another type of gift card you would prefer to receive as a performance reward, please list your favorite gift card option below:

Thank you for participating!

FIGURE 1

Effect of Reward Type^b on the Compensated Task Dimension Performance

(Positioned Slider^a)



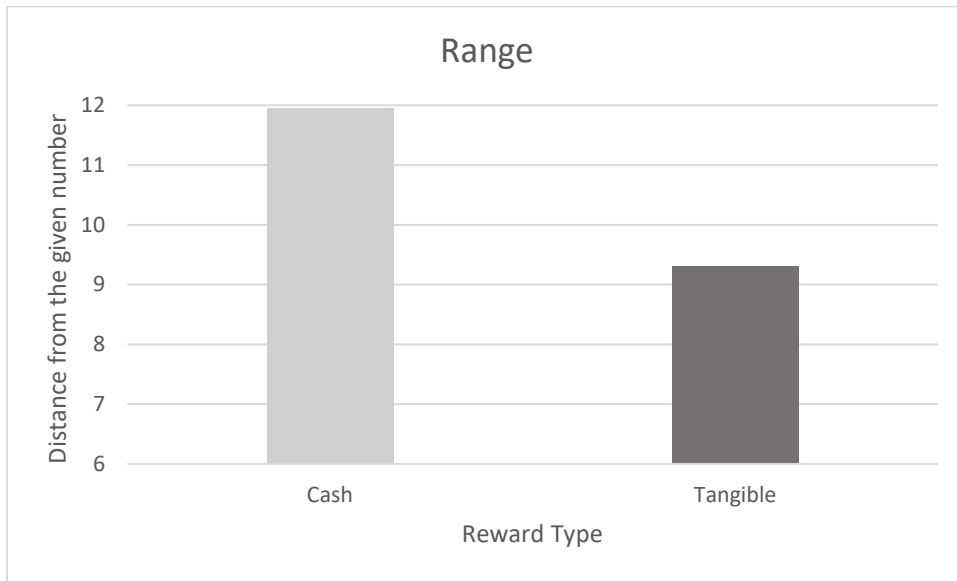
^a *Positioned slider* is measured by the total number of accepted positioned sliders in 10 minutes.

^b *Reward type* is manipulated at two levels, *cash reward* and *tangible reward*. Participants in the *cash reward* condition receive cash in U.S. dollars at a rate of \$0.10 for each accepted positioned slider. Participants in the *tangible reward* condition receive a Starbucks gift card at the same rate for each accepted positioned slider.

FIGURE 2

Effect of Reward Type^b on the Uncompensated Task Dimension Performance

(Range^a)



^a *Range* is measured by the average distance between the positioned number to the given number of the accepted positioned sliders. It can range from 0 to 50. Specifically, a higher *range* indicates a lower accuracy of the positioned sliders.

^b *Reward type* is manipulated at two levels, *cash reward* and *tangible reward*. Participants in the *cash reward* condition receive cash in U.S. dollars at a rate of \$0.10 for each accepted positioned slider. Participants in the *tangible reward* condition receive a Starbucks gift card at the same rate for each accepted positioned slider.

TABLE 1**Descriptive Statistics**

<i>Mean (Standard Deviation)</i>		
Reward Type^c	<i>Positioned Slider^a</i>	<i>Range^b</i>
Cash	71.51 (28.41) N=45	11.94 (8.00) N=45
Tangible	62.55 (31.18) N=51	9.30 (8.78) N=51
Overall	66.75 (30.09) N=96	10.53 (8.48) N=96

^a *Positioned slider* is measured by the total number of accepted positioned sliders in 10 minutes.

^b *Range* is measured by the average distance between the positioned number to the given number of the accepted positioned sliders. It can range from 0 to 50. Specifically, a higher *range* indicates a lower accuracy of the positioned sliders.

^c *Reward type* is manipulated at two levels, *cash reward* and *tangible reward*. Participants in the *cash reward* condition receive cash in U.S. dollars at a rate of \$0.10 for each accepted positioned slider. Participants in the *tangible reward* condition receive a Starbucks gift card at the same rate for each accepted positioned slider.

TABLE 2
Effect of Reward Type^b on the Compensated Task Dimension Performance
(Positioned Slider^a)

Analysis of Variance on Positioned slider

Factor	df	Mean Square	F	p-value
Reward Type^b	1	1920.13	2.15	0.15
Error	94	894.81		

^a *Positioned slider* is measured by the total number of accepted positioned sliders in 10 minutes.
^b *Reward type* is manipulated at two levels, *cash reward* and *tangible reward*. Participants in the *cash reward* condition receive cash in U.S. dollars at a rate of \$0.10 for each accepted positioned slider. Participants in the *tangible reward* condition receive a Starbucks gift card at the same rate for each accepted positioned slider.

*Reported p-value is two-tailed.

TABLE 3
Effect of Reward Type^b on the Uncompensated Task Dimension Performance
(Range^a)

Analysis of Variance on Range

Factor	df	Mean Square	F	p-value
Reward Type^b	1	166.36	2.34	0.06
Error	94	70.99		

^a *Range* is measured by the average distance between the positioned number to the given number of the accepted positioned sliders. It can range from 0 to 50. Specifically, a higher *range* indicates a lower accuracy of the positioned sliders.

^b *Reward type* is manipulated at two levels, *cash reward* and *tangible reward*. Participants in the *cash reward* condition receive cash in U.S. dollars at a rate of \$0.10 for each accepted positioned slider. Participants in the *tangible reward* condition receive a Starbucks gift card at the same rate for each accepted positioned slider.

*Reported p-value is one-tailed due to the directional prediction.