

The Effects of Reward Nature and Reward Contingency on Employee Voluntary Training

by

Pei Wang

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Examining Committee Membership

The following served on the Examining Committee for this thesis. The decision of the Examining Committee is by majority vote.

External Examiner	NAME: Ivo D. Tafkov Title: Professor
Supervisor	NAME: Adam Presslee Title: Associate Professor
Internal Member	NAME: Bradley Pomeroy Title: Associate Professor
Member	NAME: Alan Webb Title: Retired – Distinguished Professor Emeritus
Internal-external Member	NAME: Douglas Brown Title: Professor

Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Despite firms investing billions of dollars in voluntary training, employees' skills still fall behind what firms need. Therefore, managers must motivate employees to allocate more effort toward voluntary training. In a multi-task setting where effort allocated to both production and voluntary training can increase employee performance, I examine how two attributes of performance-based rewards – reward nature (hedonic vs. utilitarian) and reward contingency (goal-based vs. piece-rate) – affect employee total effort, voluntary training effort proportion, and performance. Using a lab experiment, I find that the effect of hedonic (vs. utilitarian) reward nature on employee total effort is more positive when the reward is goal-based than piece-rate; the effect of hedonic (vs. utilitarian) reward nature on employee voluntary training effort proportion is more negative when the reward is goal-based than piece-rate; and the effect of hedonic (vs. utilitarian) reward nature on employee performance is more positive when the reward is goal-based than piece-rate. These results inform managers of the need to consider reward nature and reward contingency together in reward design: adjusting the reward nature is likely more useful in balancing employees' production effort and voluntary training effort for jobs where goal-based rewards are offered than for jobs where piece-rate rewards are offered. Utilitarian reward nature can motivate employees to allocate more time to training than hedonic reward nature when the reward is goal-based; however, reward nature matters less when the reward is piece-rate.

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Dedication

To Yunzhang, Kelan, Mom (Hongmei), and Dad (Qingfeng): this dissertation would not have been possible without you. Thank you for your love and support.

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Chapter 1: Introduction

Firms spend billions of dollars each year on offering voluntary training ([Berkes 2022](#); [Freifeld 2022](#)). Yet, across multiple industries, employees' skills are falling further behind what firms need ([Capranos and Magda 2023](#); [Thier 2023](#)). One problem is that employees are often reluctant to allocate effort toward voluntary training ([Kruse 2022](#); [Rallyware 2021](#); [SHRM 2022](#)). While employees may train to improve their skills and boost their performance over time, the benefit of training, in many cases, is too uncertain for employees to justify a reduction in immediate performance ([Arnold et al. 2025a](#); [Bonner and Sprinkle 2002](#)). Hence, it is critical for managers to better motivate employees to allocate effort from production (i.e., a direct contribution to performance) to voluntary training.

Firms commonly use performance-based rewards to increase employee performance ([Harrison 2019](#); [Merchant and Van der Stede 2023](#)). Since employees' skills can positively affect their performance, performance-based rewards incentivize employees to improve their skills via training ([Berthiaume and Culpepper 2008](#); [Bonner and Sprinkle 2002](#); [Furttmuller et al. 2016](#); [Gimbal 2023](#); [Ledford and Heneman 2011](#)). For example, firms such as Adobe and Coca-Cola offer employees performance-based rewards so that employees are rewarded when training improves their performance ([Mitra 2009](#); [Morris 2017](#)).

Firms' performance-based reward design can vary in two attributes: reward nature and reward contingency. Reward nature is the extent to which a reward is fun and exciting (i.e., hedonic) versus useful and practical (i.e., utilitarian) ([Mitchell et al. 2022](#)). In recent years, firms have begun to diversify employees' performance-based rewards by offering items such as gift cards, merchandise, and trips ([Cusson and Main 2023](#); [Fiolleau et al. 2023](#); [Mayo 2021](#)). Garlick ([2022](#)) estimates that 84 percent of U.S. companies with at least \$1

million in revenue offer rewards other than cash. This has resulted in great variation in reward nature. Reward contingency refers to the contracted relationship between performance levels and rewards ([Bucklin and Dickinson 2001](#); [Ryan et al. 1983](#)). Two types of reward contingency popular among firms are goal-based contingency and piece-rate contingency ([Burek and Malafis 2017](#); [Indeed Editorial Team 2024](#); [Lane 2022](#); [Xoxoday Compass n.d.](#)). A piece-rate reward links the reward monetary value to each unit of an employee's output with a fixed rate, whereas a goal-based reward links the reward monetary value to a specific output level, which is the performance goal ([Bonner and Sprinkle 2002](#)).

While performance-based rewards vary in their nature and contingency in practice, it is unclear how reward nature and reward contingency impact employee effort allocation in a multi-task setting where effort allocated to both production and voluntary training can increase performance. On the reward nature side, prior literature suggests that the effect of reward nature (hedonic vs. utilitarian) on single-task performance depends on how employees assess their rewards. When employees compare their rewards to their salary and focus on whether these two are of the same category, hedonic rewards lead to higher performance than utilitarian rewards ([Mitchell et al. 2022](#); [Choi and Presslee 2023](#)). Alternatively, when employees focus on whether they will feel positive from consuming the rewards, hedonic rewards may lead to higher performance than utilitarian rewards at a low monetary value but lower performance at a high monetary value ([Hsee and Rottenstreich 2004](#)). On the reward contingency side, prior literature suggests that the effect of reward contingency (goal-based vs. piece-rate) on single-task performance depends on the goal difficulty: a piece-rate reward leads to lower performance than a reward based on an easy or difficult goal but higher performance than a reward based on a stretch goal ([Fatseas and Hirst](#)

[1992](#); [Lee et al. 1997](#); [Mowen et al. 1981](#)). Notably, prior literature tends to separately consider the effects of reward nature and reward contingency. As discussed below, there are reasons to believe that reward contingency will moderate the effect of reward nature on employee total effort and their training effort proportion in the setting of this study.

In my dissertation, I develop hypotheses using two mechanisms within the mental accounting framework ([Thaler 1985](#); [1999](#)), which explains individuals' decisions based on how they categorize and value financial outcomes into various mental accounts. Prior studies suggest a categorization mechanism where employees assign utilitarian rewards and their salary to one mental account but assign hedonic rewards to a separate account ([Mitchell et al. 2022](#)). A hedonic reward thus causes a larger proportional increase in an employee's mental account than a utilitarian reward of the same dollar amount ([Mitchell et al. 2022](#)).

Additionally, a few studies suggest a valuation mechanism where employees tend to value hedonic rewards with feelings but utilitarian rewards with calculation ([Chang and Pham 2018](#); [Hsee and Rottenstreich 2004](#); [Kahneman et al. 1999](#); [Kim and Kim 2016](#)). Employees using feelings (vs. calculation) perceive larger increases in their mental accounts when they first secure the presence of their reward but perceive smaller increases in their mental account for reward size increase beyond securing presence of their reward ([Hsee and Rottenstreich 2004](#); [Kahneman et al. 1999](#); [Levav and McGraw 2009](#); [Schaller and Cialdini 1990](#)). Notably, the categorization mechanism requires employees to be calculative and estimate proportional changes in their mental accounts, but employees who rely on feelings care little about the size of increases in their mental accounts as long as there is an increase. Hence, the categorization mechanism and the valuation mechanism can compete against each other, and only one can be active at a given time. The competing relationship between the

two mechanisms is consistent with prior findings that individuals' calculative thinking competes with their affective thinking ([Berger, Guo, and Presslee 2023](#); [Small, Loewenstein, and Slovic 2007](#); [Zhong 2011](#)).

When the categorization mechanism is active, employees pursuing hedonic (vs. utilitarian) rewards perceive a larger increase in their mental accounts and exert more total effort (H1). Further, prospect theory suggests that employees are more reluctant to risk losing a reward of higher perceived value ([Kahneman and Tversky 1979](#); [Presslee et al. 2013](#)). Because the benefit of the training task is more uncertain than the production task ([Arnold et al. 2025a](#)), allocating a higher proportion of effort to training puts more reward at risk. Subsequently, the categorization mechanism predicts that employees' voluntary training effort proportion will be lower when they pursue hedonic rewards than utilitarian rewards (H3). The reward contingency does not affect the categorization mechanism because employees do not consider reward contingency as they categorize hedonic and utilitarian rewards ([Choi and Presslee 2023](#); [Mitchell et al. 2022](#)).

When the valuation mechanism is active, employees pursuing hedonic (vs. utilitarian) rewards perceive larger increases in their mental accounts when they first secure the presence of their reward but perceive smaller increases in their mental account for further increases in reward size ([Hsee and Rottenstreich 2004](#); [Kahneman et al. 1999](#); [Levav and McGraw 2009](#); [Schaller and Cialdini 1990](#)). Since securing the presence of reward tends to be harder when the reward is goal-based than piece-rate ([Berger et al. 2023](#); [Locke and Latham 2015](#)), employees pursuing hedonic (vs. utilitarian) rewards are more likely to perceive a larger increase in their mental account when the reward is goal-based than piece-rate; the effect of hedonic (vs. utilitarian) reward nature on employee total effort will be more positive when

rewards are goal-based than piece-rate (H2). Given that employees lower their voluntary training effort proportion for larger perceived increase in their mental accounts, the valuation mechanism also predicts that the effect of hedonic (vs. utilitarian) reward nature on employee voluntary training effort proportion will be more negative when rewards are goal-based than piece-rate (H4). Finally, I pose a research question on the effects of reward nature and reward contingency on employee performance (RQ1) since the predicted effects of reward nature and reward contingency on employee total effort and voluntary training effort proportion do not allow me to predict their effects on employee performance.

I conduct a 2 (*Reward Nature*: hedonic vs. utilitarian) $\times$ 2 (*Reward Contingency*: goal-based vs. piece-rate) laboratory experiment with 141 undergraduate students from a Canadian university. Under each reward contingency condition, participants are randomly assigned to one of the two reward nature conditions. Based on results from a pilot study, I offer movie theater chain gift cards under the hedonic condition and grocery store chain gift cards under the utilitarian condition. I run the experiment under the piece-rate condition first to determine the performance goal and goal-based reward before running the goal-based condition. Following prior literature ([Bonner and Sprinkle 2002](#); [Kelly et al. 2015](#)), I select the number of points gained by the top 20 percent of participants under the piece-rate condition as a difficult but attainable goal, and the goal-based gift card value is the average gift card value received by the top 20 percent of participants under the piece-rate condition.

Participants work on a production task and a training task over three one-minute periods. The production task and the training task each are a modified version of the slider task developed by Gill and Prowse ([2012](#)). Each slider has a range of 0 to 100 and is initially positioned at 0. Participants can change the position of each slider using a computer mouse.

Under the production task, participants are given 60 sliders each period and they complete sliders to gain points. Following the conventional way to gain points, participants gain 1 point for each slider positioned to exactly 50. In addition, there are six alternative ways to gain points. Each alternative way to gain points involves four special sliders from which participants can gain an average of 20 points for positioning the 4 sliders to a special value (i.e., 5 points per slider). The high points per slider incentivize participants to reveal alternative ways. Participants learn the conventional way from the instructions but can only discover those alternative ways by working on the training task. Under the training task, participants are given a separate set of 60 sliders throughout the three production periods. By positioning these training sliders to 50, participants do not gain points but can reveal the six alternative ways. While all six alternative ways are revealed when the 60 sliders are completed, each alternative way takes a different number of sliders to reveal. Once an alternative way is revealed, it will remain visible at the top of the screen until the end of the third production period.

Participants' total effort is measured by the total number of sliders they complete under both the production task and the training task over three production periods. Participants' voluntary training effort proportion is calculated as the number of sliders they complete for training divided by the total number of sliders they complete. Participants' performance is measured by the total number of points they gain over three production periods.

The results offer mixed support for my hypotheses. I do not find support for the main effects of reward nature on employee total effort or voluntary training effort proportion driven by the categorization mechanism. However, I find support for the two predicted

interactions between reward nature and reward contingency driven by the valuation mechanism. The effect of hedonic (vs. utilitarian) reward nature on total effort is more positive when the reward is goal-based than piece-rate. In addition, the effect of hedonic (vs. utilitarian) reward nature on voluntary training effort proportion is more negative when the reward is goal-based than piece-rate. Finally, hedonic (vs. utilitarian) reward nature has no main effect on performance, but the effect of hedonic (vs. utilitarian) reward nature is more positive when the reward is goal-based than piece-rate. Consistent with these findings, supplemental analysis suggests that the categorization mechanism is inactive while the valuation mechanism is active.

My dissertation contributes to both theory and practice. Theoretically, I show that reward nature can affect employees' effort allocation in a multi-task setting, extending prior findings that reward nature affects employee effort in a single-task setting ([Choi and Presslee 2023](#); [Mitchell et al. 2022](#)). I also provide evidence that reward contingency moderates the effect of reward nature via a valuation mechanism, and the valuation mechanism competes with the categorization mechanism. To the best of my knowledge, this is the first study to demonstrate how reward nature affects employee training effort allocation in a multi-task setting and how reward contingency moderates the effect of reward nature. While this study focuses on production and training tasks, the theory of this study may generalize to other multi-task settings where tasks differ in their payoff uncertainty (e.g., [Chen et al. 2025](#)).

Practically, this study contributes to the emerging literature on how management controls motivate employees to enhance their skills (e.g., [Arnold et al. 2025a](#); [Arnold et al. 2025b](#); [Kelly et al. 2021](#)). The results show that utilitarian reward nature may motivate employees to allocate more time to training than hedonic reward nature when the reward is

goal-based; when reward is piece-rate, reward nature may matter less. Hence, managers should consider both reward nature and reward contingency when designing performance-based rewards: adjusting the reward nature is likely more useful in balancing the short-term need for performance and long-term need for employee development for jobs where goal-based rewards are offered than for jobs where piece-rate rewards are offered.

The remainder of my dissertation is organized as follows: Chapter 2 reviews literature related to employee voluntary training, multi-task effort allocation, reward nature, and reward contingency. Chapter 3 develops theories on the effects of reward nature and reward contingency on 1) employee total effort on a production task and a voluntary training task, and 2) their voluntary training effort proportion. Chapter 4 describes the experiment design for data collection. Chapter 5 discusses the results of hypothesis testing and supplemental tests. Chapter 6 discusses the contribution of this dissertation and future research opportunities that arise from its limitations.

Chapter 2: Literature Review

2.1 Introduction

In this chapter, I review prior literature related to my research questions. This chapter is organized as follows. In section 2.2, I review the training literature that is relevant to the current study. In section 2.3, I review existing literature with multi-task settings. Sections 2.4 and 2.5 cover prior studies on the two independent variables of this study: reward nature and reward contingency. This chapter concludes with section 2.6.

2.2 Training

2.2.1 Voluntary Training

Training is an effort to increase skills for performing one or more activities ([Buckley and Caple 2009](#)). It is well-established in prior literature that training is beneficial to employee performance. Arthur et al. ([2003](#)) find from a meta-analysis of 26 studies medium to large sample-weighted effect sizes of training on various job performance measures.¹ In another meta-analysis of 56 studies on small and medium-sized enterprises, Rauch and Hatak ([2016](#)) find that enhancing employee skills is positively correlated with firm performance. Ibrahim et al. ([2017](#)) surveyed 260 trainees who underwent a soft skills training program and their supervisors. The authors find a positive correlation between trainees' soft skills acquired and their supervisor-assessed job performance. Lacerenza et al. ([2017](#)) find from a meta-analysis of 335 studies that leadership training positively impacts employee job performance and firm performance.

¹ Arthur et al. ([2003](#)) suggest that the effect size of training tends to be larger when training outcome is measured by post-training test performance than by trainees' self-reported effectiveness, trainees' on-the-job performance, or firm performance. The reason for the differences in effect sizes may be that post-training test performance is less affected by employees forgetting or having limited opportunities to apply what they learned ([Arthur et al. 2003](#)).

Firms recognize the value of training and spend billions of dollars to provide employees with training, especially voluntary training ([Berkes 2022](#); [Freifeld 2022](#)). Voluntary training is any training that is not an employment requirement ([Curado et al. 2015](#); [Gegenfurtner et al. 2016](#)). U.S. companies invested over \$100 billion in training in 2023, with 87% of this amount allocated to voluntary training ([Freifeld 2023](#)). These voluntary training programs often allow employees to 1) improve their skills for their current role and 2) allocate effort to training at the most convenient time and location. [Table 1](#) summarizes features and customers of the top nine employee training systems listed on Forbes ([Haan and Watts 2024](#)). These training systems are used by more than 71,000 companies worldwide, and many large organizations such as IBM, Walmart, and Amazon are among the clients of these training systems. All nine training systems allow employees to access training anytime from anywhere. In addition, eight of these training systems allow employees to upskill, which means increasing employee skills for the same role in practice ([Hall 2023](#)). To help employees allocate effort to training at work, many firms including Bosch and Unilever are also joining the recent trend of microlearning, where firms break down their training into many short sessions that can fit in between work tasks ([WalkMe Team 2023](#)).

Prior research offers conflicting evidence on which type (i.e., voluntary vs. mandatory) of training is more beneficial to firms. On the one hand, adult learning theory ([Knowles 1973](#)) suggests that employees will only learn what they want to learn. Therefore, voluntary training may lead to better learning outcomes than mandatory training, as employees who take training voluntarily are more likely to be interested in the training than those who are mandated to take training. Consistent with this idea, several studies have found that voluntary training is more effective than mandatory training. Hicks and Klimoski ([1987](#))

find from a field experiment at a large not-for-profit organization in the U.S. that employees are more motivated to learn and learn more when training is voluntary than mandatory. Cohen ([1990](#)) surveys employees at five U.S. organizations and show that employees are more motivated to train when training is voluntary than mandatory. Baldwin et al. ([1991](#)) find from a lab experiment that individuals are more motivated to train on topics of their choice. Mathieu et al. ([1992](#)) survey employees of a large university in the U.S. before and after training; they find that employees react more positively to training and learn more when training is voluntary than mandatory. Yardley ([2003](#)) surveys participants of government pre-employment training programs in England and finds that voluntary training helps participants get employed sooner than mandatory training. Curado et al. ([2015](#)) survey employees of a large Portuguese insurance company and demonstrate that employees who take training voluntarily are more motivated to share training knowledge with others than those mandated to take training.

On the other hand, there is evidence that mandatory training is more beneficial to firms than voluntary training. Tsai and Tai ([2003](#)) survey participants of government-sponsored bank training programs in Taiwan and find that mandatory training leads to higher training motivation than voluntary training when trainees believe that an important training program is more likely to be made mandatory than voluntary. Sandvik et al. ([2021](#)) find from a field experiment involving a mentorship program that mandatory training leads to more performance improvement than voluntary training because employees who can benefit the most from training may not participate when training is voluntary. Overall, which training form (voluntary vs. mandatory) is more beneficial seems to depend on firms' training needs:

voluntary (vs. mandatory) training tends to result in fewer employees taking training, but those who train have higher training motivation.

Anecdotal evidence suggests that firms choose voluntary training over mandatory training in practice for a few reasons. First, employees may feel controlled and react negatively when forced to take training ([Tomlinson 2002](#)); second, firms can save money with voluntary training since some jurisdictions do not require firms to pay for employees' time spent on voluntary training or only require firms to pay for voluntary training under certain conditions ([Shukullari 2023](#); [US Department of Labor n.d.](#)); finally, making training voluntary instead of mandatory help lower employees' stress at work ([Vladyslav 2022](#)).

My dissertation does not aim to determine whether voluntary training is more beneficial to firms than mandatory training. Rather, I focus on the effect of incentives on employees' effort allocation in a setting where all employees are offered voluntary training, which is more common than mandatory training in practice.

Despite firms' heavy investment in voluntary training, employees often avoid allocating effort toward voluntary training. Nearly 70% of employees claim that they are busy working and have no time for training, indicating stronger motivation for production than training ([Bloom 2024](#); [Kruse 2022](#)). To address this problem, managers will need to motivate employees to allocate effort between training and production in a more balanced way. Since multiple tasks are involved here, I will discuss prior studies that involve multiple tasks in the next section.

2.3 Prior Literature with Multi-task Settings

2.3.1 Multitasking in Practice

Most employees multitask whereby they work on multiple tasks over a time period (e.g., [Douglas et al. 2017](#); [Liu et al. 2021](#); [Suija-Markova et al. 2020](#)). For instance, a waiter serves multiple groups of customers during dining hours; an office worker compiles a report and takes training on work automation during the day. More than 80% employees multitask at work ([World Economic Forum 2022](#)), and an average employee switches between ten applications multiple times a day ([Martins 2025](#)).

Employees have limited cognitive resources for performing tasks; performing more tasks during the same period reduces cognitive resources for each task and increases cognitive resources spent on task switching, causing performance to drop ([Rubinstein et al. 2001](#); [Wickens 1991](#)). Multiple studies in cognitive psychology, driver distraction, and human-computer interaction show that multitasking reduces performance efficiency and accuracy (see a review by [Douglas et al. 2017](#)). Although Adler and Benbunan-Fich ([2012](#); [2015](#)) suggest based on lab experiments that multitasking may not harm performance when multitasking level is low (e.g., a low number of tasks or a short duration of multitasking) or when tasks are easy, sufficient evidence remains about the downside of multitasking.

Despite the evidence of the downsides of multitasking, employees are often required to multitask for a few reasons. First, some jobs are inherently multitasking (e.g., driving). Second, assigning employees multiple tasks can help employees develop more skills, making them versatile and change-ready ([Whitfield 2000](#)). Third, employees assigned multiple tasks are less likely to feel bored and are more likely to stay engaged at work ([Liu et al. 2021](#); [Spink et al. 2008](#)). Finally, firms typically utilize multiple software programs that force

employees to multitask ([Martins 2025](#)). My dissertation does not seek to address whether firms should assign employees multiple tasks. Instead, I seek to understand how reward design features affect employees' efforts in production and training tasks.

2.3.2 Motivating Effort in Multi-Task Settings

When employees are assigned multiple tasks, managers are faced with the challenges of motivating the desired level of total effort and the desired effort allocation ([Hannan et al. 2013](#)).² Analytical research suggests that firms may motivate the desired effort allocation with rewards based on multiple weighted performance measures if performance is easily measurable ([Feltham and Xie 1994](#); [Datar et al. 2001](#)), and firms should opt for fixed pay if performance is costly to measure and/or if increased effort on one task decreases effort on other tasks ([Holmstrom and Milgrom 1991](#)). Hannan et al. ([2013](#); [2019](#)) find that relative performance information can play a similar role as performance-based rewards in distracting effort and can have a stronger effect on employee effort allocation than certain rewards. Schnieder et al. ([2024](#)) shows additional evidence that relative performance information increases productive effort but reduces knowledge-sharing effort in a setting where employees can produce output or share knowledge with others.

A few studies challenge the notion that rewarding performance on one task decreases effort on unrewarded tasks. Hecht et al. ([2012](#)) find from a lab experiment that a partial (i.e., based on the performance of some but not all tasks) reward does not reduce performance of the unrewarded task when employees perform both tasks in the same period, because the physiological response to the partial rewards induces more effort on both rewarded and

² Some studies use the term dimension and describe their settings as multi-dimensional (i.e., multiple dimensions for effort exertion), where effort exerted in one dimension does not affect performance in other dimensions. For ease of reading, I only use the term task and refer to any multi-dimensional settings as multi-task settings with independent tasks.

unrewarded tasks. Lane ([2022](#)) shows via lab experiments that goal attainment and positive feedback of a rewarded task result in more effort spillover to the unrewarded task when employees perform tasks sequentially than concurrently. Xu ([2021](#)) further suggests from a lab experiment that employees pursuing non-cash partial rewards become less self-interested and allocate more effort to the unrewarded task than those pursuing cash rewards. These studies suggest that the motivating effect of partial rewards may go beyond the rewarded task, making it possible for partial rewards to be better than fixed pay in a multi-task setting.

Note that the studies discussed above only consider independent tasks, where effort on one task does not contribute to performance on other tasks ([Holmstrom and Milgrom 1991](#)). Some tasks are not independent - effort allocated to one task can change how effort translates to performance in other tasks ([Webb et al. 2013](#)).³ In the earlier example of an office worker compiling a report and taking training on automation during the day, the report compilation task depends on the training task because the effort on automation may allow the same report to be created and formatted with one click instead of a number of clicks plus typing. Such non-independent settings offer a unique opportunity to explore the effects of rewards that are based on performance in one task but can incentivize two tasks. Webb et al. ([2013](#)) experimentally examine a setting where employees can either perform a task in a conventional way or look for production efficiencies to perform the same task more efficiently. They find that easy goals and fixed pay lead to more shortcuts discovered than challenging goals and goal-based pay. Newman et al. ([2025](#)) explore the same setting and find that conditional reward frequency decreases efficiency discovery, whereas unconditional

³ Some studies examine interdependent tasks in a team setting, where the effort and skills of each team member can influence the link between team performance and other team members' effort ([Arnold and Tafkov 2019](#); [Arnold and Bauch 2022](#)). The setting of this study involves only one employee and one-way dependency, where the production task depends on the training task but the training task does not depend on the production task.

reward frequency increases efficiency discovery. Chen et al. ([2025](#)) further explore this setting and find that encouraging employee failure disclosure results in higher exploration performance only when employees' task-related skills are evaluated.

Arnold et al. ([2025a](#)) experimentally examine a setting that is similar yet different from Webb et al. ([2013](#)). In Arnold et al. ([2025a](#)), employees can perform a task with or without training to improve their task skills. Whereas high performance can be achieved with high effort only and does not require knowing the product efficiency in Webb et al. ([2013](#)), high performance requires both high effort and high skill in Arnold et al. ([2025a](#)). Arnold et al. ([2025a](#)) find that employees are more (less) likely to take training outside (inside) working hours when relative performance information is present than when relative performance information is absent. In a subsequent study, Arnold et al. ([2025b](#)) find that under the same setting, performance goals reduce employees' training effort, and training recommendations motivate training effort better at the beginning of a period than in the middle of the period. This result is consistent with the finding of Webb et al. ([2013](#)), such that employees pursuing current performance goals care less about their future performance, so tasks that benefit future performance (e.g., finding efficiency and improving skills) are less important to employees.

Relative to the setting of Webb et al. ([2013](#)), the setting of this study makes it easier for employees to gain production efficiency by directly offering the knowledge of production efficiency via training instead of asking employees to discover such knowledge on their own. In addition, high task skill is not a necessary condition for high performance in the setting of this study, which makes training less appealing in this study than Arnold et al. ([2025a](#); [2025b](#)). Finally, it remains unexamined how employees' effort allocation between production

and training depends on two important but understudied compensation system elements: reward nature and reward contingency. I review prior literature related to them in the next two sections.

2.3.3 Performance-Based Rewards and Effort Allocation

Firms commonly use performance-based rewards to increase employee output ([Luthans et al. 2021](#)). For instance, salespeople earn commissions based on their sales, and housekeepers receive additional pay for high-quality work. Seventy-seven percent of U.S. firms use performance-based rewards, and more than half of them commit over 10 percent of their total payroll budget to such rewards ([Harrison 2019](#)). Performance-based rewards increase employee effort allocated to output-increasing tasks (as opposed to non-output-increasing tasks), so that employees can achieve higher output and more desired rewards (e.g., [Bonner and Sprinkle 2002](#); [Lazear 2000](#); [Merchant and Van der Stede 2023](#)).⁴ Garbers and Konradt's ([2014](#)) meta-analysis of 146 studies shows that performance-based rewards positively impact performance quantity and quality. While some earlier studies argue that performance-based rewards can crowd out employees' intrinsic motivation (e.g., [Deci and Ryan 1985](#)), Cerasoli et al. ([2014](#)) find from a meta-analysis of 183 studies that the relationship between intrinsic motivation and performance is stronger when extrinsic performance-based rewards are offered. Hence, it is clear from prior research that performance-based rewards can increase employee output without hurting employees' intrinsic motivation.⁵

⁴ Effort includes effort intensity, effort duration, effort direction (i.e., tasks employees choose to engage) to increase current performance and strategy development (i.e., acquiring skills needed to perform) to increase future performance ([Bonner and Sprinkle 2002](#))

⁵ Performance-based rewards have some limitations. For example, when the full range of work performance is not defined or measured, performance-based reward will distort employee effort allocation – employees can allocate too much effort to the rewarded performance dimension(s) ([Kerr and Rifkin 2009](#))

Performance-based rewards can increase performance by increasing productive effort or voluntary training effort ([Bonner and Sprinkle 2002](#); [Furtmuller et al. 2016](#)). Productive effort directly contributes to performance, whereas voluntary training effort improves employees' skills, which are knowledge and abilities that are relevant to task performance ([Bonner and Sprinkle 2002](#)). When employees' skill increases, the same amount of productive effort results in more output ([Bonner and Sprinkle 2002](#); [Sprinkle 2000](#)).⁶ For this reason, performance-based rewards are an essential component of a skill-based pay system ([Ledford and Heneman 2011](#)).

2.3.4 Training Rewards

Several firms use training rewards, where firms reward employees for completing training. The firm for the field study by Kelly et al. ([2021](#)) allow employees to play slot machines upon training completion; a U.S. outdoor gear retailer rewards employees with outdoor gear for completing training ([Krell 2013](#)); Centurion Asset Management rewards employees gift cards for completing training ([HRReporter 2023](#)); and Royal Bank of Canada rewards employees points for completing training, and employees can use these points to redeem merchandise and gift cards ([Axonify n.d.](#)).

As discussed earlier, performance-based rewards boost performance ([Garbers and Konradt 2014](#); [Cerasoli et al. 2014](#)). Similarly, training rewards increase employees' training completion as training completion results in more desired rewards. The accounting literature offers limited direct evidence on the effectiveness of training rewards, but in the education space, Lintner ([2024](#)) finds from a meta-analysis of 18 studies with random assignment that

⁶ When firms offer employee training as benefits, employees may reciprocate with increased effort and performance ([Balkin and Richebe 2007](#)). Because all the employees receive the same voluntary training opportunity in this study, the main effect of training biases against detecting performance-based reward effects on employee performance.

rewards contingent on higher education students' performance increase these students' learning performance (e.g., college credits earned and exam scores).

However, training rewards have at least two limitations. First, training rewards do not effectively incentivize employees to apply what they learn from training, as employees do not receive additional training rewards beyond the completion of training. Second, training rewards may cause an adverse selection problem because employees have private information regarding their skills ([Sprinkle 2003](#); [Rallyware 2022](#)). Employees may take training they do not need only to obtain more training rewards. In my dissertation, I do not consider the effect of training rewards. Instead, I focus on performance-based rewards that incentivize employees to take training and apply training to improve their performance.

2.4 Reward Nature

2.4.1 Reward Type and Reward Nature

U.S. companies spend approximately \$176 billion annually on non-cash rewards ([Garlick 2022](#)). Such rewards include a wide range of offerings – gift cards, merchandise, and trips ([Fiolleau et al. 2023](#); [Giftcards.com 2021](#); [Incentive Research Foundation 2023](#)). For instance, a recent survey reports that merchandise rewards widely used in North America and Europe include apparel, food, electronics, sporting items, office accessories, luggage, housewares, and flowers ([Incentive Research Foundation 2023](#)). This widespread use of non-cash rewards highlights the diversity of reward nature in practice, where rewards can range from fun and exciting (hedonic) to useful and practical (utilitarian) ([Mitchell et al. 2022](#)). Hedonic and utilitarian nature are not necessarily two ends of the same spectrum - low hedonic nature does not guarantee high utilitarian nature and vice versa ([Voss et al. 2003](#)). I

follow prior literature and take a holistic approach by conceptualizing reward nature as a summary construct ([Mitchell et al. 2022](#); [Okada 2005](#)).

Despite the variation of reward nature in practice, few studies have examined the effect of reward nature on employee effort. The prior literature tends to focus on reward type and compare cash rewards to tangible rewards, defined as non-cash rewards with restricted use ([Choi and Presslee 2023](#)).⁷ Silbert ([2005](#)) suggests based on a survey that tangible rewards valued by employees are recalled more frequently than cash rewards, resulting in higher perceived organizational support. Jeffrey ([2009](#)) offers evidence from a lab experiment on the positive effect of tangible (vs. cash) rewards on employee performance. He suggests that employees can be more motivated by tangible rewards than cash, as receiving tangible rewards eliminates the need to justify purchases of tangible items. Shaffer and Arkes ([2009](#)) suggest that employees desire tangible rewards more than cash rewards when evaluating each reward type separately but desire cash rewards more than tangible rewards when evaluating two reward types jointly, because the stronger positive feeling from consuming tangible (vs. cash) rewards is highlighted during separate evaluation but the higher fungibility of cash (vs. tangible) rewards is highlighted during joint evaluation. Presslee et al. ([2013](#)) draw on mental accounting theory ([Thaler 1999](#)) and theorize a categorization mechanism where employees tend to assign cash rewards and salary under the same mental account but assign tangible rewards to a different mental account. Subsequently, employees perceive a larger proportional change in their mental accounts when they pursue tangible rewards than cash rewards. The authors conduct a quasi-field experiment at a

⁷ Some studies define tangible rewards as rewards that are easily observable and measurable and compare tangible rewards to intangible rewards, defined as rewards that are difficult to observe and measure (e.g., [Xiao and Hew 2024](#); [Yoon et al. 2015](#)). These studies are excluded from the literature review since they are out of the scope of the current study.

financial services firm and find that employees who receive tangible (vs. cash) rewards only for goal attainment choose easier goals and are more committed to attaining their goals. As a result, employees pursuing tangible (vs. cash) rewards perform worse due to selecting easier goals. Kelly et al. ([2017](#)) also rely on the categorization mechanism to predict that employees pursuing hedonic tangible (vs. cash) rewards will perform better in a tournament. Using field experiment data from rug retailers, the authors find no effect of tangible (vs. cash) rewards on performance in the first tournament but a positive effect of tangible (vs. cash) rewards in the second tournament, driven by losers in the first tournament.

To reconcile conflicting prior findings, Choi and Presslee ([2023](#)) argue that tangible rewards differ from cash rewards over four attributes, namely fungibility (low vs. high), reward nature (hedonic vs. utilitarian), novelty (high vs. low), and discrete framing (discrete vs. joint). Based on a series of studies, the authors show that the positive effect of tangible (vs. cash) rewards on employee effort hinges on employees' perceived differences in reward nature, novelty, and discrete framing. Consistent with these findings, Kachelmeier et al. ([2023](#)) show that tangible rewards with low fungibility and low hedonic nature result in lower effort than cash rewards, and this demotivating effect is stronger when the reward is based on group performance than individual performance because employees are uncertain of group-level tangible rewards' attractiveness to their group members. Newman et al. ([2024](#)) suggest that the motivating effect of a tangible (vs. cash) reward diminishes as reward frequency increases, because tangible rewards are less fungible than cash rewards. Stubbs and Bentley ([2024](#)) further suggest that subordinates (vs. supervisors) focus more on fungibility and perceive cash to be more desirable than tangible rewards. Through a lab experiment, they show that tangible (vs. cash) rewards based on subordinates' performance

have a more positive effect on performance targets set by supervisors increase than subordinates' effort level.

Importantly, in Choi and Presslee's ([2023](#)) Experiment 2, participants reading the description of a hedonic (vs. utilitarian) reward nature condition indicate higher motivation to earn the reward. This result suggests that a difference in reward nature alone can be sufficient to activate the categorization mechanism for employees, enabling a positive effect of hedonic (vs. utilitarian) reward nature on employee effort. Mitchell et al. ([2022](#)) also support this main effect of reward nature. The authors theorize that because employees spend a large portion of their salary on utilitarian purchases, they tend to assign utilitarian rewards to the same mental account as salary but assign hedonic rewards to a different mental account. Subsequently, employees perceive a larger proportional increase in their mental accounts when they pursue hedonic rewards than utilitarian rewards. To test their theory, the authors conduct two experiments. In experiment one, where participants categorize utilitarian and hedonic tangible rewards by completing a sorting task, the authors find that participants assign utilitarian and hedonic rewards to two separate categories, and salary is more frequently assigned to the same category as utilitarian rewards. In experiment two, participants complete a real-effort task to earn either a grocery store gift card (utilitarian) or a movie theater gift card (hedonic). Participants pursuing hedonic rewards outperform those pursuing utilitarian rewards.

Another stream of literature suggests a valuation mechanism, where employees can value their rewards using either feelings or calculation, and they are more likely to use feelings to value tangible (vs. cash) or hedonic (vs. utilitarian) rewards. Rottenstreich and Hsee ([2001](#)) find that individuals value affect-rich outcomes with feelings but value affect-

poor outcomes with calculation; relative to individuals using calculation, individuals using feelings perceive a small probability to be larger but a large probability to be smaller. For instance, in one experiment, participants prefer a 1% probability of winning a \$500 coupon for a European vacation (i.e., valued with feelings) over a 1% probability of winning a \$500 coupon for covering tuition (i.e., valued with calculation), but they prefer a 99% probability of winning a \$500 coupon for covering tuition than a 99% probability of winning a \$500 coupon for a European vacation. McGraw et al. ([2010](#)) suggest that the findings of Rottenstreich and Hsee ([2001](#)) could be driven by the increased difficulty of combining outcome value with probability when the outcome is non-monetary. The authors show from a lab experiment that the pattern observed by Rottenstreich and Hsee ([2001](#)) can be lessened by making probability information more salient. Several accounting studies suggest that reward type affects probability perception via the valuation mechanism. Kelly et al. ([2017](#)) follow Rottenstreich and Hsee ([2001](#)) and theorize that tournament winners pursuing tangible (vs. cash) rewards perceive a lower probability of a future win and become less complacent, whereas tournament losers pursuing tangible (vs. cash) rewards perceive a higher probability of a future win and are less likely to give up. The authors' field experiment shows that tangible (vs. cash) rewards positively affect performance in a subsequent tournament, driven by the performance increase of losers in the initial tournament. Similarly, Cardinaels et al. ([2025](#)) theorize that tangible (vs. cash) rewards weaken the negative effect of idea rejection on subsequent creative performance because employees pursuing tangible (vs. cash) rewards are less likely to perceive a lower probability of future success after idea rejection. Their lab experiment results support their theory.

Two studies suggest a different consequence of the valuation mechanism: employees valuing rewards with feelings (calculation) may also be more prosocial. Wang et al. ([2014](#)) show from five experiments that participants using feelings (vs. calculation) behave in a less self-interested manner in scenarios including the Dictator game and the Ultimate game. Xu ([2021](#)) chooses a setting where managers reward performance on one task but desire good performance on two tasks. The author finds that employees pursuing tangible (vs. cash) rewards are less self-interested and allocate more effort to the unpaid task.

A third consequence of the valuation mechanism is related to individuals' perceived outcome value, independent of probability information. Hsee and Rottenstreich ([2004](#)) suggest that individuals using feelings (vs. calculation) focus more on whether a reward is present or absent and less on the monetary value of the reward. As a result, employees using feelings (vs. calculation) perceive a monetary value difference between zero and a positive number to be bigger but any increase beyond that positive number to be smaller. For instance, in one of the authors' experiments, participants are willing to work significantly more hours for \$60 cash (i.e., valued with calculation) than \$30 cash, but they are willing to work similar hours for a \$60 music book (i.e., valued with feelings) and a \$30 music book. In addition, participants are willing to work more hours for a \$30 music book than \$30 cash but fewer hours for a \$60 music book than \$60 cash. Kim and Kim ([2016](#)) find from a lab experiment that the nature (hedonic vs. utilitarian) of consumption can affect consumers' choices via the valuation mechanism, suggesting that reward nature can affect employees in a similar way. Newman et al. ([2024](#)) theorize that employees experience more satiation when repeatedly receiving tangible rewards than cash rewards. Using a lab experiment, the authors

show that the motivating effect of tangible rewards decreases more than cash rewards when given more frequently.

The review of reward nature literature reveals two things. First, the reward nature literature has focused on single-task settings and has not examined the effect of reward nature on employee effort allocation in a multi-task setting where effort allocated to both a production task and a training task can increase performance. Second, the effect of reward nature on employee effort in a single-task setting is not straightforward, as the findings supporting the categorization mechanism at times appears to contradict those supporting the valuation mechanism, and vice versa. For example, in the experiment by Hsee and Rottenstreich ([2004](#)) where participants were offered either cash or a music book, the categorization mechanism would predict that participants pursuing the music book were willing to work more hours than those pursuing cash, regardless of the dollar value. In the experiment by Mitchell et al. ([2022](#)) where participants were offered either grocery gift cards (i.e., utilitarian rewards) or movie theater gift cards (i.e., hedonic rewards), participants pursuing hedonic rewards outperformed participants pursuing utilitarian rewards consistently over three rounds, with no drop in performance over time. This result supports the categorization mechanism but is in conflict with the valuation mechanism, which would suggest a reduction in effort over time under the hedonic reward nature condition.⁸ A possible explanation for the conflicting findings is that the categorization mechanism requires employees to be calculative and estimate proportional changes in their mental

⁸ In Mitchell et al. ([2022](#)) experiment 2, participants receive US\$0.04 for each correctly positioned slider. Participants complete an average of 86.58 sliders under the utilitarian reward nature condition and an average of 93.85 sliders under the hedonic reward nature condition. Those translate to US\$3.46 worth of gift card under the utilitarian reward nature condition and US\$3.75 worth of gift card under the hedonic reward nature condition. Thus, it is possible that the monetary value of the reward offered in Mitchell et al. ([2022](#)) experiment 2 is too low to reach satiation.

accounts, but employees who rely on feelings care little about the size of increase in their mental accounts as long as there is an increase. Subsequently, the categorization mechanism and the valuation mechanism compete against each other, and only one can be active at a given time. The competing relationship between the two mechanisms is consistent with prior findings that individuals' calculative thinking competes with their affective thinking ([Berger et al. 2023](#); [Small, Loewenstein, and Slovic 2007](#); [Zhong 2011](#)).

2.5 Reward Contingency

Reward contingency refers to the contracted relationship between performance levels and rewards ([Bucklin and Dickinson 2001](#); [Ryan et al. 1983](#)). As discussed in previous sections, performance-based rewards are commonly used in practice with various reward contingencies (e.g., [Lazear 2000](#); [Presslee et al. 2013](#); [Kelly et al. 2017](#); [Grabner and Martin 2021](#)). In this study, I focus on goal-based (e.g., target bonus) and piece-rate (e.g., sales commission) reward contingency. A piece-rate reward links the reward monetary value to each unit of an employee's output with a fixed rate, whereas a goal-based reward links the reward monetary value to a specific output level, which is the performance goal ([Bonner and Sprinkle 2002](#)). Piece-rate rewards are commonly used in industries such as manufacturing, forestry, sales, service, and medical care ([Lane 2022](#); [Starr 2024](#); [Toupin et al. 2007](#)); goal-based rewards are also seen in many industries, including finance, energy, manufacturing, and technology ([Herbert 2023](#); [Merchant and Van der Stede 2023](#); [Shoplogix 2023](#)).⁹ Piece-rate rewards and goal-based rewards both require employees' outputs to be measurable, but piece-rate rewards require that employees' output can be quantified and divided into

⁹ Many firms offer a combination of goal-based reward and piece-rate reward: employees receive a reward for reaching a performance goal and a reward for every unit of output beyond the performance goal ([Merchant and Van der Stede 2023](#)). This type of reward is outside the scope of the current study.

homogeneous units ([Indeed Editorial Team 2025](#); [Merchant and Van der Stede 2023](#)). In contrast, goal-based rewards can be based on any output ([Merchant and Van der Stede 2023](#)).

Since I have discussed existing evidence of performance-based rewards on employee performance in section 2.2.3, I focus on studies that compare a goal-based reward with a piece-rate reward in this section. Several studies provide mixed results of reward contingency (goal-based vs. piece-rate) on performance. Pritchard and Curtis ([1973](#)) conduct a lab experiment using a card-sorting task. The authors find that participants pursuing a goal-based (vs. piece-rate) reward perform better. Bazerman ([1982](#)) finds from a lab experiment using a proofreading task that a goal-based reward results in worse performance than a piece-rate reward. Huber ([1985](#)) uses a similar proofreading task in her experiment. The author finds that a piece-rate reward leads to a larger performance increase than a reward based on a self-selected goal, but a smaller performance increase than a reward based on an assigned goal. Dickinson and Gillette ([1994](#)) find no effect of reward contingency (goal-based vs. piece-rate) on performance from a lab experiment where participants work on a data-entry task with their reward switching between goal-based and piece-rate over different periods. A few studies find that a piece-rate reward leads to lower performance than a reward based on an easy or difficult goal but higher performance than a reward based on a stretch goal ([Fatseas and Hirst 1992](#); [Lee et al. 1997](#); [Mowen et al. 1981](#)). These findings suggest that the mixed results from prior studies may be driven by goal difficulty: whereas employees are nearly guaranteed to gain under a piece-rate reward, the proportion of employees who are confident to get a goal-based reward depends on the goal difficulty ([Bonner and Sprinkle 2002](#)). Chong and Leung ([2018](#)) find from a lab experiment that when individuals are assigned a performance goal and receive performance feedback, a piece-rate reward leads to higher

performance than a reward based on an easy or moderately difficult goal. Ramos ([2022](#)) further suggests that when employees are given tiered goals ranging from easy to stretch, piece-rate (vs. goal-based) rewards have no effect on their performance. Despite the evidence of the effect of reward contingency on employee effort, prior studies have not investigated how reward contingency moderates the effect of reward nature on employee effort, let alone employees' effort allocation between production and training.

2.6 Conclusion

In this chapter, I review literature related to the setting and the two independent variables of this study. These bodies of literature indicate that the effects of reward nature and reward contingency on employee effort allocation in the setting of this study remain open questions. In the next chapter, I will develop theories on the effects of reward nature and reward contingency on employee total effort (production effort plus voluntary training effort) and their voluntary training effort proportion.

Chapter 3: Hypotheses Development

3.1 Introduction

In this chapter, I first discuss in section 3.2 theories on mental accounting. Then, I develop hypotheses about the effects of reward nature and reward contingency on employee total effort (section 3.3), voluntary training effort proportion (section 3.4), and performance (section 3.5). This chapter concludes with section 3.6. The hypothesized theoretical model is depicted in [Figure 1](#).

3.2 Mental Accounting: Categorization Versus Valuation

Mental accounting theory ([Thaler 1985](#); [1999](#)) suggests that employees' decisions are driven by their perceived change in their mental accounts, which depends not only on the monetary size of rewards but also on how employees categorize and value rewards under different mental accounts. During the categorization process, employees mentally assign each reward to a mental account based on the similarity between the reward and items typically expected under the mental account ([Thaler 1985](#); [Choi and Presslee 2023](#)). Once a reward is categorized, employees value the reward by evaluating the change in the mental account caused by the reward ([Mitchell et al. 2022](#); [Thaler 1999](#)).

The theory in my dissertation builds on two competing mechanisms within the mental accounting framework: a categorization mechanism and a valuation mechanism. Under the categorization mechanism, employees tend to assign utilitarian rewards and salary to the utilitarian account but assign hedonic rewards to the hedonic account because they spend a large portion of their salary on utilitarian items ([Mitchell et al. 2022](#)). As a result, a hedonic reward causes a higher proportional change in an employee's mental account than a utilitarian reward of the same monetary value ([Choi and Presslee 2023](#); [Mitchell et al. 2022](#)).

Under the valuation mechanism, employees anticipate stronger positive feelings from consuming hedonic rewards than utilitarian rewards because: 1) hedonic (vs. utilitarian) rewards offer more fun and excitement, and 2) hedonic (vs. utilitarian) purchases are more difficult to justify ([Jeffrey 2009](#); [Kim and Kim 2016](#)). Hence, employees tend to value utilitarian rewards with calculation but value hedonic rewards with feelings ([Chang and Pham 2018](#); [Hsee and Rottenstreich 2004](#); [Kahneman et al. 1999](#); [Kim and Kim 2016](#)). When employees rely on their feelings, their focus is simply to feel positive, regardless of how positive they feel ([Levav and McGraw 2009](#); [Schaller and Cialdini 1990](#)). Since feeling positive depends on whether the reward presence is secured, employees using feelings (vs. calculation) perceive larger increases in their mental accounts when they first secure the presence of their reward but perceive smaller increases in their mental account for reward size increase beyond securing presence of their reward ([Hsee and Rottenstreich 2004](#); [Kahneman et al. 1999](#); [Levav and McGraw 2009](#); [Schaller and Cialdini 1990](#)).

As discussed in Chapter 2, the categorization mechanism and the valuation mechanism compete against each other, and only one can be active at a given time. The reason is that the categorization mechanism requires employees to be calculative and estimate proportional changes in their mental accounts. However, employees who rely on feelings care little about the size of increases in their mental accounts as long as there is an increase.¹⁰ The hypotheses development below builds on this proposed competing relationship between the two mechanisms.

¹⁰ Because 1) the boundary conditions for activation of the categorization mechanism and the valuation mechanism are not clear and 2) prior findings supporting the categorization mechanism at times appear to contradict those supporting the valuation mechanism, I assume that the two mechanisms are simultaneous. If the categorization mechanism occurs before or after the valuation mechanism (i.e., the two mechanisms are sequential), then the two mechanisms may co-exist.

3.3 Total Effort

3.3.1 Main Effect of Reward Nature

I begin by developing hypotheses on the effect of reward nature on employees' total effort allocated to a production task and a voluntary training task. When employees can increase their performance by allocating effort towards a production task and a voluntary training task, their total effort depends on their perceived increase in their mental accounts from their effort. When the categorization mechanism is active, employees pursuing hedonic (vs. utilitarian) rewards will perceive a larger increase in their mental accounts ([Choi and Presslee 2023](#); [Mitchell et al. 2022](#)). Therefore, the categorization mechanism predicts a positive main effect of hedonic (vs. utilitarian) reward nature on employee total effort.

H1: Employees will exert more total effort when they pursue hedonic rewards than utilitarian rewards.

When the valuation mechanism is active, the effect of reward nature depends on how easily employees can secure the presence of their reward. Recall that relative to those using calculation, employees using feelings perceive larger increases in their mental account when they first secure the presence of their rewards, but perceive smaller increases in their mental account beyond securing the presence of their rewards ([Hsee and Rottenstreich 2004](#); [Kahneman et al. 1999](#); [Levav and McGraw 2009](#); [Schaller and Cialdini 1990](#)). When it is easy to secure the presence of rewards, hedonic (vs. utilitarian) reward nature will likely cause a smaller perceived increase in employees' mental accounts, negatively affecting employee total effort; when it is difficult to secure the presence of reward, hedonic (vs. utilitarian) reward nature will likely cause a larger perceived increase in employees' mental accounts, positively affecting employee total effort. In this case, the valuation mechanism does not predict a main effect of reward nature on employee total effort.

3.3.2 Moderating Effect of Reward Contingency

When the categorization mechanism is active, reward contingency does not matter because employees categorize hedonic reward and utilitarian reward based on the purposes the rewards serve – whether to meet employees’ needs in life or to get the fun and excitement employees want ([Mitchell et al. 2022](#)). Subsequently, the categorization mechanism does not predict how reward contingency moderates the effect of reward nature on employee total effort.

When the valuation mechanism is active, the reward contingency determines how easily employees can secure the presence of their rewards.¹¹ Since firms rarely set performance goals at one unit of output ([Berger et al. 2023](#); [Locke and Latham 2015](#)), securing the presence of a piece-rate reward is easier than a goal-based reward in most cases. As discussed earlier, when it is easy to secure the presence of reward, hedonic (vs. utilitarian) reward nature will likely cause a smaller perceived increase in employees’ mental accounts, negatively affecting employee total effort; when it is difficult to secure the presence of reward, hedonic (vs. utilitarian) reward nature will likely cause a larger perceived increase in employees’ mental accounts, positively affecting employee total effort. Hence, the valuation mechanism predicts that the effect of hedonic (vs. utilitarian) reward nature on employee total effort will be more positive when the reward is goal-based than piece-rate.

H2: The effect of hedonic (vs. utilitarian) reward nature on employee total effort will be more positive when the reward is goal-based than piece-rate.

¹¹ I am not aware of any evidence that reward contingency affects how employees value (i.e., by feeling vs. by calculation) their rewards.

The predicted results for H1 and H2 are displayed in [Figure 2](#). Note that the valuation mechanism does not predict any main effect of reward nature on employee total effort. The reason is that the size of employees' perceived increase in their mental accounts depends on how easily employees can secure the presence of their rewards. In summary, the categorization mechanism predicts H1 but not H2, and the valuation mechanism predicts H2 but not H1.

3.4 Voluntary Training Effort Proportion

3.4.1 Main Effect of Reward Nature

Next, I theorize the effect of reward nature on employees' voluntary training effort proportion, which is the effort allocated to the voluntary training task divided by employee total effort.¹² In practice, there is more uncertainty associated with training than production ([Arnold et al. 2025a](#)). Prior to training, employees have limited information about (1) how much training will improve their skills, (2) how often and how long they will be able to apply skills gained from training, and (3) how much greater skills will improve the extent productive effort (i.e., effort allocated to the production task) translates to performance ([Arnold et al. 2025a](#); [Bonner and Sprinkle 2002](#); [Langelett 2002](#); [SHRM 2022](#)). To begin with, the well-supported Dunning-Kruger effect suggests that employees with lower skills have less accurate assessments of their own skills and performance (e.g., [Kruger and Dunning 1999](#); [Pennycook et al. 2017](#)). Further, many factors (e.g., technology and regulation) determining the skills beneficial for performance can also change over time,

¹² At the construct level, the dependent variable in H3 and H4 is effort direction. Voluntary training effort proportion operationalizes effort direction. I assume a linear relationship between total effort and voluntary training effort. Voluntary training effort proportion scales voluntary training effort by total effort to exclude any increase in voluntary training effort due to spillover from an increase in total effort, thus accurately capturing employees' effort direction.

making it more difficult to determine the future benefit of training ([Mager-Lightfoot 2018](#)). For instance, prompt engineering, a skill to optimize artificial intelligence tools' (e.g., ChatGPT) outputs with designed inputs, has gained popularity recently as firms increase their use of artificial intelligence ([McKinsey & Company 2024](#)). However, when employees decide whether or not to learn prompt engineering, they cannot accurately predict how often they will use AI tools at work or how much effort they will need to exert to achieve a desirable output each time they use AI tools. Because the benefit of the voluntary training task is more uncertain than the production task ([Arnold et al. 2025a](#)), employees pursuing performance-based rewards put more reward at risk by allocating a higher proportion of effort to voluntary training.

Prospect theory, a fundamental tenet of mental accounting, suggests that the pain of losing an amount is stronger than the pleasure of gaining the same amount ([Kahneman and Tversky 1979](#)). Thus, employees are more reluctant to risk losing a reward when the reward causes a larger increase in their mental accounts ([Presslee et al. 2013](#)). When the categorization mechanism is active, hedonic (vs. utilitarian) rewards result in a larger increase in employees' mental accounts. Hence, the categorization mechanism predicts that employees pursuing hedonic (vs. utilitarian) rewards will be more reluctant to risk losing their reward and allocate a lower proportion of total effort to voluntary training.

H3: Employees' voluntary training effort proportion will be lower when they pursue hedonic rewards than utilitarian rewards.

As discussed under H1, when the valuation mechanism is active, whether employees pursuing hedonic (vs. utilitarian) rewards perceive a larger or smaller increase in their mental accounts depends on how easily employees can secure the presence of reward. Since the valuation mechanism does not predict a main effect of reward nature on employee total

effort, it also does not predict a main effect of reward nature on employee voluntary training effort.

3.4.2 Moderating Effect of Reward Contingency

As discussed under H2, when the categorization mechanism is active, reward contingency does not matter since it does not change how employees categorize their rewards. Subsequently, the categorization mechanism does not predict how reward contingency moderates the effect of reward nature on employee voluntary training effort proportion. However, when the valuation mechanism is active, the effect of hedonic (vs. utilitarian) reward nature on employees' perceived increase in their mental accounts is more positive when the reward is goal-based than piece-rate. Given that employees are more reluctant to risk losing a reward when the reward causes a larger increase in their mental accounts ([Presslee et al. 2013](#)), the valuation mechanism predicts that the effect of hedonic (vs. utilitarian) reward nature on employees' voluntary training effort proportion will be more negative when the reward is goal-based than piece-rate.

H4: The effect of hedonic (vs. utilitarian) reward nature on employee voluntary training effort proportion is more negative when the reward is goal-based than piece-rate.

The predicted results for H3 and H4 are displayed in [Figure 3](#). Importantly, the categorization mechanism predicts H3 but not H4, and the valuation mechanism predicts H4 but not H3.

3.5 Performance

Whereas H1 predicts a positive main effect of hedonic (vs. utilitarian) reward nature on employee total effort, H3 predicts a negative main effect of hedonic (vs. utilitarian) reward nature on employee voluntary training effort proportion. Hence, the effect of hedonic (vs. utilitarian) reward nature on employee performance is unclear.

Similarly, H2 predicts that the effect of hedonic (vs. utilitarian) reward nature on employee total effort will be more positive when reward is goal-based than piece-rate, but H4 predicts that the effect of hedonic (vs. utilitarian) reward nature on employee voluntary training effort proportion will be more negative when reward is goal-based than piece-rate. Thus, the effect of goal-based (vs. piece-rate) reward contingency on employee performance is also unclear. Accordingly, I pose a research question on the effects of reward nature and reward contingency on employee performance.

RQ1: What are the effects of hedonic (vs. utilitarian) reward nature and reward contingency (goal-based vs. piece-rate) on employee performance?

3.6 Conclusion

In this chapter, I make predictions on the effects of reward nature and reward contingency on employee total effort and voluntary training effort proportion based on two competing mechanisms under the mental accounting framework: the categorization mechanism and the valuation mechanism. The next chapter will discuss the experiment design of this study.

Chapter 4: Research Method

4.1 Introduction

This chapter covers the details of my experiment design. Section 4.2 provides an overview of the experiment. I then describe the experiment design in detail, including participants (section 4.3), procedure (section 4.4), experiment tasks (section 4.5), independent variables (section 4.6), dependent variables (section 4.7), and control variables (section 4.8). This chapter concludes with section 4.9.

4.2 Overview

I use a 2 (*Reward Nature*: hedonic vs. utilitarian) $\times$ 2 (*Reward Contingency*: goal-based vs. piece-rate) computer-based laboratory experiment to test my hypotheses. Participants earn points redeemable for gift card rewards based on their performance. The vendor of participants' gift cards depends on the reward nature conditions participants are assigned. The vendors for hedonic and utilitarian reward nature are pre-determined by a pilot study following Mitchell et al. ([2022](#)). I also manipulate whether participants' gift card reward contingency is goal-based or piece-rate. I set a performance goal and a goal-based reward under the goal-based condition based on participants' performance under the piece-rate condition (run before the goal-based condition) to ensure payout consistency ([Bonner and Sprinkle 2002](#); [Kelly et al. 2015](#)). Within each reward contingency condition, participants are randomly assigned to a reward nature condition.

The experiment involves participants allocating their effort between a production task and a training task. Both the production task and the training task are adapted from the slider

task developed by Gill and Prowse ([2012](#)).¹³ Participants can earn points under the production task in a conventional way or in six alternative ways. Participants learn the conventional way from the instruction and can work on the training task to reveal alternative ways. However, working on the training task takes away time for the production task. Participants complete a one-minute practice round with the production task only, followed by a three-minute production round that includes both task options.

4.3 Participants

I recruit 141 undergraduate students from a Canadian university to participate. These participants are well-suited for the slider task, as the task is simple and can detect the motivating effect of reward on student participants' effort ([Georganas et al. 2015](#); [Mitchell et al. 2022](#)). I exclude pilot study participants from the participant pool for the main experiment because they may compare the gift card reward offered in the main experiment to other gift card options presented during the pilot study, which would unnecessarily introduce noise into the analysis. Participants take part in 20 experiment sessions over five days, with session sizes ranging between one and 20. Each participant works independently on one of 26 computers with identical hardware and software settings in a lab on campus during their experimental session.

4.4 Experiment Procedure

Once participants give their informed consent, they read the experiment instructions describing four components of the experiment: the production task, the training task, the one-minute practice round, and the three-minute production round. The instructions are presented

¹³ I use ChatGPT ([OpenAI 2024](#)) to create the first draft of JavaScript code and assist with subsequent debugging for the main experiment task.

over four screens, with each screen informing participants of only one component. After each instruction screen, participants answer one comprehension check question to verify their understanding. When participants answer a comprehension check question correctly, they are notified that their answer is correct and that they can proceed to the next screen. When participants answer a comprehension check question incorrectly, they are notified that their answer is incorrect and are provided with the correct answer before proceeding to the next screen.

After passing all the comprehension check questions, participants complete the practice round. Following prior studies (e.g., [Burt et al. 2020](#); [Kelly et al. 2015](#)), the practice round occurs before the reward nature and reward contingency manipulation so that participants' practice round performance can be used as a proxy for participants' slider task innate skill.¹⁴ The practice round differs from the production round in that the training task is not available during the practice round. The instructions inform participants of this difference. Further, to ensure that the screen layout of the practice round closely resembles the production round, I show participants the screen area where training sliders will appear, with a sentence saying that training is not available. At the end of the practice round, participants are told the number of points they obtain during the practice round and are reminded that their practice-round performance will not affect their compensation. The task screen of the production round is displayed in [Appendix A](#), and the task screen of the practice round is displayed in [Appendix B](#). The experiment instrument is displayed in [Appendix F](#).

¹⁴ I do not compensate participants for their practice round performance because I will have to choose one fixed level of reward nature and reward contingency for all employees, which may affect how they perceive the reward nature and reward contingency manipulation (discussed later).

Next, participants learn their possible gift card reward vendor (i.e., reward nature manipulation) and complete the reward nature manipulation check questions. Afterward, they are told how their gift card value is determined - whether their gift card reward is piece-rate or goal-based (i.e., reward contingency manipulation). Please see the independent variables subsection (subsection 4.6) for a detailed discussion of independent variable manipulations and manipulation checks.

Before the three-minute production round, participants are reminded of all the instructions they have read about the production round, the production and training tasks, and their potential gift card reward. The production round is divided into three one-minute periods to prevent fatigue and give participants more opportunities to benefit from training (discussed later). For each production period, when the one-minute countdown ends, participants are automatically advanced to the next screen, where they are informed of the number of points they gain during that period, the accumulated total number of points they gain (from the beginning of the first production period), and the gift card reward value based on their accumulated total points. After the production round, participants answer questions about their thought processes and provide demographic information.

Finally, participants fill in a form with their gift card reward information and their university email address, so that the lab administrator can send participants gift card rewards to their email addresses. Once the information on the form is checked by the lab administrator, participants collect \$5 show-up fee in cash and leave the lab. All participants

who earn a gift card receive their gift cards within 14 days after the experiment.¹⁵ I show the experiment procedure flow chart in [Figure 4](#).

4.5 The Tasks

The production task and the training task each are modified versions of the slider task developed by Gill and Prowse ([2012](#)). Performance on the slider task has been widely used in economics and accounting studies to proxy effort (e.g., [Chan 2018](#); [Gill and Prowse 2019](#); [Mitchell et al. 2022](#)). In the slider task, each slider has a range of 0 to 100 and is initially positioned at 0. Participants use a computer mouse to move a slider bar to exactly 50 to complete the slider.

I employ the slider task for two reasons. First, capturing participants' effort allocated to both tasks (i.e., production and training) with sliders allows me to estimate the proportion of total effort allocated to training with ease, as the sliders are identical ([Gill and Prowse 2019](#)). Second, the slider task is more effective at detecting incentive effects than other commonly used real-effort tasks ([Choi et al. 2025](#)).

In the production task, participants are given 60 sliders in each one-minute period to correctly position. The number indicating the position value of a slider is displayed on the right side of the slider, and the label of a slider is displayed on the left side of the slider. To help participants distinguish between the labels and the position value of sliders, each slider is labeled with two letters in alphabetical order from AA to CH (i.e., AA, AB, AC, ..., AY, AZ, BA, BB, ..., CG, CH). Participants can complete these sliders in any order to gain

¹⁵ Distributing gift cards at the end of each experiment session would require me to predict participants' reward amounts and purchase extra gift cards to cover the uncertainty in participants' performances. Emailing participants their gift cards after the experiment is easier to implement because I know the number of gift cards and the dollar value of each gift card. I am not aware of any negative impact on my results from emailing participants their gift cards.

points, and the instruction informs them of the conventional way to gain points – one point for each slider positioned at 50. The label of a slider is in black by default, but turns green when a slider is correctly positioned at 50. At the beginning of each period, all 60 sliders are reset to 0, allowing participants to gain points on all 60 sliders in the new period.

The purpose of giving participants 60 sliders in the production task for each one-minute period is to prevent participants from completing all the sliders and taking training out of boredom, which would threaten the internal validity of the study. In Gill and Prowse ([2019](#)), participants completed a maximum of 41 sliders in two minutes, equivalent to 20.50 sliders in one minute. In Mitchell et al. ([2022](#)), participants completed an average of 93.90 (86.60) sliders in five minutes when pursuing hedonic (utilitarian) rewards, equivalent to 18.78 (17.32) sliders in one minute. When considering mean plus three standard deviations (i.e., the common threshold for identifying outliers, see discussion in [Kline 2011](#)), participants would have completed 132.79 (138.48) in five minutes when pursuing hedonic (utilitarian) rewards, equivalent to 26.56 (27.70) sliders in one minute. Hence, it will be nearly impossible for participants to complete all 60 sliders and have spare time in the production task in one minute.¹⁶

In addition to the conventional way to gain points, there are six alternative ways to gain points in the production task, listed in [Appendix C](#). The alternative ways introduce skill elements to the production task: each alternative way allows participants to gain several points each period if they position four special sliders at a special value (e.g., gain 22 points if sliders AJ, AO, BA, CD are positioned at 79). Since participants gain more points from

¹⁶ A longer period would require more sliders on one screen and force participants to spend time scrolling up and down, which may reduce the time available for working on the two tasks.

each slider completed under the alternative ways, they are incentivized to follow the alternative ways. However, to reveal the alternative ways, participants must allocate effort to the training task (discussed below). Because each alternative way requires four sliders to be positioned at a value over 60, participants are unlikely to discover any alternative way when they follow the conventional way to gain points by positioning sliders at 50. Further, the four special sliders under each alternative way are placed randomly, preventing participants from identifying all four special sliders involved without training. When participants move these special sliders to their special positions, the labels of these special sliders turn red.

In the training task, participants are given 60 sliders from the beginning of the first production period to the end of the third production period. By positioning sliders at 50 in the training task, participants do not gain points but reveal the six alternative ways to gain points.¹⁷ Since I am not interested in the effect of participants' memory on their effort allocation and task performance, once an alternative way is revealed, the alternative way remains visible on screen during each period, until the end of the third production period. Similar to sliders in the production task, sliders in the training task are labeled with two letters from TA to VH (i.e., TA, TB, TC, ..., TY, TZ, UA, UB, ..., VG, VH). The label of a slider turns green when the slider is positioned at 50. The training task is not available during the practice round, so that participants can get a rough idea of how many points they can gain

¹⁷ Webb et al. (2013) use a letter search task where participants can discover hidden patterns in the letter boxes to count the frequencies of letters more efficiently. The slider task in this study differs from Webb et al.'s (2013) letter search task in three ways. First, whereas Webb et al. (2013) use the number of production efficiencies discovered as a proxy for effort towards outside-the-box thinking, I capture training effort with sliders. Because participants may put in effort but end up learning nothing, the number of training sliders completed as a measure of training effort is less noisy than the number of production efficiencies discovered. Second, I capture participants' effort allocated to both production and training with sliders. Since sliders are identical across repetition (Gill and Prowse 2019), participants' effort allocated to the two tasks can be compared with ease. Finally, some of the patterns in Webb et al. (2013) are harder to learn and apply than others. I choose to provide participants with easy-to-apply alternatives to minimize their effort to apply training because such effort is not captured by sliders and becomes noise when I measure employee effort with the number of sliders completed.

in one minute by following the conventional way. The task screen of the production round is displayed in [Appendix A](#).

As discussed earlier, employees are reluctant to allocate effort to voluntary training because the benefits of training are more uncertain than the benefits of production ([Arnold et al. 2025a](#); [SHRM 2022](#)). Prior to training, employees have limited information about (1) how much training will improve their skills, (2) how often and how long they will be able to apply skills gained from training, and (3) how much greater skills will improve the extent productive effort (i.e., effort allocated to the production task) translates to performance ([Arnold et al. 2025a](#); [Bonner and Sprinkle 2002](#); [Langelett 2002](#); [SHRM 2022](#)). The experiment design captures such uncertainty in several ways. First, participants do not know the number of alternative ways they can reveal. While all six alternative ways are revealed when the 60 training sliders are completed, each alternative way takes a different set of sliders to reveal ([Appendix C](#)). The instruction recommends that they follow alphabetical order (i.e., the order of the labels) when completing training sliders, but participants can complete training sliders in any order. If participants do not follow this order, they may reveal alternative ways at different times, and they are not necessarily worse off. Second, participants do not know the number of opportunities they will have to benefit from the alternative ways revealed, as they may not have enough time to follow the alternative way revealed in a given period.¹⁸ Finally, participants do not know how each alternative way modifies the link between their effort and performance, since the costs and benefits of following each alternative way differ. Despite the uncertainty in training benefits, training

¹⁸ Participants have limited time to take training and limited opportunities to apply what they learn from training during the experiment. This setting feature heightens the risk of training and biases against me in finding support for H3 and H4 regarding employee voluntary training effort proportion.

remains beneficial. On average, each alternative way grants participants 20 points for 4 sliders per period and costs 10 sliders to reveal. If participants follow the conventional way to gain points, they will gain 14 points by completing 14 sliders in the production task. Relative to the conventional way, the alternative way allows participants to gain 6 extra points (i.e., $20 - 14 = 6$) in one production period, 22 extra points (i.e., $20 \times 2 - 14 - 4 = 22$) in two production periods, and 38 extra points (i.e., $20 \times 3 - 14 - 4 - 4 = 38$) in three production periods.¹⁹

4.6 Independent Variables

4.6.1 Pilot Study for Reward Nature Manipulation

I conduct a pilot study to determine the gift cards to use for each reward nature condition in the main experiment ([Mitchell et al. 2022](#)).²⁰ Specifically, I recruit 30 undergraduate students from a Canadian university and ask their opinions on gift cards from 17 different vendors, presented in random order. Each of the 17 vendors has a website for making purchases and each has at least one location that is within a 30-minute travel distance from campus by bus (i.e., no more than 16km), so that none of the gift cards will be too costly for students to use.

Participants indicate, on a 7-point scale (i.e., $-3 = \textit{strongly disagree}$; $3 = \textit{strongly agree}$), the extent they agree/disagree with two statements: (1) “The item(s) that can be purchased with this gift card are fun and exciting to me” (i.e., rating of hedonic nature); (2)

¹⁹ To determine the average of extra points for following alternative ways, I compare the scores I gain by following the conventional ways and by following the alternative ways (i.e., apply all the revealed alternative ways first, and train if no un-applied alternative way) under various extra points for following alternative ways. At 6 extra points, my scores by following the alternative ways can surpass my scores by only following the conventional way at the end of third period. Three Ph.D. students went through the experiment instrument. They completed 22, 5, and 26 training sliders and gained 46, 56, and 64 points, respectively. Hence, it is possible to benefit from training, but the benefit is uncertain.

²⁰ Both the pilot study and the main study received ethics approval from the University of Waterloo Research Ethics Board.

“The item(s) that can be purchased with this gift card are necessary and helpful to me” (i.e., rating of utilitarian nature)” ([Mitchell et al. 2022, 197](#)). I also ask participants the frequency they visit each vendor (online store included) and their average spending per visit at each vendor (online store included), because prior literature implies that participants’ past purchases may impact their perceived value of a gift card ([Skwara 2023](#)). The pilot study instrument is located in [Appendix E](#).

The results of the pilot study are summarized in [Table 2](#). Gift card vendors whose hedonic rating is significantly higher than utilitarian rating include: Banana Republic ($t(29) = 1.98, p = 0.06$), Cineplex ($t(29) = 7.33, p < 0.01$), East Side Mario ($t(29) = 1.77, p = 0.09$), Footlocker ($t(29) = 2.25, p = 0.03$), Indigo ($t(29) = 2.90, p = 0.01$), Montanas ($t(29) = 2.25, p = 0.03$), New York Fries ($t(29) = 4.43, p < 0.01$), Roots ($t(29) = 4.23, p < 0.01$).²¹ Among them, Cineplex (Hedonic: $t(29) = 15.90, p < 0.01$; Utilitarian: $t(29) = 0.29, p = 0.10$), East Side Mario (Hedonic: $t(29) = 2.56, p = 0.02$; Utilitarian: $t(29) = 1.10, p = 0.28$), New York Fries (Hedonic: $t(29) = 5.52, p < 0.01$; Utilitarian: $t(29) = 0.29, p = 0.77$), and Roots (Hedonic: $t(29) = 3.94, p < 0.01$; Utilitarian: $t(29) = 0.20, p = 0.85$) each have a hedonic rating significantly above zero; none of them have a utilitarian rating significantly above zero. I choose the Cineplex gift card among the four options for hedonic reward nature manipulation because it has the highest hedonic mean rating (Mean = 2.50).

Gift card vendors whose utilitarian rating is significantly higher than hedonic rating include: Foodland ($t(29) = -3.94, p < 0.01$), FreshCo ($t(29) = -5.63, p < 0.01$), Sobeys ($t(29) = -5.76, p < 0.01$), Walmart ($t(29) = -4.37, p < 0.01$). Among them, FreshCo (Hedonic: $t(29) = 6.18, p < 0.01$; Utilitarian: $t(29) = -4.86, p < 0.01$), Sobeys (Hedonic: $t(29) = 4.17, p <$

²¹ All p values are two-tailed unless otherwise noted.

0.01; Utilitarian: $t(29) = -5.69, p < 0.01$), and Walmart (Hedonic: $t(29) = 1.84, p = 0.08$; Utilitarian: $t(29) = -8.03, p < 0.01$) differ from Cineplex both in hedonic rating and utilitarian rating. I choose the FreshCo gift card among the three options for utilitarian reward nature manipulation because it has the lowest mean hedonic rating (Mean = 0.63), offering the best chance of manipulating utilitarian reward nature without manipulating hedonic reward nature.

For the Cineplex, no participant goes there on a weekly basis, and less than ten percent of participants go there on a monthly basis. All participants spend less than \$50 each time they visit the Cineplex. In contrast, ten percent of participants go to the FreshCo on a weekly basis, and one-third of participants go to the FreshCo on a monthly basis. Half of participants spend less than \$50 each time they visit the FreshCo; over forty percent of participants spend between \$50 and \$100 each time they visit the FreshCo; and the remaining participants spend between \$100 and \$500 each time they visit the FreshCo.

4.6.2 Reward Nature Manipulation

Based on the pilot study results, I select Cineplex gift card for the hedonic reward nature condition and FreshCo gift card for the utilitarian reward nature condition. Since my theory relies on the difference in how participants consume hedonic (vs. utilitarian) rewards, I make this difference salient by asking participants to imagine and list items that they would like to purchase with their gift card rewards.

Immediately after the reward nature manipulation described above, participants answer several manipulation check questions. To verify that participants perceive the Cineplex gift card to be hedonic and the FreshCo gift card to be utilitarian, I use the six 7-point-scale questions from Mitchell et al. ([2022](#)). Participants are given six statements that

the items purchasable with their gift card reward are (1) fun, (2) enjoyable, (3) pleasurable, (4) useful, (5) practical, and (6) functional. Participants' average level of agreement with the former (latter) three statements indicates their perceived hedonic (utilitarian) nature of the gift card. The order of these six statements is randomized to prevent any order effect. To find out whether participants find hedonic rewards more distinct from salary than utilitarian rewards, I also adapt the circle question from prior literature ([Bauer 2015](#); [Choi and Presslee 2023](#)). Two circles representing salary and gift card reward are depicted with seven different levels of overlap, and participants are asked to choose the one graph that best describes their perceived relationship between salary and their gift card reward.

4.6.3 Reward Contingency Manipulation

I manipulate reward contingency by varying how the gift card value is determined. I conduct the experiment first under the piece-rate condition, where participants' gift card value equals \$5 plus an additional \$1 for every 10 points they gain.²² Then, I conduct the experiment under the goal-based condition, where participants receive a \$14 gift card if they attain at least 71 points over the production round. I set a difficult but attainable goal for participants because extant literature suggests that this is the optimal goal difficulty for motivating employee effort ([Locke and Latham 2015](#)). The difficult but attainable goal is set to be the number of points achieved by the top 20 percent of participants under the piece-rate condition, consistent with prior studies ([Bonner and Sprinkle 2002](#); [Kelly et al. 2015](#)).

²² My manipulation of reward contingency was limited by the options I have when purchasing gift cards. The website for purchasing gift cards does not allow me to purchase a gift card under \$5; nor does it allow me to purchase gift cards with decimal values (e.g., \$10.24). I expected participants to ignore the \$5 fixed portion as individuals tend to ignore the component/portion that remains constant when assessing multiple outcomes (e.g., [Barberis 2013](#); [Kahneman and Tversky 1979](#)). Further, there is evidence that when employees receive a mix of fixed pay and performance-based pay, the percentage of performance-based pay does not affect employee performance as long as the percentage is above zero ([Dickinson and Gillette 1994](#)). Finally, treating ten points (vs. one point) as one piece results in less difference between a piece-rate reward and a goal-based reward, which biases against my predictions.

The two-part design does not pose an internal validity threat to the study, as I am interested in the interaction of reward nature and reward contingency. Prior studies have compared the simple effects of an independent variable across experiments. For instance, Kachelmeier et al. ([2024](#)) compare simple effects of performance-contingent pay (vs. fixed pay) on creative performance across two experiments where the number of creative solutions allowed differs between the two experiments.

For reward contingency manipulation, I do not put in a manipulation check because the manipulation check questions on reward contingency may impact participants' thoughts and weaken the effectiveness of reward nature manipulation ([Hauser et al. 2018](#)). However, in the post-experiment questionnaire, I check participants' understanding of reward contingency with two questions. Participants indicate on a 7-point scale the extent to which they agree/disagree with the following statements: 1) the gift card reward can only change between absence (i.e., zero dollar value) and presence (i.e., a positive dollar value); and 2) the gift card reward can only change between positive dollar values.

4.7 Dependent Variables

Participants' total effort level is measured by the total number of sliders (i.e., both production and training) they complete over the production round. As a reminder, completion in this context means a slider is either positioned at 50 or at a special position that can help participants gain points following an alternative way. Participants' voluntary training effort proportion is calculated as the number of sliders completed in the training task divided by the total number of sliders they completed (i.e., training sliders proportion). Participants' performance is the total number of points they gain over the production round.

4.8 Controls and Other Measured Variables

In the post-experiment questionnaire, I measure participants' valuation approaches utilizing the four questions adapted from Berger et al. ([2023](#)). These four questions ask participants to rate on an 11-point scale the extent to which their decisions are “(i) based on cost-benefit analysis or feeling, (ii) practical or emotional, (iii) based on objective facts or subjective feelings, and (iv) an economic exchange or a social exchange” ([Berger et al. 2023, 247](#)). Participants who value rewards with calculation (feeling) will be more likely to select the former (latter) in each of the four questions.

Additionally, I ask participants to indicate, on a 7-point scale, the extent to which they agree/disagree that (1) effort allocated to the production task adds a lot of uncertainty to gift card reward value and (2) effort allocated to the training task adds a lot of uncertainty to gift card reward value. Participants' responses to these two questions provide evidence that they find the training task more uncertain than the production task in all conditions.

4.9 Conclusion

In this chapter, I discuss the design of the main study, which utilizes two modified versions of the slider task. The gift cards for manipulating hedonic and utilitarian reward nature are identified using a pilot study. In the next chapter, I will discuss the results of the main study.

Chapter 5: Results

5.1 Introduction

This chapter discusses the results of data analysis. Section 5.2 provides a data overview. Section 5.3 addresses the testing of all the hypotheses and the research question. Section 5.4 discusses the supplemental analysis. This chapter concludes with section 5.5.

5.2 Data Overview

5.2.1 Participants

One hundred and forty-one undergraduate students from a Canadian university participated in this study. These participants have an average age of 20.00 years (*Age*) and an average work experience of 15.13 months (*Exp_Month*). Among the participants, 72 are female, 67 are male, and two participants did not disclose their sex (*Sex*).

Reward nature (*Nature*) does not have a main effect on *Age* ($F(1, 137) = 2.38, p = 0.13$); reward contingency (*Contingency*) has a main effect on *Age* ($F(1, 137) = 106.6, p < 0.01$); *Nature* and *Contingency* do not have an interactive effect on *Age* ($F(1, 137) = 0.43, p = 0.51$). Thus, *Age* does not differ by *Nature* condition but by *Contingency* condition. However, *Age* is not significantly correlated with *Total_Sliders*, the total number of training and production sliders participants completed during the production round ($r = 0.07, p = 0.42$), *Train_Prop*, the proportion of training sliders completed out of all sliders completed during the production round ($r = 0.07, p = 0.41$), or *Total_Points*, the total number of points participants gained during the production round ($r = 0.11, p = 0.20$). Therefore, I do not control for *Age* in subsequent analysis. For more details on the correlation between variables, please see [Table 3](#).

Nature has a main effect on *Exp_Month* ($F(1, 137) = 8.89, p < 0.01$); *Contingency* has a main effect on *Exp_Month* ($F(1, 137) = 7.12, p < 0.01$); and *Nature* and *Contingency* do not have an interactive effect on *Exp_Month* ($F(1, 137) = 0.01, p = 0.93$). Thus, *Exp_Month* differs by *Nature* and *Contingency* condition. However, *Exp_Month* is not significantly correlated with *Total_Sliders* ($r = -0.02, p = 0.83$), *Train_Prop* ($r = -0.11, p = 0.20$), or *Total_Points* ($r = 0.06, p = 0.46$). Thus, I do not control for *Exp_Month* in subsequent analysis.

Nature does not have a main effect on *Sex* ($F(1, 135) = 1.77, p = 0.19$); *Contingency* does not have a main effect on *Sex* ($F(1, 135) = 0.50, p = 0.48$); and *Nature* and *Contingency* do not have an interactive effect on *Sex* ($F(1, 135) = 0.37, p = 0.54$). Thus, *Sex* does not differ by *Nature* or *Contingency* condition. Although *Sex* is significantly correlated with *Total_Sliders* ($r = -0.14, p = 0.10$), *Train_Prop* ($r = -0.14, p = 0.10$), and *Total_Points* ($r = -0.24, p = 0.01$), I do not control for *Sex* in subsequent analysis since *Sex* does not differ by experiment condition.

5.2.2 Manipulation Check

As shown in [Table 4, Panel A](#), the six questions developed by Mitchell et al. (2022) to measure reward nature loaded on two factors: hedonic nature items (i.e., *Fun*, *Enjoyable*, and *Pleasurable*) and utilitarian items (i.e., *Useful*, *Practical*, and *Functional*). The two factors explain 84.4% of the variance. Hence, I calculate the average of the three hedonic questions (i.e., *Hedonic_Avg*), the average of the three utilitarian questions (i.e., *Utilitarian_Avg*), and the difference between these two average ratings (i.e., *Nature_Diff*) ([Table 4, Panel B](#)). Factorial ANOVA ([Table 4, Panel C](#)) suggests that *Nature* has a significant main effect on *Nature_Diff* ($F(1, 137) = 93.76, p < 0.01$), but neither the

Contingency ($F(1, 137) = 1.50, p = 0.22$) nor its interaction with the *Nature* has a significant ($F(1, 137) = 0.00, p = 0.95$) effect on *Nature_Diff*.²³ Thus, the reward nature manipulation appears successful.

Recall that I do not use a manipulation check for my reward contingency manipulation because there is a possibility that the reward contingency manipulation check questions could impact participants' thoughts and weaken the effectiveness of reward nature manipulation ([Hauser et al. 2018](#)). Instead, I check reward contingency manipulation in the post-experiment questionnaire. *RC_Absence*, the extent to which participants agree to the statement that the gift card reward can only change between absence (i.e., zero-dollar value) and presence (i.e., a positive dollar value), is not significantly higher under the goal-based condition than the piece-rate condition ($F(1, 137) = 2.65, p = 0.11$, Goal: Mean = 1.29, $SD = 1.64$, Piece: Mean = 0.82, $SD = 1.77$). *RC_Positive*, the extent to which participants agree to the statement that the gift card reward can only change between positive dollar values, is significantly lower under the goal-based condition than the piece-rate condition ($F(1, 137) = 11.94, p < 0.01$, Goal: Mean = 0.53, $SD = 1.80$, Piece: Mean = 1.51, $SD = 1.49$). These results suggest that participants understood the reward contingency condition to which they were assigned.

5.2.3 Descriptives

Descriptive statistics for the dependent variables are shown in [Table 5](#). The mean of *Total_Sliders* is 54.27 ($SD = 23.40$) under the piece-rate, hedonic condition; 57.65 ($SD = 22.40$) under the piece-rate, utilitarian condition; 54.41 ($SD = 21.75$) under the goal-based,

²³ When I replace the *Nature_diff* with *Hedonic_Avg* or *Utilitarian_Avg*, ANOVA results still suggest that reward nature manipulation is successful: *Hedonic_Avg* is higher under hedonic reward nature condition than utilitarian reward nature condition; *Utilitarian_Avg* is higher under utilitarian reward nature condition than hedonic reward nature condition.

hedonic condition; and 48.66 ($SD = 15.84$) under the goal-based, utilitarian condition. The mean of *Train_Prop* is 0.34 ($SD = 0.22$) under the piece-rate, hedonic condition; 0.33 ($SD = 0.23$) under the piece-rate, utilitarian condition; 0.22 ($SD = 0.20$) under the goal-based, hedonic condition; and 0.32 ($SD = 0.23$) under the goal-based, utilitarian condition. The mean of *Total_Points* is 55.97 ($SD = 26.36$) under the piece-rate, hedonic condition; 55.81 ($SD = 21.82$) under the piece-rate, utilitarian condition; 53.85 ($SD = 24.95$) under the goal-based, hedonic condition; and 44.95 ($SD = 17.55$) under the goal-based, utilitarian condition.

5.3 Hypotheses Testing

5.3.1 Covariate

I rely on *Practice* (i.e., the total number of sliders participants completed during the practice round) as a covariate to control for participants' innate slider task skills prior to training.²⁴ *Practice* can effectively reduce the error sum of squares because it is highly correlated with all dependent variables of interest (*Total_Slider*: $r = 0.49, p < 0.01$; *Train_Prop*: $r = 0.20, p = 0.02$; *Total_Points*: $r = 0.57, p < 0.01$); at the same time, *Practice* is not significantly correlated with independent variables of interest (*Nature*: $r = 0.11, p = 0.18$; *Contingency*: $r = -0.01, p = 0.88$; *Nature* × *Contingency*: $r = 0.02, p = 0.79$) so that it does not take away the variance explained by the independent variables of interest or their interaction (see [Table 3](#)) ([Loftin and Madison 1991](#)).²⁵ Factorial ANOVA (untabulated) with

²⁴ For instance, Kelly et al. ([2015](#)) use participants' practice round performance to control for their innate skill.

²⁵ The ANCOVA results when I use participants' practice round points are nearly identical to the results when I use practice round sliders completed. These two sets of ANCOVA results are not fully identical because one participant positioned one slider to the special position to gain points under the alternative ways. The slider was counted as completed but did not give the participant any point, since the participant would need to position all four special sliders to a special value to gain points via each alternative way. Additionally, participants completed more sliders in the first production period than in the practice round ($t(140) = 4.77, p < 0.01$), but gained fewer points in the first production period than in the practice round ($t(140) = -3.94, p < 0.01$). If participants figured out the alternative ways, they would gain more points with fewer sliders completed in the first production period. Hence, no participant fully discovered any alternative way of gaining points during the practice round.

Practice as dependent variable suggests that *Practice* is not explained by *Nature* ($F(1, 137) = 2.16, p = 0.14$), *Contingency* ($F(1, 137) = 0.03, p = 0.86$), or the interaction of *Nature* and *Contingency* ($F(1, 137) = 0.83, p = 0.37$). Please refer to [Appendix D](#) for a list of variable definitions.

Following Piercey ([2023](#)), I also examine whether there is any unexpected effect of *Practice* on the three dependent variables other than an expected main effect. There are two tests involved: 1) all *Practice* effect, which includes a main effect of *Practice* and its interaction with *Nature*, *Contingency*, and *Nature*×*Contingency*, and 2) all *Practice* interaction effect, which only includes *Practice*'s interaction with *Nature*, *Contingency*, and *Nature*×*Contingency*. The all *Practice* effect on *Total_Sliders* is significant ($F(63, 72) = 1.59, p = 0.03$), driven by a main effect of *Practice* on *Total_Sliders* ($F(30, 72) = 2.58, p < 0.01$). When I exclude the main effect of *Practice*, the all *Practice* interaction effect on *Total_Sliders* is insignificant ($F(33, 72) = 0.68, p = 0.89$). For more details, please see [Table 6](#).

Similarly, the all *Practice* effect on *Train_Prop* is significant ($F(63, 72) = 1.44, p = 0.07$), driven by a main effect of *Practice* on *Train_Prop* ($F(30, 72) = 1.61, p = 0.05$). When I exclude the main effect of *Practice*, the all *Practice* interaction effect on *Train_Prop* is insignificant ($F(33, 72) = 1.21, p = 0.25$). For more details, please see [Table 7](#).

Finally, the all *Practice* effect on *Total_Points* is significant ($F(63, 72) = 2.00, p < 0.01$), driven by a main effect of *Practice* on *Total_Points* ($F(30, 72) = 3.43, p < 0.01$). When I exclude the main effect of *Practice*, the all *Practice* interaction effect on *Total_Points* is insignificant ($F(33, 72) = 0.70, p = 0.87$). For more details, please see [Table 8](#). Since there is no unexpected effect of *Practice* on any of the dependent variables, *Practice* can be used as a

covariate in hypothesis testing ([Piercey 2023](#)). Subsequently, I use ANCOVA where dependent variables are explained by *Nature*, *Contingency*, *Nature*×*Contingency*, and *Practice* (i.e., the covariate).

5.3.2 Total Effort (H1 & H2)

H1 predicts that employee total effort will be higher when they pursue hedonic rewards than utilitarian rewards. As shown in [Table 9, Panel B](#), I do not find a main effect of *Nature* on *Total_Sliders* ($F(1, 136) = 0.21, p = 0.65$). Thus, results do not support H1.

H2 predicts that the effect of hedonic (vs. utilitarian) reward nature on employee total effort will be more positive when the reward is goal-based than piece-rate.²⁶ As shown in [Table 9, Panel B](#), I find an interaction effect of *Nature* and *Contingency* on *Total_Sliders* ($F(1, 136) = 4.05, p = 0.05$). Hedonic (vs. utilitarian) reward nature has a negative simple effect ($F(1, 136) = 2.67, p = 0.05$ one-tailed) on *Total_Sliders* (Piece_Hedonic: *EMM* (*Estimated Marginal Mean*) = 51.96, *SE* = 3.30; Piece_Utilitarian: *EMM* = 59.56, *SE* = 3.25) under piece-rate condition, but has no simple effect on *Total_Sliders* ($F(1, 136) = 1.39, p = 0.24$) under goal-based condition (Goal_Hedonic: *EMM* = 54.02, *SE* = 2.88; Goal_Utilitarian: *EMM* = 49.27, *SE* = 2.81). Additionally, I conduct contrast analysis following prior literature's recommendation ([Buckless and Ravenscroft 1990](#); [Guggenmos et al. 2018](#)). As shown in [Figure 5](#), the pattern of estimated marginal means suggests that the effect of hedonic (vs. utilitarian) reward nature on *Total_Sliders* is more positive when reward is goal-based than piece-rate, consistent with H2; contrast analysis (Piece_Utilitarian = 3; Piece_Hedonic = -1; Goal_Utilitarian = -1; Goal_Hedonic = -1) suggests a significant interaction effect of *Nature* and *Contingency* on *Total_Sliders* ($F(1, 136) = 4.48, p = 0.04, q^2$

²⁶ In this study, I treat “more positive” and “less negative” the same.

= 0.91).²⁷ The residual between-cells variance is significant ($F(3, 136) = 15.86, p < 0.01$), partly because the residual between-cells variance contains the variance explainable by the covariate ([Table 9, Panel C](#)).²⁸ In this case, two out of three pieces of evidence (i.e., visual confirmation, contrast analysis, and residual between-cells variance) suggested by Guggenmos et al. (2018) converge; the contrast analysis provides some support to the predicted interaction. Overall, results support H2.²⁹

5.3.3 Voluntary Training Effort Proportion (H3 & H4)

H3 predicts that employees' voluntary training effort proportion will be lower when they pursue hedonic rewards than utilitarian rewards. As shown in [Table 10, Panel B](#), I do not find a main effect of *Nature* on *Train_Prop* ($F(1, 136) = 2.18, p = 0.14$). Thus, results do not support H3.

H4 predicts that the effect of hedonic (vs. utilitarian) reward nature on employee voluntary training effort proportion will be more negative when the reward is goal-based than piece-rate. As shown in [Table 10, Panel B](#), ANCOVA results do not suggest that *Nature* and

²⁷ q^2 measures the proportion of variance not explained by the contrast, $q^2 = 1 - r^2 = 1 - (SS_{contrast}/SS_{between})$ (Guggenmos et al. 2018).

²⁸ I used the mean squared error (*MSE*) from ANCOVA to conduct the planned contrast analysis, an approach commonly seen in prior literature (e.g., Barcellos and Kadous 2022; Haesebrouck 2021). To my best knowledge, there is no clear guidance on how to separate the effect of covariate from the residual between-cells variance in contrast analysis. Guggenmos et al. (2018) do not state that a significant residual between-cells variance should prevent one from concluding support for an interaction; rather, they recommend evaluating support for an interaction based on all three pieces of evidence (i.e., visual confirmation, contrast analysis, and residual between-cells variance).

²⁹ When I use the total number of production sliders participants completed during the production round (i.e., *Total_Prod_Sliders*) instead of *Total_Sliders*, I find no significant main effect of *Nature* ($F(1, 136) = 0.25, p = 0.62$) but a significant interaction of *Nature* and *Contingency* ($F(1, 136) = 3.34, p = 0.07$). Hedonic (vs. utilitarian) reward nature has no simple effect on *Total_Prod_Sliders* under the piece-rate condition ($F(1, 136) = 0.77, p = 0.38$, Hedonic-Piece condition: $EMM = 36.10, SE = 4.33$; Utilitarian-Piece condition: $EMM = 41.44, SE = 4.25$) but a positive simple effect on *Total_Prod_Sliders* under the goal-based condition ($F(1, 136) = 3.14, p = 0.08$, Hedonic-Goal condition: $EMM = 44.27, SE = 3.78$; Utilitarian-Goal condition: $EMM = 34.92, SE = 3.68$). The results are inconsistent with H1 but consistent with H2. When I use ANOVA with *Total_Sliders* as the dependent variable and without *Practice* as a covariate, I do not find a main effect of *Nature* on *Total_Sliders* ($F(1, 137) = 0.11, p = 0.74$) or an interaction effect of *Nature* and *Contingency* on *Total_Sliders* ($F(1, 137) = 1.68, p = 0.20$).

Contingency have an interactive effect on *Train_Prop* ($F(1, 136) = 1.69, p = 0.20$). However, the pattern of estimated marginal means in [Figure 6](#) suggests that the effect of hedonic (vs. utilitarian) reward nature on *Train_Prop* is more negative when reward is goal-based than piece-rate, consistent with H4. Contrast analysis (Piece_Utilitarian = 1; Piece_Hedonic = 1; Goal_Utilitarian = 1; Goal_Hedonic = -3) suggests a significant interaction effect of *Nature* and *Contingency* on *Train_Prop* ($F(1, 136) = 7.50, p = 0.01, q^2 = 0.44$). The residual between-cells variance is insignificant ($F(3, 136) = 1.87, p = 0.14$) even though the residual between-cells variance contains the variance explainable by the covariate ([Table 10, Panel C](#)). In this case, all three pieces of evidence suggested by Guggenmos et al. (2018) converge, supporting the predicted interaction. Hedonic (vs. utilitarian) reward nature has no simple effect ($F(1, 136) = 0.01, p = 0.90$) on *Train_Prop* under piece-rate condition (Piece_Hedonic: $EMM = 0.33, SE = 0.04$; Piece_Utilitarian: $EMM = 0.34, SE = 0.04$) but has a negative simple effect ($F(1, 136) = 4.50, p = 0.04$) on *Train_Prop* under goal-based condition (Goal_Hedonic: $EMM = 0.22, SE = 0.03$; Goal_Utilitarian: $EMM = 0.32, SE = 0.03$). Overall, the results support H4.³⁰

³⁰ When I use the total number of training sliders participants completed during the production round (i.e., *Total_Train_Sliders*) instead of *Train_Prop*, I find a significant negative main effect of hedonic (vs. utilitarian) reward nature ($F(1, 136) = 3.39, p = 0.07$) and an insignificant interaction of *Nature* and *Contingency* ($F(1, 136) = 0.40, p = 0.53$). Hedonic (vs. utilitarian) reward nature has no simple effect on *Total_Train_Sliders* under the piece-rate condition ($F(1, 136) = 0.65, p = 0.42$, Hedonic-Piece condition: $EMM = 15.86, SE = 1.99$; Utilitarian-Piece condition: $EMM = 18.12, SE = 1.96$) but a negative simple effect on *Total_Train_Sliders* under the goal-based condition ($F(1, 136) = 3.58, p = 0.06$, Hedonic-Goal condition: $EMM = 9.75, SE = 1.74$; Utilitarian-Goal condition: $EMM = 14.35, SE = 1.70$). These results are consistent with H3 and inconsistent with H4, highlighting the value of *Train_Prop* as a measure of employee effort direction. When I use ANOVA with *Train_Prop* as the dependent variable and without *Practice* as a covariate, I do not find a main effect of *Nature* on *Train_Prop* ($F(1, 137) = 1.32, p = 0.25$) or an interaction effect of *Nature* and *Contingency* on *Train_Prop* ($F(1, 137) = 2.16, p = 0.14$).

5.3.4 Performance (RQ1)

RQ1 asks about the effects of reward nature and reward contingency on employee performance, which is measured by *Total_Points*. As shown in [Table 11, Panel B](#), *Nature* does not have a main effect on *Total_Points* ($F(1, 136) = 0.15, p = 0.70$), but *Nature* and *Contingency* have an interactive effect on *Total_Points* ($F(1, 136) = 4.12, p = 0.04$). Hedonic (vs. utilitarian) reward nature has no simple effect on *Total_Points* ($F(1, 136) = 1.17, p = 0.28$) under piece-rate condition (Piece_Hedonic: $EMM = 53.05, SE = 3.40$; Piece_Utilitarian: $EMM = 58.22, SE = 3.34$) but has a positive simple effect on *Total_Points* ($F(1, 136) = 3.40, p = 0.07$) under goal-based condition (Goal_Hedonic: $EMM = 53.36, SE = 2.96$; Goal_Utilitarian: $EMM = 45.72, SE = 2.89$).³¹ Thus, I find the effect of hedonic (vs. utilitarian) reward nature on performance is more positive when the reward is goal-based than piece-rate; hedonic (vs. utilitarian) reward nature has a positive effect on performance when the reward is goal-based, but has no effect on performance when the reward is piece-rate. The interaction effect of reward nature and reward contingency on employee performance is more consistent with the valuation mechanism, which predicts an interaction effect of reward nature and reward contingency on employee effort. The pattern of results is displayed in [Figure 7](#).³²

³¹ The proportion of participants who gained at least 71 points (i.e., the performance level required for goal attainment) does not differ by *Nature* ($\chi^2(1, 61) = 0.06, p = 0.81$) when reward is piece-rate or goal-based ($\chi^2(1, 80) = 1.81, p = 0.18$).

³² When I use ANOVA without *Practice* as a covariate, I do not find a main effect of *Nature* on *Total_Points* ($F(1, 137) = 1.38, p = 0.24$) or an interaction effect of *Nature* and *Contingency* on *Total_Points* ($F(1, 137) = 1.28, p = 0.26$).

5.4 Supplemental Analysis

5.4.1 Perceived Uncertainty of Production Task and Training Task

Recall that my setting requires participants' perceived benefit uncertainty of the production task to be higher than the training task. Participants indicated, on a 7-point scale, the extent to which they agreed/disagreed that (1) effort allocated to the production task adds a lot of uncertainty to gift card reward value and (2) effort allocated to the training task adds a lot of uncertainty to gift card reward value. Participants' perceived benefit uncertainty of the production task is significantly lower than the training task ($t(140) = -8.78, p < 0.01$), consistent with the setting.

5.4.2 Categorization Mechanism and Valuation Mechanism

The hypothesis testing results suggest that the categorization mechanism was inactive and the valuation mechanism was active in my experiment. For further verification, I examine post-experiment questions that measure the categorization mechanism and the valuation mechanism. *Overlap* (i.e., participants' perceived overlaps between salary and their gift card reward) does not differ ($t(139) = 0.07, p = 0.95$) across reward nature conditions (Hedonic: Mean = 2.87, $SD = 1.78$; Utilitarian: Mean = 2.89, $SD = 1.61$), indicating that the categorization mechanism driving H1 and H3 main effect predictions was not active.

Conversely, participants under the hedonic (vs. utilitarian) reward condition (Hedonic: Mean = 3.76, $SD = 1.83$; Utilitarian: Mean = 3.26, $SD = 1.67$) rely more on the feeling valuation approach (*Valuation_Avg*: $t(139) = -1.70, p = 0.09$), suggesting that the valuation mechanism driving the interaction effects of *Nature* and *Contingency* under H2 and H4 was active.³³

³³ The four questions measuring participants' valuation approach load on a single factor, explaining 54.63% of variance. Hence, I calculate *Valuation_Avg* - the average of the participants' responses to the four questions for comparing their valuation approaches across conditions.

5.4.3 Work Experience

Work experience may have contributed to the categorization mechanism's inactivity. Since the categorization mechanism requires participants to expect a salary amount under their utilitarian accounts ([Mitchell et al. 2022](#)), participants with less work experience will have less experience spending salary on utilitarian items and be less likely to activate the categorization mechanism. Consistent with this argument, I find that *Overlap* is negatively correlated ($r = -0.13, p = 0.07$ one-tailed) with *Exp_Month* (i.e., participants' work experience in number of months), but the *Valuation_Avg* is not significantly correlated with *Exp_Month* ($r = 0.04, p = 0.65$). When I exclude participants with no work experience, *Overlap* still does not differ ($t(115) = 0.91, p = 0.37$) across reward nature conditions (Hedonic: Mean = 2.64, $SD = 1.58$; Utilitarian: Mean = 2.91, $SD = 1.65$).³⁴

5.4.4 Age

Participants' age may also impact the activation of the categorization mechanism. Prior literature suggests that younger consumers tend to make more hedonic purchases ([LeFebvre and Huta 2021](#); [Wilksa et al. 2023](#)). If participants spend a large portion of their salary on hedonic purchases, they may not assign hedonic rewards to a mental account separate from salary, deactivating the categorization mechanism. Correlation analysis suggests that *Age* (i.e., participants' age) is significantly negatively correlated with *Overlap* ($r = -0.34, p < 0.01$) but uncorrelated with *Valuation_Avg* ($r = -0.04, p = 0.65$). Since age is positively correlated with work experience ($r = 0.37, p < 0.01$), I also use the residual from regressing *Age* on *Exp_Month*, and the results hold (with *Overlap*: $r = -0.31, p < 0.01$, with

³⁴ Although the overlap measure was used in prior literature ([Bauer 2015](#); [Choi and Presslee 2023](#)), it is possible that the overlap measure was a low-statistical power measure in my experiment.

Valuation_Avg: $r = -0.06, p = 0.50$). The correlation results suggest that age is negatively associated with participants' perceived overlap between salary and their gift card reward and is positively associated with the activation of the categorization mechanism. However, when I exclude participants whose age is below 19, *Overlap* still does not differ ($t(105) = 0.61, p = 0.54$) across reward nature conditions (Hedonic: Mean = 2.53, $SD = 1.45$; Utilitarian: Mean = 2.71, $SD = 1.58$).

5.4.5 Practice Performance and Training Choice

Another possible reason for the lack of support for H3 is that participants perform too well, leading them to consider training unnecessary. However, contradicting this explanation, the number of sliders participants complete during the practice round is positively correlated with their voluntary training effort proportion ($r = 0.20, p = 0.02$). When I exclude participants who completed at least 25 sliders during the practice round (i.e., top 10% for the practice round), ANCOVA results do not support a negative effect of hedonic (vs. utilitarian) reward nature on employee voluntary training effort proportion ($F(1,123) = 1.28, p = 0.26$). Therefore, lack of support for H3 does not appear to be driven by participants performing too well during the practice round.

5.4.6 Period Effect

Regarding employee total effort, mixed ANCOVA with *Period* as repeated measure does not suggest a main effect of *Period* on *Total_Sliders* ($F(1.96, 266.81) = 0.58, p = 0.56$ with Huynh-Feldt correction).³⁵ *Period* and *Nature* do not have a significant interaction effect on *Total_Sliders* ($F(1.96, 266.81) = 0.74, p = 0.48$ with Huynh-Feldt correction).

³⁵ Huynh and Feldt (1976) correction is commonly used to address violations of sphericity. For more details on this correction, please refer to Huynh and Feldt (1976).

Period, *Nature*, and *Contingency* do not have a significant interaction effect on *Total_Sliders* ($F(1.96, 266.81) = 0.24, p = 0.78$ with Huynh-Feldt correction). Hence, I do not further analyze single-period data on *Total_Sliders*.

Regarding employee voluntary training effort proportion, mixed ANCOVA with *Period* as repeated measure does not suggest a main effect of *Period* on *Train_Prop* ($F(2.00, 272.00) = 0.35, p = 0.71$ with Huynh-Feldt correction). *Period* and *Nature* do not have a significant interaction effect on *Train_Prop* ($F(2.00, 272.00) = 0.81, p = 0.45$ with Huynh-Feldt correction). However, *Period*, *Nature*, and *Contingency* have a significant interaction effect on *Train_Prop* ($F(2.00, 272.00) = 3.11, p = 0.05$ with Huynh-Feldt correction).

In the first production period, *Nature* and *Contingency* do not have a significant interaction effect on *P1_Train_Prop* ($F(1, 136) = 1.54, p = 0.22$) per ANCOVA. However, the pattern of estimated marginal means ([Figure 8](#)) suggests that the effect of hedonic (vs. utilitarian) reward nature on *P1_Train_Prop* is more negative when the reward is goal-based than piece-rate, consistent with H4; contrast analysis (i.e., Piece_Utilitarian = 1; Piece_Hedonic = 1; Goal_Utilitarian = 1; Goal_Hedonic = -3) suggests that *Nature* and *Contingency* have a significant interaction effect on *P1_Train_Prop* ($F(1, 136) = 3.55, p = 0.06$), but the residual between-cell variance (following recommendation of [Guggenmos et al. 2018](#)) is significant ($F(3, 136) = 2.93, p = 0.04$) partly due to the covariate missing from the contrast. I do not find any significant simple effect of *Nature* under each *Contingency* condition. The contrast analysis provides some support for H4 in the first production period.

In the second production period, *Nature* and *Contingency* do not have a significant interaction effect on *P2_Train_Prop* ($F(1, 136) = 0.13, p = 0.72$) per ANCOVA. Contrast analysis suggests that *Nature* and *Contingency* have a significant interaction effect on

$P2_Train_Prop$ ($F(1, 136) = 3.47, p = 0.06$), and the residual between-cell variance is insignificant ($F(3, 136) = 1.90, p = 0.13$). However, the pattern of the estimated marginal means suggests no interaction ([Figure 9](#)). I do not find any significant simple effect of *Nature* under each *Contingency* condition. The contrast analysis provides nearly no support for H4 in the second production period.

In the third production period, *Nature* and *Contingency* have a significant interaction effect on $P3_Train_Prop$ ($F(1, 136) = 9.99, p < 0.01$) per ANCOVA. Under the piece-rate condition, $P3_Train_Prop$ does not differ between hedonic and utilitarian reward nature conditions ($F(1, 136) = 1.38, p = 0.24$). Under the goal-based condition, hedonic (vs. utilitarian) reward nature results in significantly lower $P3_Train_Prop$ ($F(1, 136) = -11.96, p < 0.01$). Hence, the third period data support the H4, and the evidence is stronger in the third period than in the first and second periods. The pattern of the estimated marginal means is displayed in [Figure 10](#).

Regarding employee performance, mixed ANCOVA with *Period* as repeated measure does not suggest a main effect of *Period* on $Total_Points$ ($F(2.00, 272.00) = 0.05, p = 0.95$ with Huynh-Feldt correction). *Period* and *Nature* do not have a significant interaction effect on $Total_Points$ ($F(2.00, 272.00) = 0.90, p = 0.41$ with Huynh-Feldt correction). *Period*, *Nature*, and *Contingency* do not have a significant interaction effect on $Total_Points$ ($F(2.00, 272.00) = 0.16, p = 0.85$ with Huynh-Feldt correction). Therefore, I do not further analyze single-period data on $Total_Points$.

5.5 Conclusion

This chapter discusses the results of theory testing. In a setting where employees allocate effort between a production task and a training task to increase their performance,

H1 and H2 consider the effects of reward nature and reward contingency on employee total effort (i.e., sum of production effort and voluntary training effort); H3 and H4 consider the effects of reward nature and reward contingency on employee voluntary training effort proportion (i.e., voluntary training effort divided by total effort); RQ1 asks about the effects of reward nature and reward contingency on employee performance.

I do not find evidence of a positive main effect of hedonic (vs. utilitarian) reward nature on employee total effort, which is inconsistent with H1. I find that the effect of hedonic (vs. utilitarian) reward nature on employee total effort is more positive when the reward is goal-based than piece-rate, supporting H2. Further, I do not find evidence of a negative main effect of hedonic (vs. utilitarian) reward nature on employee voluntary training effort proportion, which is inconsistent with H3. I find that the effect of hedonic (vs. utilitarian) reward nature on employee voluntary training effort proportion is more negative when the reward is goal-based than piece-rate, supporting H4. Finally, in answer to RQ1, I do not find evidence of any main effect of hedonic (vs. utilitarian) reward nature on employee performance, but I find that the effect of hedonic (vs. utilitarian) reward nature on employee performance is more positive when the reward is goal-based than piece-rate. Consistently, supplemental analysis suggests that the categorization mechanism driving H1 and H3 is inactive while the valuation mechanism driving H2 and H4 is active. The next chapter discusses the research and practice implications of this study, as well as its limitations.

Chapter 6: Conclusion

6.1 Introduction

In this chapter, I first summarize my dissertation results in section 6.2. The limitations of my dissertation and future research opportunities are identified in section 6.3. Finally, I conclude in section 6.4 with my dissertation's contribution to theory and practice.

6.2 Review of Results

In a setting where employees can allocate effort to a production task and/or a voluntary training task to increase performance, I examine the effects of reward nature and reward contingency on employee total effort (i.e., sum of production effort and voluntary training effort), voluntary training effort proportion (i.e., voluntary training effort divided by total effort), and performance. Inconsistent with the categorization mechanism (H1), I do not find evidence of a positive main effect of hedonic (vs. utilitarian) reward nature on employee total effort. But consistent with the valuation mechanism (H2), I find that the effect of hedonic (vs. utilitarian) reward nature is more positive when the reward is goal-based than piece-rate. Inconsistent with the categorization mechanism (H3), I do not find evidence of a negative main effect of hedonic (vs. utilitarian) reward nature on employee voluntary training effort proportion. However, consistent with the valuation mechanism (H4), I find that the effect of hedonic (vs. utilitarian) reward nature is more negative when the reward is goal-based than piece-rate. In answer to RQ1, I find no main effect of hedonic (vs. utilitarian) reward nature on performance, but I find that the effect of hedonic (vs. utilitarian) reward nature on performance is more positive when reward is goal-based than piece-rate. Supplemental analysis further suggests that the categorization mechanism underlying H1 and

H3 was inactive, and the valuation mechanism underlying H2 and H4 was active in my experiment.

In addition to the theorized competition from the valuation mechanism, work experience and age may have contributed to the inactivity of the categorization mechanism. First, I find that participants' work experience is significantly negatively correlated with their perceived overlaps between salary and their gift card (i.e., the measure of the categorization mechanism activation, where overlap should be lower for those who activate categorization mechanism than those who do not); participants' work experience is not significantly correlated with the extent to which they rely on feelings (vs. calculation). However, the categorization mechanism remains inactive when I only include participants with work experience. Second, I find that participants' age is significantly negatively correlated with their perceived overlaps between salary and their gift card; participants' age is not significantly correlated with the extent to which they rely on feelings (vs. calculation). But when I exclude participants under 19, the categorization mechanism remains inactive for the subsample. Finally, I rule out the possibility that participants' practice round performance causes them to consider training unnecessary. The number of sliders participants complete during the practice round is positively correlated with their voluntary training effort proportion. When I exclude participants who completed at least 25 sliders during the practice round (i.e., top 10% for the practice round), I still find no negative effect of hedonic (vs. utilitarian) reward nature on employee voluntary training effort proportion.

6.3 Limitations and Future Research Opportunities

Several future research opportunities arise from the limitations of this study. First, while the results suggest that the valuation mechanism competes with the categorization

mechanism, this study cannot rule out the possibility that employees may simultaneously activate the categorization mechanism and the valuation mechanism, and the boundary conditions for activating the two mechanisms remain unclear. Future studies can investigate these boundary conditions to help managers activate the desirable mechanism(s). One interesting path for exploration is employees' decisions when they have tools to help quantify their feelings (e.g., a scale that asks employees to rate on a seven-point scale how positive a reward makes them feel). Will employees activate both mechanisms?

Second, I set a difficult but attainable goal in my experiment because 1) extant literature suggests that this is the optimal goal difficulty for motivating employee effort and 2) difficult but attainable goals are commonly used in practice ([Berger et al. 2023](#); [Locke and Latham 2015](#)). If the goal is easy, employees may perceive similar difficulty in securing a goal-based reward and a piece-rate reward, and the moderating effect of reward contingency on reward nature will be weak. If the goal is stretch, employees may perceive greater difficulty in securing a goal-based reward than a piece-rate reward, but they may perceive the production task as more uncertain than the training task. In this case, the effect of hedonic (vs. utilitarian) reward nature on voluntary training effort proportion may become more positive when the reward is goal-based than piece-rate. Future research can examine how the theory in this study may change in scenarios where goal difficulty is easy or stretching.

Third, I only offer reward to participants once in my experiment. However, the valuation mechanism suggests that the motivating effect of hedonic rewards may decrease once the presence of reward is secured, and to the extent that cash rewards are utilitarian and tangible rewards are hedonic, Newman et al. ([2024](#)) suggest that the motivating effect of tangible rewards decreases more than cash rewards when offered more frequently. In

practice, managers are trying to address this issue by offering a different hedonic reward each time ([Wong 2025](#)). It is unclear to what extent switching hedonic rewards helps employees reset their mental account balance, and that is another opportunity for future research.

Finally, a key feature of the setting in this study is that participants perceive the benefits of the production task as less uncertain than those of the training task. This feature may not hold in two practice settings. One setting is where firms may provide employees with information to reduce the uncertainty involved in training. For instance, if a manager provides employees with training recommendations during a performance review, employees may perceive the benefits of the recommended training as less uncertain. The other setting where employees may not perceive more uncertainty from training than production is a job that involves high uncertainty, such as emergency service, logging, and fishing ([Roberts 2024](#); [Torpey 2016](#)). For those whose production task involves high uncertainty, the additional uncertainty from the training task may appear less concerning. Hence, future studies can investigate whether the theory of this study generalizes to these two settings. Further, employees who are more risk-seeking may prefer the training task over the production task, and researchers can investigate the effect of participants' trait risk preference on their effort allocation between production and training.

6.4 Conclusion

This study contributes to the reward nature literature ([Choi and Presslee 2023](#); [Mitchell et al. 2022](#)). Where prior literature shows that reward nature affects employee effort in a single-task setting ([Choi and Presslee 2023](#); [Mitchell et al. 2022](#)), this study suggests that reward nature can also affect employees' effort allocation in a multi-task setting. Additionally, I provide evidence that reward contingency moderates the effect of reward

nature via a valuation mechanism, and the valuation mechanism competes with the categorization mechanism. To the best of my knowledge, this is the first study to investigate the effect of reward nature on employee training effort allocation in a multi-task setting and to tease apart the categorization mechanism and the valuation mechanism.

This study also contributes to the literature that examines how management control systems affect employee effort allocation in a multi-task setting (e.g., [Datar et al. 2001](#); [Feltham and Xie 1994](#); [Hannan et al. 2013, 2019](#); [Holmstrom and Milgrom 1991](#); [Xu 2021](#)). Among the few studies involving a multi-task setting where the effort towards one task affects performance on the other task ([Arnold et al. 2025a, 2025b](#); [Chen et al. 2025](#); [Newman et al. 2025](#); [Webb et al. 2013](#)), this study shows that employees' effort allocation depends on reward nature and reward contingency. While this study focuses on production and training tasks, the theory of this study may generalize to other multi-task settings where tasks differ in their payoff uncertainty.

Furthermore, this study contributes to the emerging literature on how management controls can motivate employees to enhance their skills ([Arnold et al. 2025a, 2025b](#); [Kelly et al. 2021](#)). Whereas the existing literature examines the effects of slot machines, relative performance information, and manager feedback, this study focuses on the nature and contingency of performance-based rewards. The results show that utilitarian reward nature may motivate employees to allocate more time to training than hedonic reward nature when the reward is goal-based; when reward is piece-rate, reward nature may matter less.

Finally, this study highlights the need for managers to consider both reward nature and reward contingency when designing performance-based rewards. Adjusting the reward nature is likely more useful in balancing employees' production effort and voluntary training

effort for jobs where goal-based rewards are offered than for jobs where piece-rate rewards are offered. This is particularly relevant when 1) there is a great variation in the type of rewards firms give to employees ([Cusson and Main 2023](#); [Fiolleau et al. 2023](#); [Mayo 2021](#)), and 2) employees' skills are falling further behind what firms need across multiple industries ([Capranos and Magda 2023](#); [Their 2023](#)).

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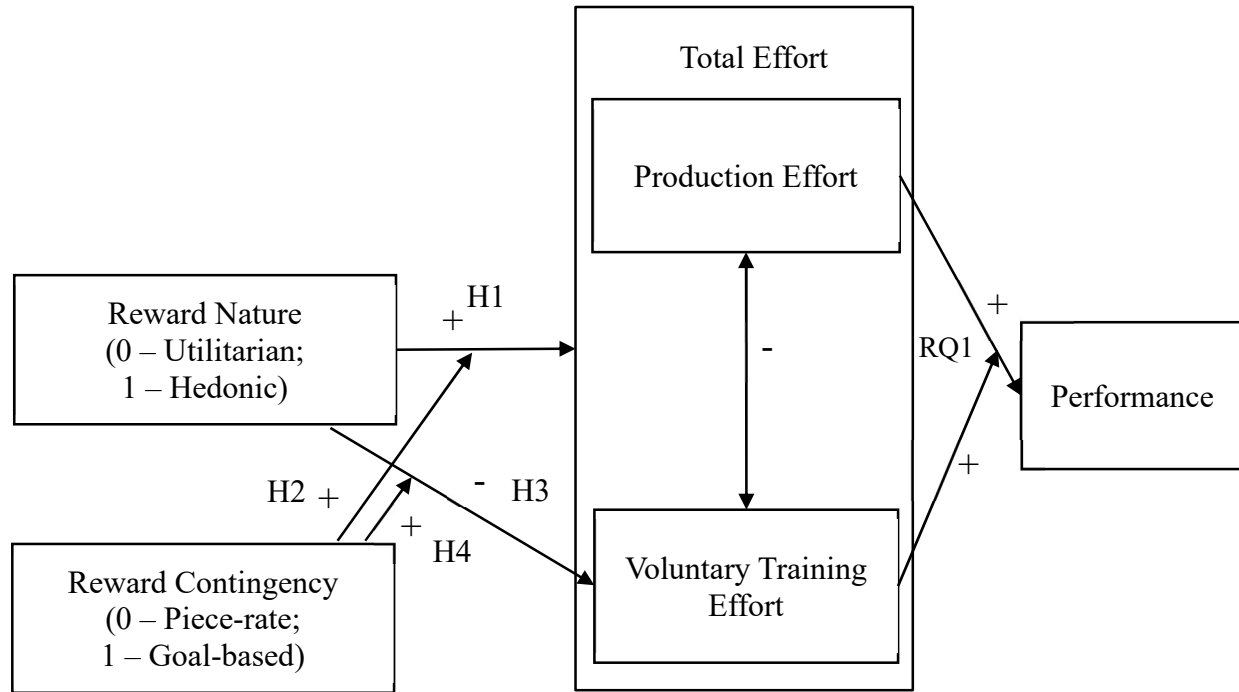
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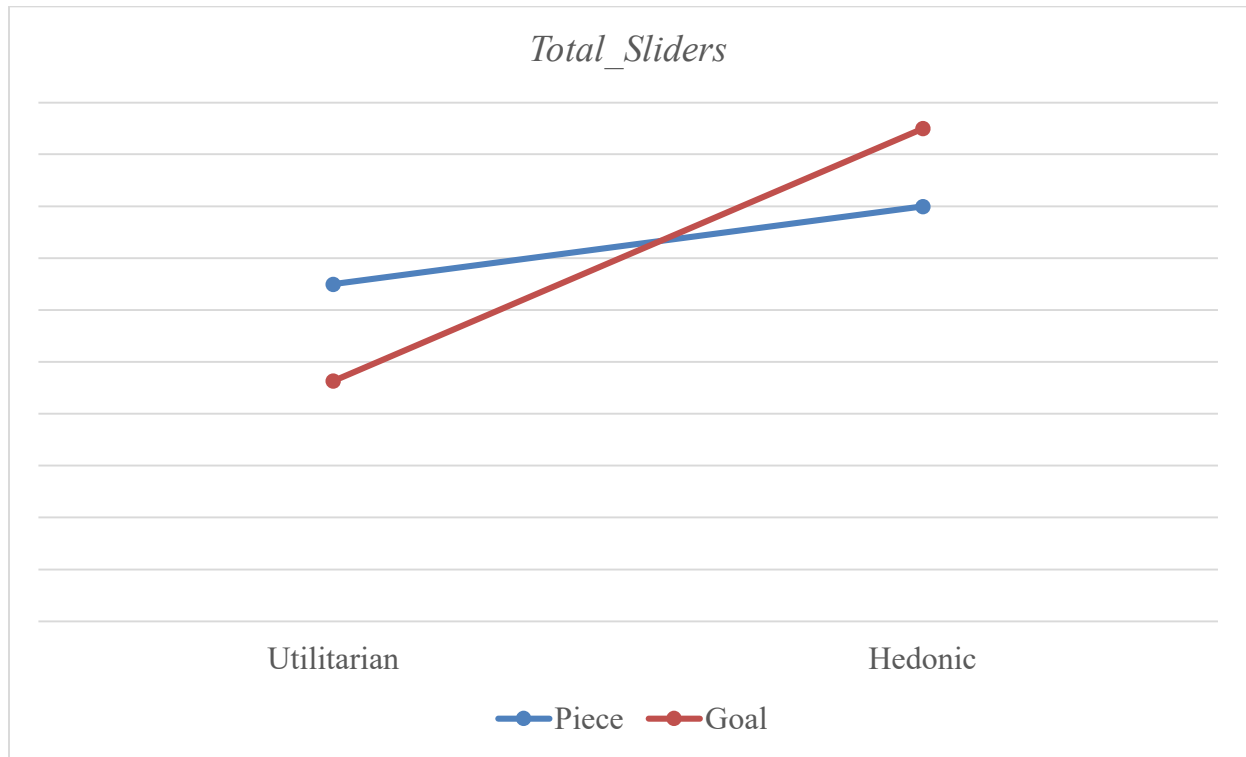
Figures

Figure 1. Theoretical Model



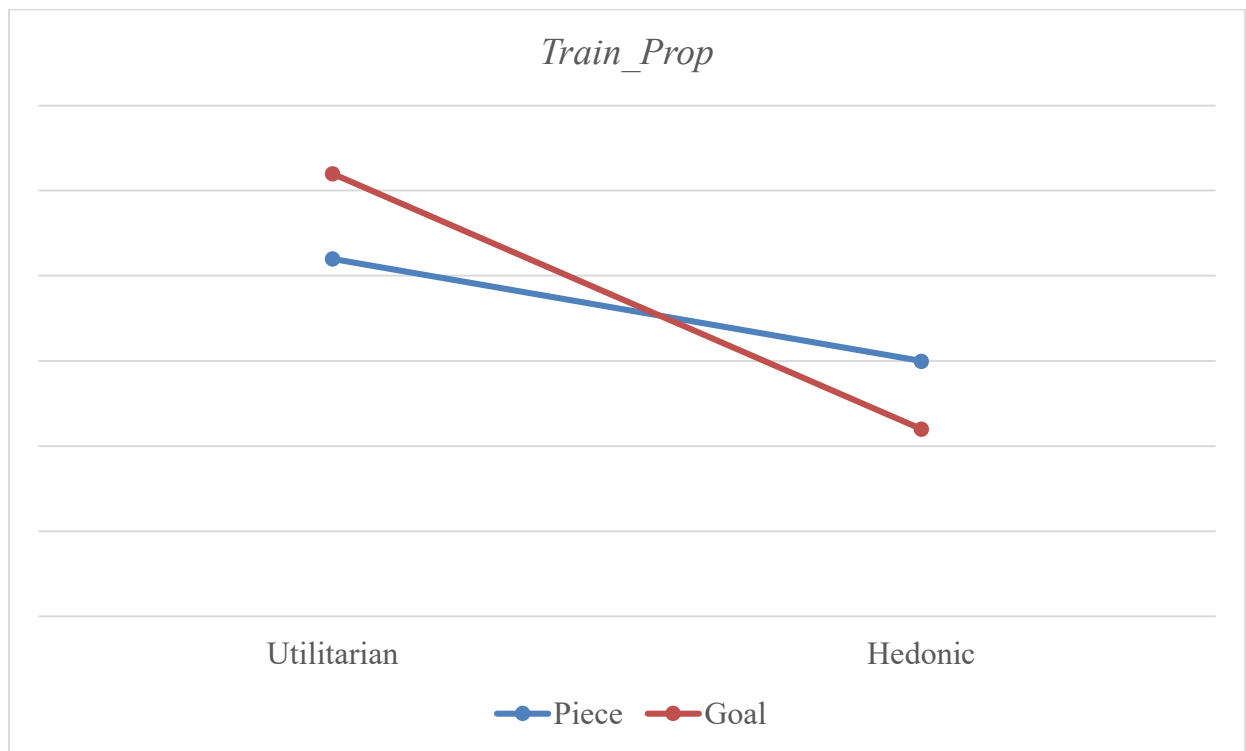
Note: Figure 1 demonstrates the theoretical model underlying all hypotheses. H1 predicts a positive main effect of hedonic (vs. utilitarian) reward nature on employee total effort (i.e., production effort plus voluntary training effort). H2 predicts that the effect of hedonic (vs. utilitarian) reward nature on employee total effort will be more positive when the reward is goal-based than piece-rate. H3 predicts a negative main effect of hedonic (vs. utilitarian) reward nature on employee voluntary training effort proportion (i.e., voluntary training effort divided by total effort). H4 predicts that the effect of hedonic (vs. utilitarian) reward nature on employee voluntary training effort proportion will be more negative when the reward is goal-based than piece-rate. RQ1 posits a question on the effects of reward nature and reward contingency on employee performance.

Figure 2. Predicted Results for H1 and H2



Note: Figure 2 shows the predicted pattern of *Total_Sliders* (i.e., total number of sliders participants completed during the production round) for H1 and H2. H1 predicts that employees will exert more total effort when they pursue hedonic rewards than utilitarian rewards. H2 predicts that the effect of hedonic (vs. utilitarian) reward nature on employee total effort will be more positive when the reward is goal-based than piece-rate.

Figure 3. Predicted Results for H3 and H4



Note: Figure 3 shows the predicted pattern of *Train_Prop* (i.e., the proportion of training sliders completed out of all sliders completed during the production round) for H3 and H4. H3 predicts that employees' voluntary training effort proportion will be lower when they pursue hedonic rewards than utilitarian rewards. H4 predicts that the effect of hedonic (vs. utilitarian) reward nature on employee voluntary training effort proportion is more negative when the reward is goal-based than piece-rate.

Figure 4. Experiment Procedure Flow Chart

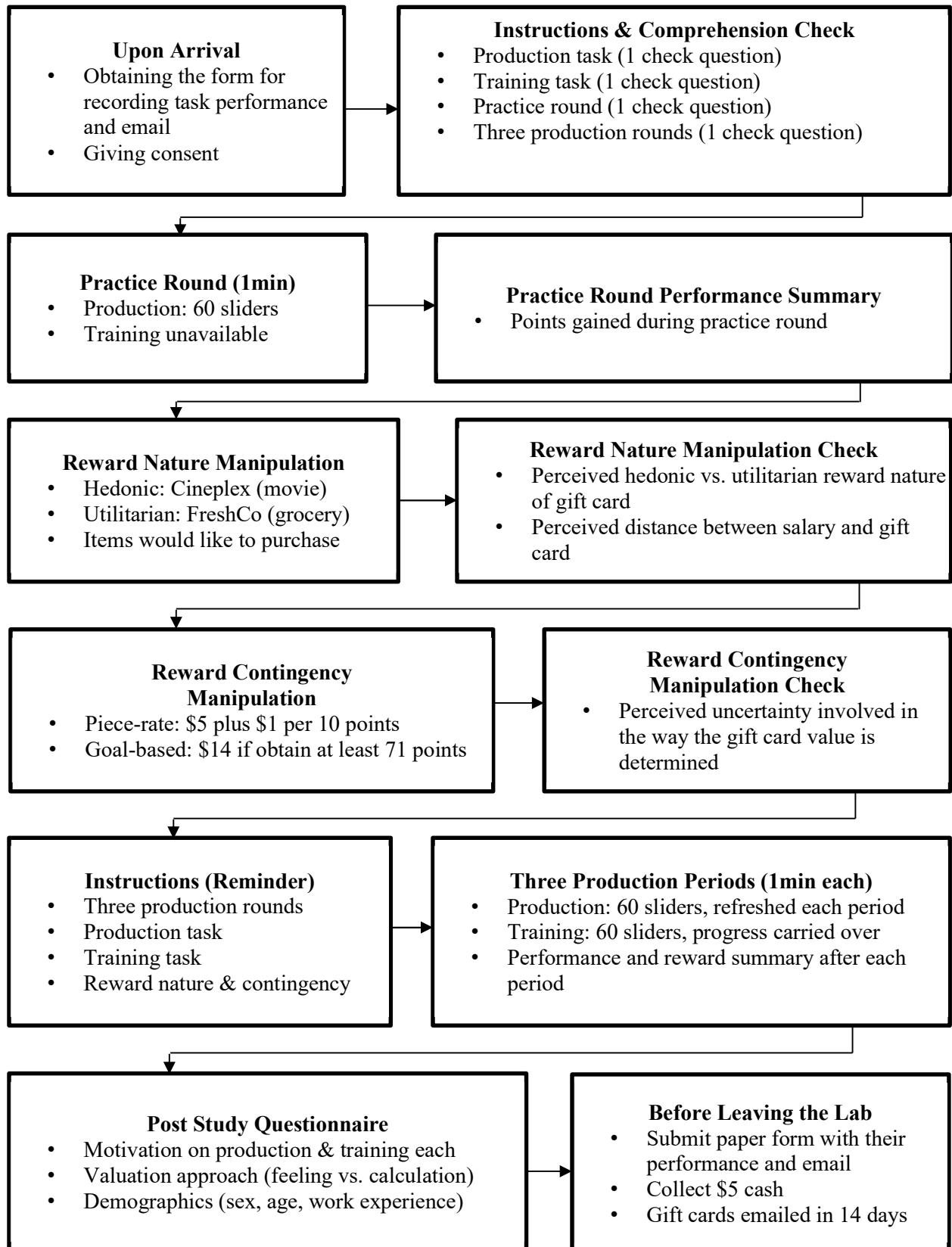
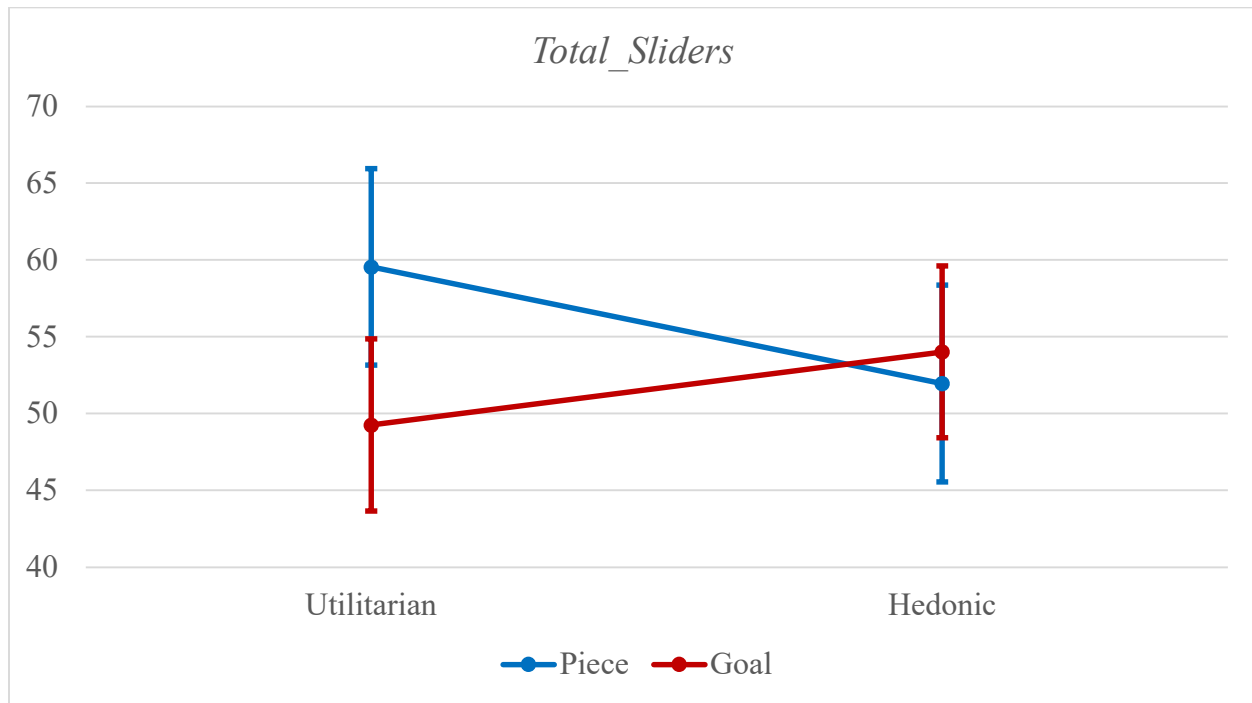
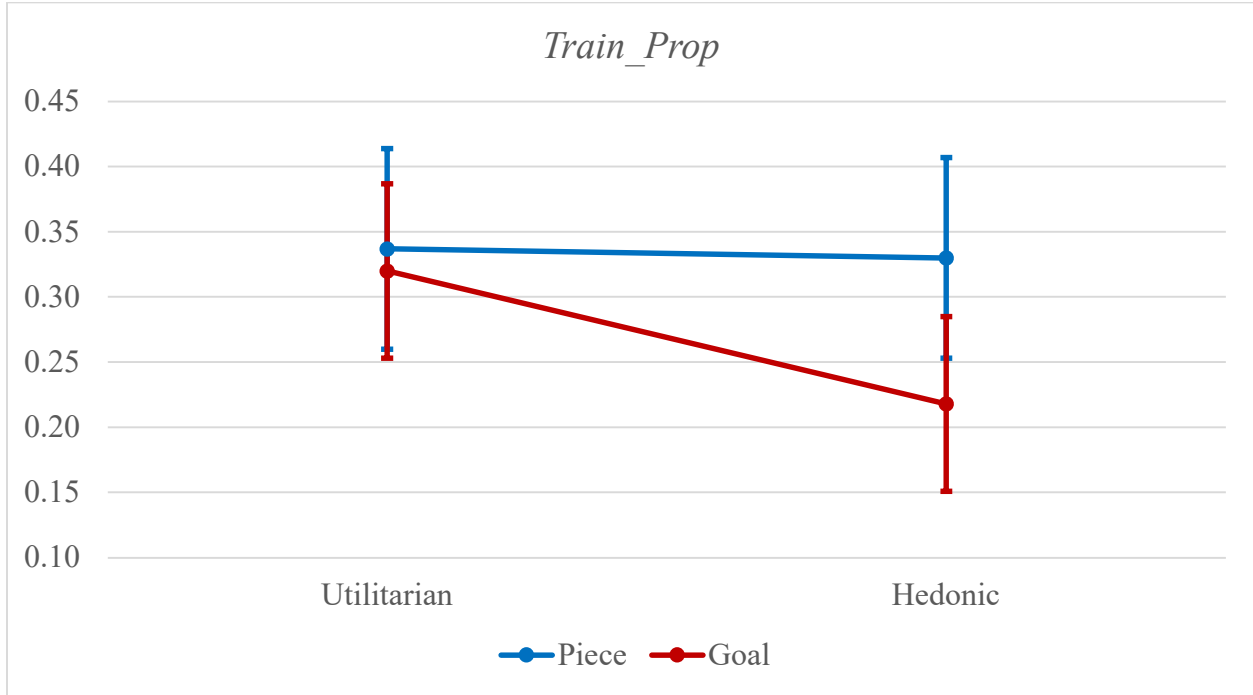


Figure 5. Results for H1 and H2 Testing



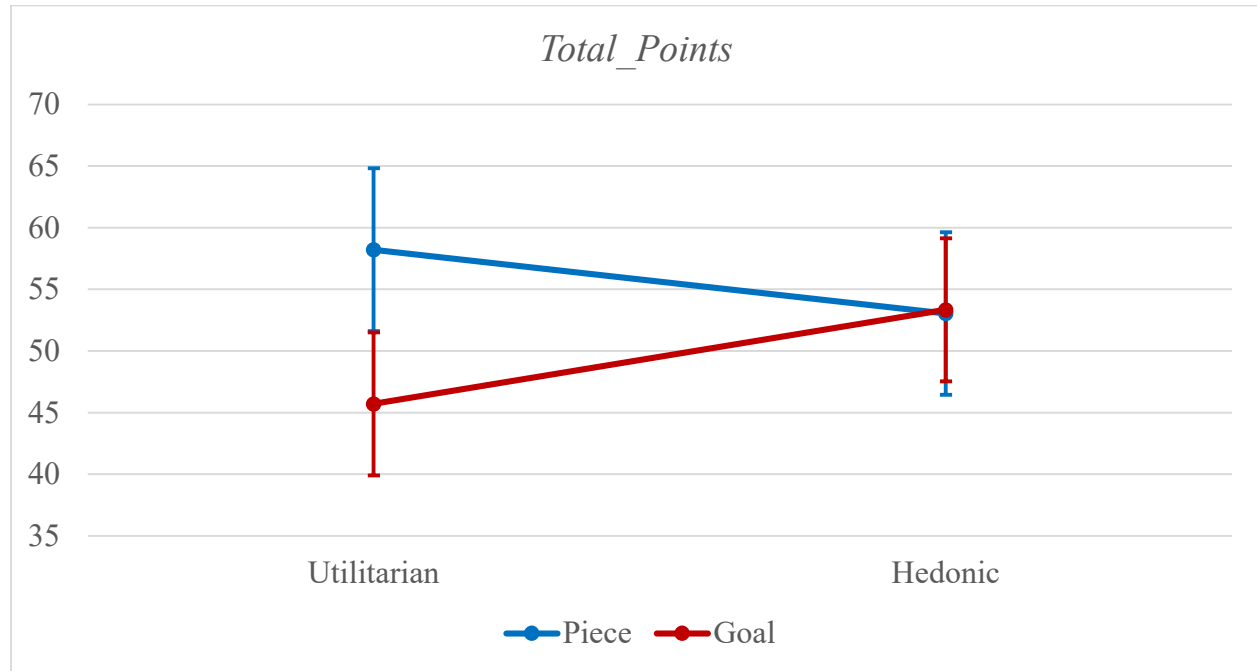
Note: Figure 5 shows the estimated marginal means of *Total_Sliders* (i.e., total number of sliders participants completed during the production round) with *Practice* (i.e., total number of sliders participants completed during the practice round) as a covariate. The error bars display 95% confidence interval. *Practice* is a suitable covariate to use for hypotheses testing with ANCOVA because 1) it is not significantly correlated with *Nature*, *Contingency*, or *Nature* $\times$ *Contingency*, but is significantly correlated with *Total_Sliders* (see Table 3) (Loftin and Madison 1991); and 2) there is no unexpected effect of *Practice* on *Total_Sliders* other than an expected main effect (see Table 6) (Piercey 2023). ANCOVA results do not suggest *Nature* has a main effect on *Total_Sliders* ($F(1, 136) = 0.21, p = 0.65$). The results do not support H1. ANCOVA results suggest that *Nature* and *Contingency* have an interactive effect on *Total_Sliders* ($F(1, 136) = 4.05, p = 0.05$). Further, hedonic (vs. utilitarian) reward nature has a negative simple effect ($F(1, 136) = 2.67, p = 0.05$ one-tailed) on *Total_Sliders* (Piece_Hedonic: EMM (Estimated Marginal Mean) = 51.96, $SE = 3.30$; Piece_Utilitarian: EMM = 59.56, $SE = 3.25$) under piece-rate condition but has no simple effect on *Total_Sliders* ($F(1, 136) = 1.39, p = 0.24$) under goal-based condition (Goal_Hedonic: EMM = 54.02, $SE = 2.88$; Goal_Utilitarian: EMM = 49.27, $SE = 2.81$). The results support H2.

Figure 6. Results for H3 and H4 Testing



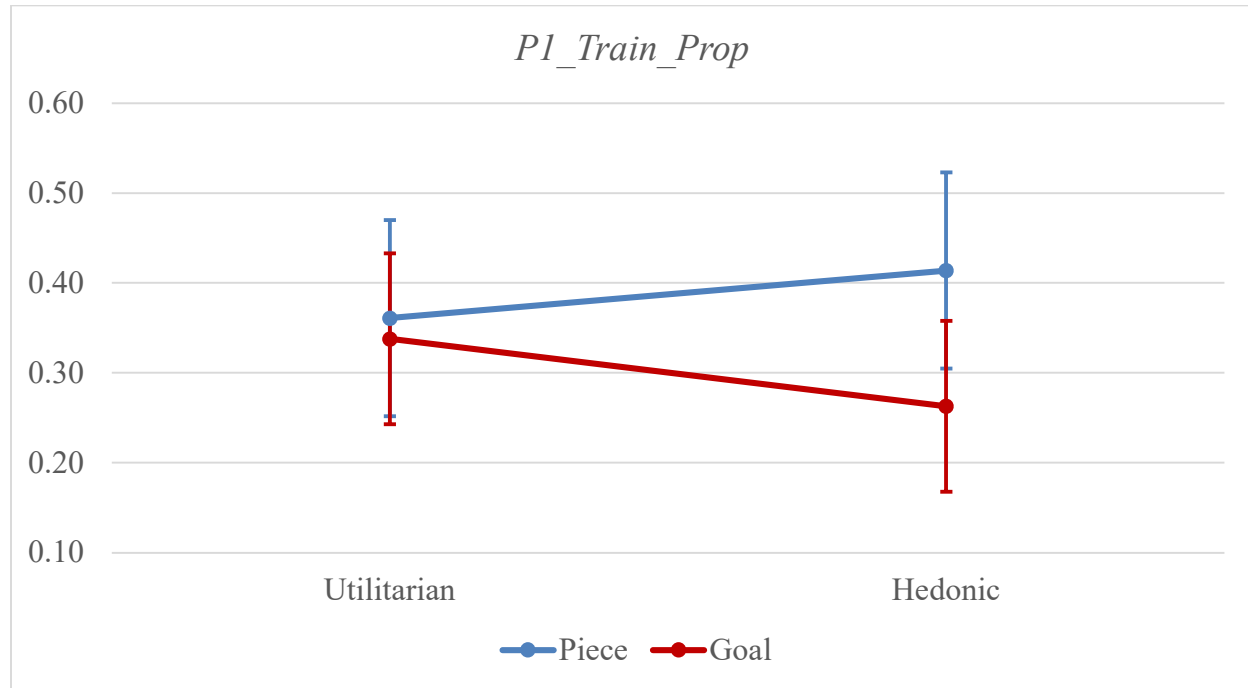
Note: Figure 6 shows the estimated marginal means of *Train_Prop* (i.e., the proportion of training sliders completed out of all sliders completed during the production round) with *Practice* (i.e., total number of sliders participants completed during the practice round) as a covariate. The error bars display 95% confidence interval. *Practice* is a suitable covariate to use for hypotheses testing with ANCOVA because 1) it is not significantly correlated with *Nature*, *Contingency*, or *Nature*×*Contingency*, but is significantly correlated with *Train_Prop* (see Table 3) (Loftin and Madison 1991); and 2) there is no unexpected effect of *Practice* on *Train_Prop* other than an expected main effect (see Table 7) (Piercey 2023). ANCOVA results do not suggest that *Nature* has a main effect on *Train_Prop* ($F(1, 136) = 2.18, p = 0.14$). The results do not support H3. ANCOVA results do not suggest that *Nature* and *Contingency* have an interactive effect on *Train_Prop* ($F(1, 136) = 1.69, p = 0.20$). However, contrast analysis (Piece_Utilitarian = 1; Piece_Hedonic = 1; Goal_Utilitarian = 1; Goal_Hedonic = -3) following Guggenmos et al. (2018) supports that *Nature* and *Contingency* have an interactive effect on *Train_Prop* ($F(1, 136) = 7.50, p = 0.01$, residual between-cells variance insignificant $F(3, 136) = 1.87, p = 0.14$). Further analysis shows that hedonic (vs. utilitarian) reward nature has no simple effect ($F(1, 136) = 0.01, p = 0.90$) on *Train_Prop* under piece-rate condition (Piece_Hedonic: $EMM = 0.33, SE = 0.04$; Piece_Utilitarian: $EMM = 0.34, SE = 0.04$) but has a negative simple effect ($F(1, 136) = 4.50, p = 0.04$) on *Train_Prop* under goal-based condition (Goal_Hedonic: $EMM = 0.22, SE = 0.03$; Goal_Utilitarian: $EMM = 0.32, SE = 0.03$). The results support H4.

Figure 7. Results for RQ1 Testing



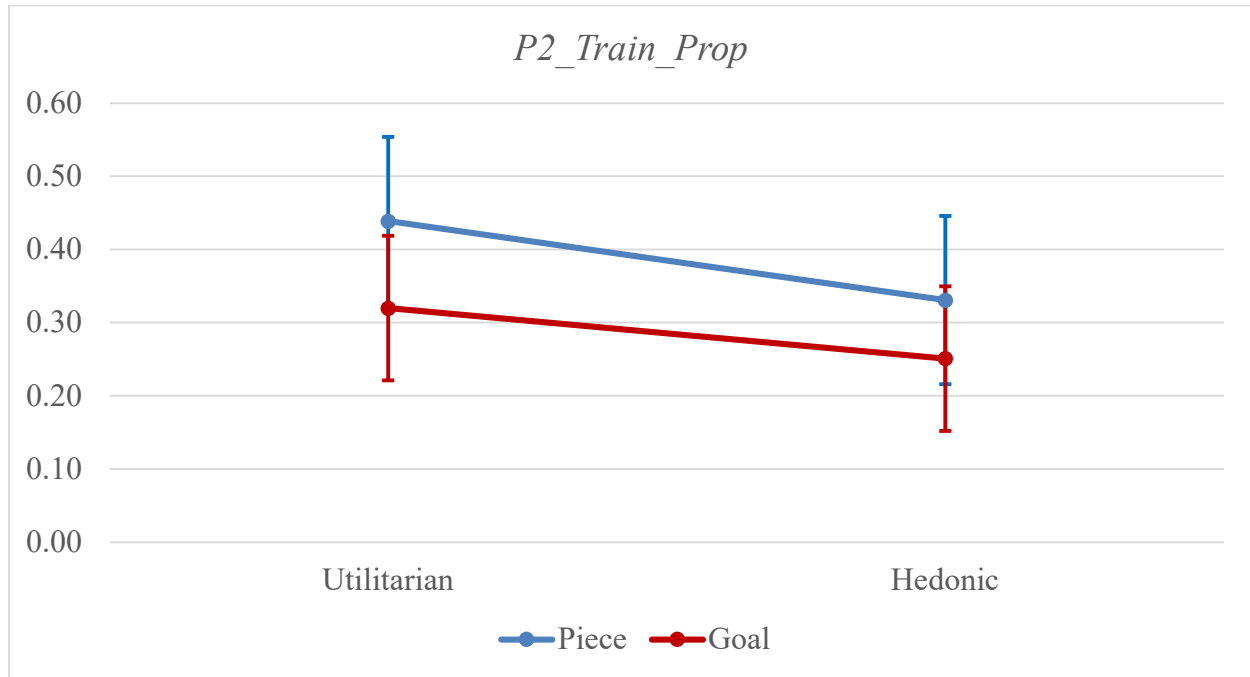
Note: Figure 7 shows the estimated marginal means of *Total_Points* (i.e., total number of points participants gained) with *Practice* (i.e., total number of sliders participants completed during the practice round) as a covariate. The error bars display 95% confidence interval. *Practice* is a suitable covariate to use for hypotheses testing with ANCOVA because 1) it is not significantly correlated with *Nature*, *Contingency*, or *Nature*×*Contingency*, but is significantly correlated with *Total_Points* (see [Table 3](#)) ([Loftin and Madison 1991](#)); and 2) there is no unexpected effect of *Practice* on *Total_Points* other than an expected main effect (see [Table 8](#)) ([Piercey 2023](#)). ANCOVA results suggest that *Nature* does not have a main effect on *Total_Points* ($F(1, 136) = 0.15, p = 0.70$), but *Nature* and *Contingency* have an interactive effect on *Total_Points* ($F(1, 136) = 4.12, p = 0.04$). Simple contrast suggests that hedonic (vs. utilitarian) reward nature has no simple effect on *Total_Points* ($F(1, 136) = 1.17, p = 0.28$) under piece-rate condition (Piece_Hedonic: $EMM = 53.05, SE = 3.40$; Piece_Utilitarian: $EMM = 58.22, SE = 3.34$) but has a positive simple effect on *Total_Points* ($F(1, 136) = 3.40, p = 0.07$) under goal-based condition (Goal_Hedonic: $EMM = 53.36, SE = 2.96$; Goal_Utilitarian: $EMM = 45.72, SE = 2.89$). Thus, RQ1 is answered: the effect of hedonic (vs. utilitarian) reward nature is more positive when the reward is goal-based than piece-rate; hedonic (vs. utilitarian) reward nature has a positive effect on performance when the reward is goal-based but has no effect on performance when the reward is piece-rate.

Figure 8. Training Sliders Proportion in Period 1



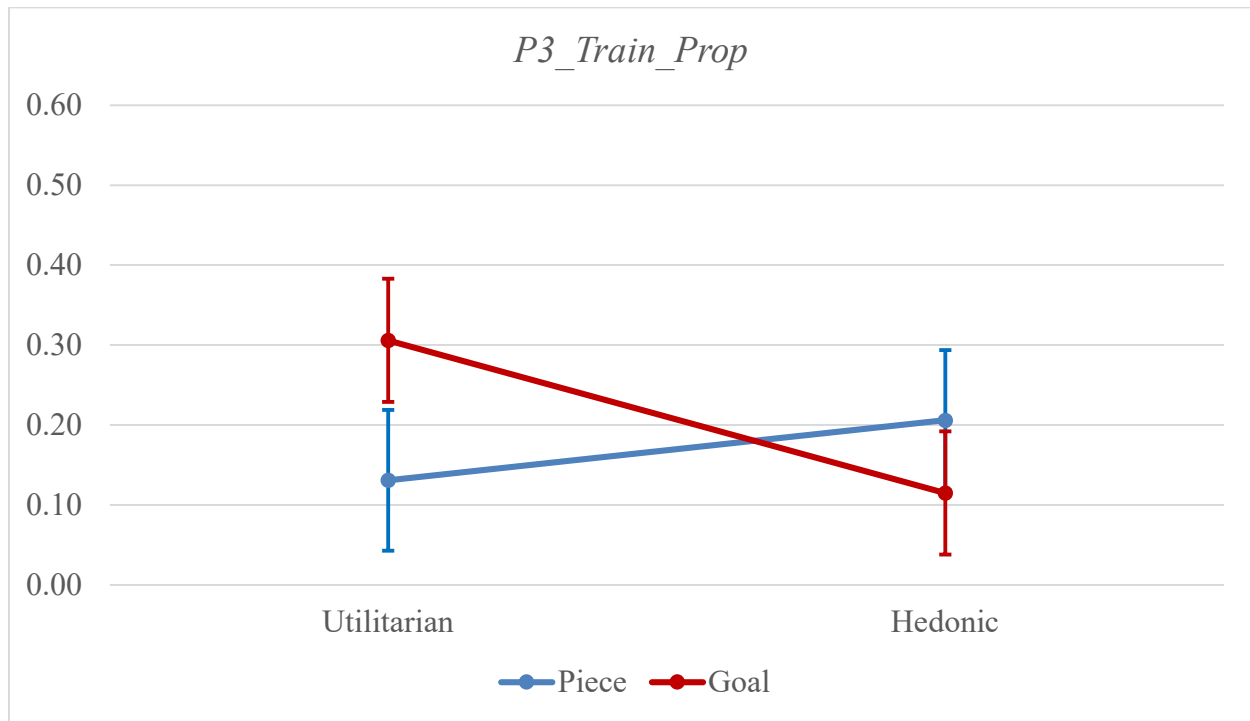
Note: Figure 8 shows the estimated marginal means of *PI_Train_Prop* (i.e., the proportion of training sliders completed out of all sliders completed during the production period 1) with *Practice* (i.e., total number of sliders participants completed during the practice round) as a covariate. The error bars display 95% confidence interval. ANCOVA results do not suggest that *Nature* has a main effect on *PI_Train_Prop* ($F(1, 136) = 0.04, p = 0.84$); ANCOVA results do not suggest that *Nature* and *Contingency* have an interactive effect on *PI_Train_Prop* ($F(1, 136) = 1.54, p = 0.22$). Given that the visual pattern of estimated marginal means suggest an interaction, contrast analysis (Piece_Utilitarian = 1; Piece_Hedonic = 1; Goal_Utilitarian = 1; Goal_Hedonic = -3) following Guggenmos et al. (2018) offers some support that *Nature* and *Contingency* have an interactive effect on *PI_Train_Prop* ($F(1, 136) = 3.55, p = 0.06$, residual between-cells variance significant $F(3, 136) = 2.93, p = 0.04$). Further analysis shows that hedonic (vs. utilitarian) reward nature has no simple effect ($F(1, 136) = 0.47, p = 0.49$) on *PI_Train_Prop* under piece-rate condition (Piece_Hedonic: $EMM = 0.41, SE = 0.06$; Piece_Utilitarian: $EMM = 0.36, SE = 0.05$) and has no simple effect ($F(1, 136) = 1.21, p = 0.27$) on *PI_Train_Prop* under goal-based condition (Goal_Hedonic: $EMM = 0.26, SE = 0.05$; Goal_Utilitarian: $EMM = 0.34, SE = 0.05$).

Figure 9. Training Sliders Proportion in Period 2



Note: Figure 9 shows the estimated marginal means of *P2_Train_Prop* (i.e., the proportion of training sliders completed out of all sliders completed during the production period 2) with *Practice* (i.e., total number of sliders participants completed during the practice round) as a covariate. The error bars display 95% confidence interval. ANCOVA results do not suggest that *Nature* has a main effect on *P2_Train_Prop* ($F(1, 136) = 2.62, p = 0.11$); ANCOVA results do not suggest that *Nature* and *Contingency* have an interactive effect on *P2_Train_Prop* ($F(1, 136) = 0.13, p = 0.72$). While contrast analysis (Piece_Utilitarian = 1; Piece_Hedonic = 1; Goal_Utilitarian = 1; Goal_Hedonic = -3) following Guggenmos et al. (2018) offers some support that *Nature* and *Contingency* have an interactive effect on *P2_Train_Prop* ($F(1, 136) = 3.47, p = 0.06$, residual between-cells variance insignificant $F(3, 136) = 1.93, p = 0.13$), the pattern of estimated marginal means does not suggest an interaction. Further analysis shows that hedonic (vs. utilitarian) reward nature has no simple effect ($F(1, 136) = 1.73, p = 0.19$) on *P2_Train_Prop* under piece-rate condition (Piece_Hedonic: $EMM = 0.33, SE = 0.06$; Piece_Utilitarian: $EMM = 0.44, SE = 0.06$) and has no simple effect ($F(1, 136) = 0.93, p = 0.34$) on *P2_Train_Prop* under goal-based condition (Goal_Hedonic: $EMM = 0.25, SE = 0.05$; Goal_Utilitarian: $EMM = 0.32, SE = 0.05$).

Figure 10. Training Sliders Proportion in Period 3



Note: Figure 10 shows the estimated marginal means of *P3_Train_Prop* (i.e., the proportion of training sliders completed out of all sliders completed during the production period 3) with *Practice* (i.e., total number of sliders participants completed during the practice round) as a covariate. The error bars display 95% confidence interval. ANCOVA results do not suggest that *Nature* has a main effect on *P3_Train_Prop* ($F(1, 136) = 1.88, p = 0.17$); ANCOVA results suggest that *Nature* and *Contingency* have an interactive effect on *P3_Train_Prop* ($F(1, 136) = 9.99, p < 0.01$). Further analysis shows that hedonic (vs. utilitarian) reward nature has no simple effect ($F(1, 136) = 1.38, p = 0.24$) on *P3_Train_Prop* under piece-rate condition (Piece_Hedonic: $EMM = 0.21, SE = 0.05$; Piece_Utilitarian: $EMM = 0.13, SE = 0.04$) but has a negative simple effect ($F(1, 136) = 11.96, p < 0.01$) on *P3_Train_Prop* under goal-based condition (Goal_Hedonic: $EMM = 0.12, SE = 0.04$; Goal_Utilitarian: $EMM = 0.31, SE = 0.04$).

Tables

Table 1. Employee Training System Feature Check

#	Company Name	Allow training anytime and anywhere?	Suitable for upskilling?	Number of customers mentioned on website	Examples of mentioned customers
1	Absorb Software	Yes	Yes	≥ 27	Sony; GAP; Johnson&Johnson; Samsung; A&W
2	Anthology	Yes	No	≥ 12	AT&T; LabCorp
3	Canvas	Yes	Yes	≥ 7000	Professional Golfers' Association of America
4	Cypher Learning	Yes	Yes	≥ 21	McDonald
5	D2L	Yes	Yes	≥ 1300	Walmart; Colliers
6	Docebo	Yes	Yes	≥ 3700	Lego; Lululemon; BMW; SunLife; L'Oreal; Zoom
7	iSpring	Yes	Yes	≥ 59000	IBM; AMD; Siemens; ASUS; GE; P&G; Intel; Microsoft; Pfizer; 20th Century Fox
8	Moodle	Yes	Yes	≥ 9	McGraw Hill; HP
9	TalentLMS	Yes	Yes	≥ 35	Oracle; Google; Amazon; OpenAI; Meta; PwC

Note: The nine training systems shown above were listed as best training systems of 2024 in a Forbes article ([Haan and Watts 2024](#)). The information in the table above was collected from each training system company's website between May 5 2024 and May 9 2024. When companies do not state how many customers use their platform, I take the minimum number of company customers supported by the facts on the websites. For example, when a company has a few customers listed on its website, I count the number of customers listed and use that number. One special case is TalentLMS, which mentions on its website that over 70,000 teams use it. I estimated the number of customers of TalentLMS, assuming there are 2,000 teams for each customer. In total, these nine training systems have at least 71,104 company customers. Below are the links to these nine training system companies' websites:

Absorb Software: <https://www.absorblms.com/products/absorb-infuse/>

Anthology (previously Blackboard): <https://www.anthology.com/business>

Canvas: <https://www.instructure.com/professional-education>

Cypher: <https://www.cypherlearning.com/lms>

D2L: <https://www.d2l.com/solutions/corporate/>

Docebo: <https://www.docebo.com/solutions/employee-training/>

iSpring: <https://www.ispringsolutions.com/solutions/induction-training>

Moodle: <https://moodle.com/solutions/moodle-app/>

TalentLMS: <https://www.talentlms.com/>

Table 2. Hedonic Nature and Utilitarian Nature of Gift Cards – Pilot Study

#	Vendor Name	Category	Hedonic Mean (SD)	Utilitarian Mean (SD)	Hedonic vs. Utilitarian	
					t-statistic	p-value
1	Banana Republic	Retail	0.20 (1.47)	-0.30 (1.53)	1.98	0.06
2	Burger King	Restaurant	1.47 (1.25)	1.00 (1.72)	1.47	0.15
3	Cineplex*	Theater	2.50 (0.86)	0.10 (1.88)	7.33	< 0.01
4	East Side Mario	Restaurant	0.87 (1.85)	0.33 (1.67)	1.77	0.09
5	Foodland	Grocery	-0.13 (1.81)	0.86 (2.08)	-3.94	< 0.01
6	Footlocker	Retail	1.40 (1.90)	0.63 (1.94)	2.25	0.03
7	FreshCo**	Grocery	0.63 (1.67)	2.20 (1.10)	-5.63	< 0.01
8	GAP	Retail	0.93 (1.66)	0.83 (1.51)	0.42	0.68
9	Harveys	Restaurant	1.37 (1.40)	0.90 (1.63)	1.54	0.13
10	Indigo	Retail	2.10 (1.56)	1.17 (1.95)	2.90	0.01
11	Montanas	Restaurant	0.47 (1.85)	0.00 (1.80)	2.25	0.03
12	New York Fries	Restaurant	1.47 (1.46)	0.10 (1.86)	4.43	< 0.01
13	Old Navy	Retail	0.90 (1.83)	0.87 (1.55)	0.14	0.89
14	Roots	Retail	1.23 (1.72)	0.07 (1.86)	4.23	< 0.01
15	Sobeys	Grocery	1.03 (1.73)	2.37 (0.81)	-5.76	< 0.01
16	Tim Hortons	Restaurant	2.20 (1.19)	2.13 (1.17)	2.73	0.79
17	Walmart	Retail	2.10 (1.09)	2.80 (0.41)	-4.37	< 0.01

Note: Table 2 shows pilot test participants' hedonic rating and utilitarian rating of 17 gift cards. All vendors have locations that is within 30 minutes bus ride from the campus ($\leq 16\text{km}$). Thirty undergraduate students were given information about these 17 gift cards in random order. Following Mitchell et al. (2022), I asked participants to indicate on a 7-point Likert scale (-3 = strongly disagree, 0 = neither agree nor disagree, $+3$ = strongly agree) the extent to which they agree with two statements: (1) "the item(s) that can be purchased with this gift card are fun and exciting to me" [Hedonic reward nature], and (2) "the item(s) that can be purchased with this gift card are necessary and helpful to me" [Utilitarian reward nature]. In addition, participants were also asked to indicate the frequency they visit each vendor (online store included) and their average spending per visit at each vendor (online store included). All p-values are two-tailed.

*Among all the gift cards whose hedonic rating is significantly higher than utilitarian rating, Cineplex (Hedonic: $t(29) = 15.90, p < 0.01$; Utilitarian: $t(29) = 0.29, p = 0.10$), East Side Mario (Hedonic: $t(29) = 2.56, p = 0.02$; Utilitarian: $t(29) = 1.10, p = 0.28$), New York Fries (Hedonic: $t(29) = 5.52, p < 0.01$; Utilitarian: $t(29) = 0.29, p = 0.77$), and Roots (Hedonic: $t(29) = 3.94, p < 0.01$; Utilitarian: $t(29) = 0.20, p = 0.85$) each have a hedonic rating significantly above zero; none of them have a utilitarian rating significantly above zero. I chose the Cineplex gift card among the four options for hedonic reward nature manipulation because it has the highest hedonic mean rating (Mean = 2.50).

**Among all the gift cards whose utilitarian rating is significantly higher than hedonic rating, FreshCo (Hedonic: $t(29) = 6.18, p < 0.01$; Utilitarian: $t(29) = -4.86, p < 0.01$), Sobeys (Hedonic: $t(29) = 4.17, p < 0.01$; Utilitarian: $t(29) = -5.69, p < 0.01$), and Walmart (Hedonic: $t(29) = 1.84, p = 0.08$; Utilitarian: $t(29) = -8.03, p < 0.01$) differ from Cineplex both in hedonic rating and utilitarian rating. I chose the FreshCo gift card among the three options for utilitarian reward nature manipulation because it has the lowest mean hedonic rating (Mean = 0.63), offering the best chance of manipulating utilitarian reward nature without manipulating hedonic reward nature.

Table 3. Pearson Correlations

	<i>Nature</i>	<i>Contingency</i>	<i>Practice</i>	<i>Total_Sliders</i>	<i>Train_Prop</i>	<i>Total_Points</i>	<i>Sex</i>	<i>Age</i>	<i>Exp_Month</i>
<i>Nature</i>	1.00	-0.00	0.11	0.04	-0.11	0.11	-0.11	0.11	0.24***
<i>Contingency</i>	-0.00	1.00	-0.01	-0.11	-0.15*	-0.14*	0.06	-0.66***	-0.22**
<i>Practice</i>	0.11	-0.01	1.00	0.49***	0.20**	0.57***	-0.28***	0.01	0.02
<i>Total_Sliders</i>	0.04	-0.11	0.49***	1.00	-0.36***	0.77***	-0.14*	0.07	-0.02
<i>Train_Prop</i>	-0.11	-0.15*	0.20**	-0.36***	1.00	-0.25***	-0.14*	0.07	-0.11
<i>Total_Points</i>	0.11	-0.14*	0.57***	0.77***	-0.25***	1.00	-0.24***	0.11	0.06
<i>Sex</i>	-0.11	0.06	-0.28***	-0.14*	-0.14*	-0.24***	1.00	0.06	0.10
<i>Age</i>	0.11	-0.66***	0.01	0.07	0.07	0.11	0.06	1.00	0.37***
<i>Exp_Month</i>	0.24***	-0.22**	0.02	-0.02	-0.11	0.06	0.10	0.37***	1.00

Notes: Table 3 displays the Pearson correlation between various variables. *Nature* is the dummy variable for reward nature conditions (i.e., 0 for utilitarian condition and 1 for hedonic condition). *Contingency* is the dummy variable for reward contingency conditions (i.e., 0 for piece-rate condition and 1 for goal-based condition). *Total_Sliders* is the total number of sliders (i.e., production plus training) participants completed during the production round. *Train_Prop* is the proportion of training sliders participants completed out of all the sliders completed during the production round. *Total_Points* is the total number of points participants gained during the production round. *Sex* is participant's sex. *Age* is participant's age. *Exp_Month* is participant's work experience in number of months. *, ** and *** represent two-tailed significance at 0.1, 0.05, 0.01 levels, respectively. The correlation results suggest that *Practice* is a suitable covariate to use for hypotheses testing with ANCOVA because it is not significantly correlated with independent variables (i.e., *Nature* and *Contingency*) but is significantly correlated with all dependent variables (i.e., *Total_Sliders*, *Train_Prop*, *Total_Points*) ([Loftin and Madison 1991](#)). All p-values are two-tailed unless otherwise stated. All variables meet the guidelines of $|\text{skewness}| < 3.0$ and $|\text{kurtosis}| < 10.0$ for normal distribution such that no transformation is necessary ([Kline 2011](#)). For a full list of variables with definitions, please refer to [Appendix D](#).

Table 4. Manipulation Check**Panel A: Factor Loading of Reward Nature Questions**

	Hedonic Loading	Utilitarian Loading
<i>Fun</i>	0.87	-0.11
<i>Enjoyable</i>	0.91	0.13
<i>Pleasurable</i>	0.88	0.27
<i>Useful</i>	0.07	0.93
<i>Practical</i>	0.11	0.93
<i>Functional</i>	0.08	0.92

Panel B: Reward Nature across Conditions

	Piece-rate		Goal-based	
	Hedonic Mean (SD)	Utilitarian Mean (SD)	Hedonic Mean (SD)	Utilitarian Mean (SD)
<i>Hedonic_Avg</i>	1.88 (1.31)	1.20 (1.05)	2.25 (0.84)	1.57 (1.21)
<i>Utilitarian_Avg</i>	0.76 (1.58)	2.24 (1.10)	0.84 (1.37)	2.34 (1.06)
<i>Nature_Diff</i>	1.12 (1.24)	-1.03 (1.37)	1.41 (1.27)	-0.77(1.38)

Panel C: Factorial ANOVA – Difference between Hedonic and Utilitarian Rating

DV: <i>Nature_Diff</i>					
Source of Variance	SS	df	MS	F	p-value
<i>Nature</i>	162.69	1	162.69	93.76	< 0.01
<i>Contingency</i>	2.60	1	2.60	1.50	0.22
<i>Nature × Contingency</i>	0.01	1	0.01	0.00	0.95
Error	237.72	137	1.74		

Notes: Table 4 Panel A displays factor loadings for the six questions developed by Mitchell et al. (2022) to measure reward nature. I use principal component analysis with varimax rotation. *Fun*, *Enjoyable*, and *Pleasurable* are intended to measure the hedonic nature, and they load on a single factor; *Useful*, *Practical*, and *Functional* are intended to measure the utilitarian nature, and they load on a single factor. The two factors explain 84.4% of the variance. Table 4 Panel B displays means and standard deviations of participants' average hedonic rating, average utilitarian rating and the difference between the two ratings. *Hedonic_Avg* is the average of *Fun*, *Enjoyable*, and *Pleasurable*; *Utilitarian_Avg* is the average of *Useful*, *Practical*, and *Functional*. *Nature_Diff* is the difference between *Hedonic_Avg* and *Utilitarian_Avg*. Table 4 Panel C displays ANOVA results with *Nature_Diff* as dependent variable. *Nature* is the reward nature conditions participants were assigned to. Utilitarian = 0; Hedonic = 1. *Contingency* is the reward contingency conditions participants were assigned to. Piece-rate = 0; Goal-based = 1. $N = 141$. The results hold when I replace the DV with *Hedonic_Avg* or *Utilitarian_Avg*. All p-values are two-tailed unless otherwise stated. All variables meet the guidelines of $|\text{skewness}| < 3.0$ and $|\text{kurtosis}| < 10.0$ for normal distribution such that no transformation is necessary (Kline 2011). For a full list of variables with definitions, please refer to Appendix D.

Table 5. Descriptives**Panel A Participants' Performance Mean (Standard Deviation)**

	Piece-Rate		Goal-based	
	Utilitarian	Hedonic	Utilitarian	Hedonic
Practice Round				
Production Sliders Completed [<i>practice</i>]	14.77 (6.71)	17.40 (5.98)	15.59 (6.30)	16.21 (6.90)
Production Round				
Production Sliders Completed [<i>Total_Prod_Sliders</i>]	40.39 (25.96)	37.37 (26.39)	34.59 (19.31)	44.49 (25.54)
Training Sliders Completed [<i>Total_Train_Sliders</i>]	17.26 (13.83)	16.90 (13.61)	14.07 (11.53)	9.92 (8.34)
Sliders Completed [<i>Total_Sliders</i>]	57.65 (22.40)	54.27 (23.40)	48.66 (15.84)	54.41 (21.75)
Training Sliders Proportion [<i>Train_Prop</i>]	0.33 (0.23)	0.34 (0.22)	0.32 (0.23)	0.22 (0.20)
Total Points [<i>Total_Points</i>]	55.81 (21.82)	55.97 (26.36)	44.95 (17.55)	53.85 (24.95)
Number of Alternative Ways Revealed [<i>Total_Alt</i>]	1.10 (1.45)	1.23 (1.36)	0.78 (1.17)	0.59 (0.91)
Points Gained Following Alternative Ways [<i>Total_Alt_Points</i>]	19.84 (25.29)	24.07 (27.28)	13.68 (17.94)	12.23 (24.03)

Panel B Proportion of Participants Achieving the Goal

	Piece-Rate		Goal-based	
	Utilitarian	Hedonic	Utilitarian	Hedonic
Proportion of Participants Achieving 71 Points (i.e., the Performance Goal) or More	22.58%	20.00%	9.76%	20.51%

Notes: Table 5 Panel A shows the means and standard deviations of the number of production sliders participants completed, the number of training sliders participants completed, the proportion of training sliders out of all sliders completed, the points gained by participants during the production round, the number of alternative ways revealed by participants, and the points gained following alternative ways under each condition. All dependent variables meet the guidelines of $|\text{skewness}| < 3.0$ and $|\text{kurtosis}| < 10.0$ for normal distribution such that no transformation is necessary (Kline 2011). Table 5 Panel B shows the proportion of participants achieving 71 points (i.e., the performance goal) or more. The proportion of participants who gained at least 71 points (i.e., the performance level required for goal attainment) does not differ by *Nature* ($\chi^2(1, 61) = 0.06, p = 0.81$) when reward is piece-rate or goal-based ($\chi^2(1, 81) = 1.81, p = 0.18$).

Table 6. Test of Unexpected Effect of Covariate - Total Sliders Completed**Panel A: Full Model**

Source of Variance	SS	df	MS	F	p-value
<i>Nature</i>	280.65	1	280.65	0.87	0.35
<i>Contingency</i>	13.47	1	13.47	0.04	0.84
<i>Nature</i> × <i>Contingency</i>	1566.13	1	1566.13	4.87	0.03
<i>Practice</i>	24931.98	30	831.07	2.58	< 0.01
<i>Nature</i> × <i>Practice</i>	4220.24	14	301.45	0.94	0.52
<i>Contingency</i> × <i>Practice</i>	2084.12	15	138.94	0.43	0.96
<i>Nature</i> × <i>Contingency</i> × <i>Practice</i>	967.20	4	241.80	0.75	0.56
Error	23161.15	72	321.68		

Panel B: Reduced Model

Source of Variance	SS	df	MS	F	p-value
<i>Nature</i>	48.71	1	48.71	0.11	0.74
<i>Contingency</i>	676.33	1	676.33	1.57	0.21
<i>Nature</i> × <i>Contingency</i>	720.97	1	720.97	1.67	0.20
Error	58955.62	137	430.33		

Panel C: Test of All Practice Effects and All Practice Interaction Effects

Source of Variance	SS	df	MS	F	p-value
<i>Practice</i>	24931.98	30	831.07	2.58	< 0.01
<i>Nature</i> × <i>Practice</i>	4220.24	14	301.45	0.94	0.52
<i>Contingency</i> × <i>Practice</i>	2084.12	15	138.94	0.43	0.96
<i>Nature</i> × <i>Contingency</i> × <i>Practice</i>	967.20	4	241.80	0.75	0.56
All <i>Practice</i> effects	32203.54	63	511.17	1.59	0.03
<i>Nature</i> × <i>Practice</i>	4220.24	14	301.45	0.94	0.52
<i>Contingency</i> × <i>Practice</i>	2084.12	15	138.94	0.43	0.96
<i>Nature</i> × <i>Contingency</i> × <i>Practice</i>	967.20	4	241.80	0.75	0.56
All <i>Practice</i> interaction effects	7271.56	33	220.35	0.68	0.89
Error – full model	23161.15	72	321.68		

Note: Following Piercey (2023), I examine whether there is any unexpected effect of *Practice* on *Total_Sliders* other than an expected main effect. There are two tests involved: 1) all *Practice* effect, which includes a main effect of *Practice* and its interaction with *Nature*, *Contingency*, and *Nature*×*Contingency*, and 2) all *Practice* interaction effect, which only includes *Practice*'s interaction with *Nature*, *Contingency*, and *Nature*×*Contingency*. Table 6 Panel A shows the full model for *Total_Sliders*, the total number of sliders participants completed during the production round. Table 6 Panel B shows the reduced model for *Total_Sliders*. $N = 141$. Table 6 Panel C shows the test of all *Practice* effects and all *Practice* interaction effects. The all *Practice* effect on *Total_Sliders* is significant ($F(63, 72) = 1.59, p = 0.03$), driven by a main effect of *Practice* on *Total_Sliders* ($F(30, 72) = 2.58, p < 0.01$). When I exclude the main effect of *Practice*, the all *Practice* interaction effect on *Total_Sliders* is insignificant ($F(33, 72) = 0.68, p = 0.89$). Hence, it is appropriate to use *Practice* as a covariate. All p-values are two-tailed unless otherwise stated. All variables meet the guidelines of $|\text{skewness}| < 3.0$ and $|\text{kurtosis}| < 10.0$ for normal distribution such that no transformation is necessary (Kline 2011). For a full list of variables with definitions, please refer to Appendix D.

Table 7. Test of Unexpected Effect of Covariate – Training Effort Proportion**Panel A: Full Model**

Source of Variance	SS	df	MS	<i>F</i>	p-value
<i>Nature</i>	0.00	1	0.00	0.05	0.82
<i>Contingency</i>	0.13	1	0.13	3.21	0.08
<i>Nature</i> × <i>Contingency</i>	0.01	1	0.01	0.32	0.57
<i>Practice</i>	2.02	30	0.07	1.61	0.05
<i>Nature</i> × <i>Practice</i>	0.62	14	0.04	1.06	0.41
<i>Contingency</i> × <i>Practice</i>	0.61	15	0.04	0.97	0.50
<i>Nature</i> × <i>Contingency</i> × <i>Practice</i>	0.37	4	0.09	2.21	0.08
Error	3.01	72	0.04		

Panel B: Reduced Model

Source of Variance	SS	df	MS	<i>F</i>	p-value
<i>Nature</i>	0.06	1	0.06	1.32	0.25
<i>Contingency</i>	0.15	1	0.15	3.15	0.08
<i>Nature</i> × <i>Contingency</i>	0.10	1	0.10	2.16	0.14
Error	6.59	137	0.05		

Panel C: Test of All Practice Effects and All Practice Interaction Effects

Source of Variance	SS	df	MS	<i>F</i>	p-value
<i>Practice</i>	2.02	30	0.07	1.61	0.05
<i>Nature</i> × <i>Practice</i>	0.62	14	0.04	1.06	0.41
<i>Contingency</i> × <i>Practice</i>	0.61	15	0.04	0.97	0.50
<i>Nature</i> × <i>Contingency</i> × <i>Practice</i>	0.37	4	0.09	2.21	0.08
All <i>Practice</i> effects	3.62	63	0.06	1.44	0.07
<i>Nature</i> × <i>Practice</i>	0.62	14	0.04	1.06	0.41
<i>Contingency</i> × <i>Practice</i>	0.61	15	0.04	0.97	0.50
<i>Nature</i> × <i>Contingency</i> × <i>Practice</i>	0.37	4	0.09	2.21	0.08
All <i>Practice</i> interaction effects	1.60	33	0.05	1.21	0.25
Error – full model	3.01	72	0.04		

Note: Following Piercey (2023), I examine whether there is any unexpected effect of *Practice* on *Train_Prop* other than an expected main effect. There are two tests involved: 1) all *Practice* effect, which includes a main effect of *Practice* and its interaction with *Nature*, *Contingency*, and *Nature*×*Contingency*, and 2) all *Practice* interaction effect, which only includes *Practice*'s interaction with *Nature*, *Contingency*, and *Nature*×*Contingency*. Table 7 Panel A shows the full model for *Train_Prop*, the proportion of training sliders completed out of all sliders completed during the production round. Table 7 Panel B shows the reduced model for *Train_Prop*. $N = 141$. Table 7 Panel C shows the test of all *Practice* effects and all *Practice* interaction effects. The all *Practice* effect on *Train_Prop* is significant ($F(63, 72) = 1.44, p = 0.07$), driven by a main effect of *Practice* on *Train_Prop* ($F(30, 72) = 1.61, p = 0.05$). When I exclude the main effect of *Practice*, the all *Practice* interaction effect on *Train_Prop* is insignificant ($F(33, 72) = 1.21, p = 0.25$). Hence, it is appropriate to use *Practice* as a covariate. All p-values are two-tailed unless otherwise stated. All variables meet the guidelines of $|\text{skewness}| < 3.0$ and $|\text{kurtosis}| < 10.0$ for normal distribution such that no transformation is necessary (Kline 2011). For a full list of variables with definitions, please refer to [Appendix D](#).

Table 8. Test of Unexpected Effect of Covariate – Total Points Gained**Panel A: Full Model**

Source of Variance	SS	df	MS	F	p-value
<i>Nature</i>	0.27	1	0.27	0.00	0.98
<i>Contingency</i>	209.11	1	209.11	0.62	0.43
<i>Nature × Contingency</i>	2184.37	1	2184.37	6.50	0.01
<i>Practice</i>	34549.96	30	1151.67	3.43	< 0.01
<i>Nature × Practice</i>	4244.16	14	303.15	0.90	0.56
<i>Contingency × Practice</i>	2891.41	15	192.76	0.57	0.89
<i>Nature × Contingency × Practice</i>	586.76	4	146.69	0.44	0.78
Error	24193.08	72	336.02		

Panel B: Reduced Model

Source of Variance	SS	df	MS	F	p-value
<i>Nature</i>	709.17	1	709.17	1.38	0.24
<i>Contingency</i>	1456.20	1	1456.20	2.83	0.09
<i>Nature × Contingency</i>	659.86	1	659.86	1.28	0.26
Error	70410.78	137	513.95		

Panel C: Test of All Practice Effects and All Practice Interaction Effects

Source of Variance	SS	df	MS	F	p-value
<i>Practice</i>	34549.96	30	1151.67	3.43	< 0.01
<i>Nature × Practice</i>	4244.16	14	303.15	0.90	0.56
<i>Contingency × Practice</i>	2891.41	15	192.76	0.57	0.89
<i>Nature × Contingency × Practice</i>	586.76	4	146.69	0.44	0.78
All Practice effects	42272.29	63	670.99	2.00	< 0.01
<i>Nature × Practice</i>	4244.16	14	303.15	0.90	0.56
<i>Contingency × Practice</i>	2891.41	15	192.76	0.57	0.89
<i>Nature × Contingency × Practice</i>	586.76	4	146.69	0.44	0.78
All Practice interaction effects	7722.33	33	234.01	0.70	0.87
Error – full model	24193.08	72	336.02		

Note: Following Piercey (2023), I examine whether there is any unexpected effect of *Practice* on *Total_Points* other than an expected main effect. There are two tests involved: 1) all *Practice* effect, which includes a main effect of *Practice* and its interaction with *Nature*, *Contingency*, and *Nature×Contingency*, and 2) all *Practice* interaction effect, which only includes *Practice*'s interaction with *Nature*, *Contingency*, and *Nature×Contingency*. Table 8 Panel A shows the full model for *Total_Points*, the total number of points participants gained during the production round. Table 8 Panel B shows the reduced model for *Total_Points*. $N = 141$. Table 8 Panel C shows the test of all *Practice* effects and all *Practice* interaction effects. The all *Practice* effect on *Total_Points* is significant ($F(63, 72) = 2.00, p < 0.01$), driven by a main effect of *Practice* on *Total_Points* ($F(30, 72) = 3.43, p < 0.01$). When I exclude the main effect of *Practice*, the all *Practice* interaction effect on *Total_Points* is insignificant ($F(33, 72) = 0.70, p = 0.87$). Hence, it is appropriate to use *Practice* as a covariate. All p-values are two-tailed unless otherwise stated. All variables meet the guidelines of $|\text{skewness}| < 3.0$ and $|\text{kurtosis}| < 10.0$ for normal distribution such that no transformation is necessary (Kline 2011). For a full list of variables with definitions, please refer to Appendix D.

Table 9. Hypotheses Testing - Total Sliders Completed**Panel A: Estimated Marginal Means and Standard Errors**

DV = <i>Total_Sliders</i> Covariate = <i>Practice</i>	Utilitarian E.M. Mean (SE)	Hedonic E.M. Mean (SE)
Piece-rate	59.56 (3.25)	51.96 (3.30)
Goal-based	49.27 (2.81)	54.02 (2.88)

Panel B: Factorial ANCOVA

Source of Variance	SS	df	MS	F	p-value
<i>Nature</i>	68.50	1	68.50	0.21	0.65
<i>Contingency</i>	585.28	1	585.28	1.81	0.18
<i>Nature</i> × <i>Contingency</i>	1311.28	1	1311.28	4.05	0.05
<i>Practice</i>	14898.99	1	14898.99	45.99	< 0.01
Total between-cells variance	16864.05	4	4216.01	13.01	< 0.01
Error	44056.63	136	323.95		

Panel C: Contrast Analysis for Interaction and Residual Between-Cells Variance Test

Source of Variance	SS	df	MS	F	p-value
Piece_Utilitarian = 3; Piece_Hedonic = -1	1451.08	1	1451.08	4.48	0.04
Goal_Utilitarian = -1; Goal_Hedonic = -1					
Residual between-cells variance	15412.97	3	5137.66	15.86	< 0.01
Total between-cells variance	16864.05	4	4216.01	13.01	< 0.01
Error	44056.63	136	323.95		

Panel D: Contrast Analysis for Simple Effects

#	Source of Variance	SS	df	MS	F	p-value
1	Piece_Utilitarian = -1; Piece_Hedonic = 1	863.34	1	863.34	2.67	0.10
	Goal_Utilitarian = 0; Goal_Hedonic = 0					
2	Piece_Utilitarian = 0; Piece_Hedonic = 0	451.69	1	451.69	1.39	0.24
	Goal_Utilitarian = -1; Goal_Hedonic = 1					

Table 9. Hypotheses Testing - Total Sliders Completed (Continued)

Note: Table 9 Panel A shows the marginal means and standard errors for *Total_Sliders*. *Total_Sliders* is the total number of sliders participants completed during the production round. Table 9 Panel B shows the results of factorial ANCOVA with *Total_Sliders* being dependent variable. $N = 141$. Table 9 Panel C shows the contrast analysis for the interaction of *Nature* and *Contingency*, and the residual between-cells variance test (Guggenmos et al. 2018). Table 9 Panel D shows the simple effects of *Nature* under each *Contingency* condition. *Nature* is the dummy variable for reward nature conditions. *Contingency* is the dummy variable for reward contingency conditions. *Practice*, the covariate, is the number of sliders participants completed (i.e., positioned a slider to 50 following the conventional way or positioned a slider to the special position required for gaining points under one of the alternative ways) during the practice round. *Practice* is a suitable covariate to use for hypotheses testing with ANCOVA because 1) it is not significantly correlated with *Nature*, *Contingency*, or *Nature*×*Contingency*, but is significantly correlated with *Total_Sliders* (see Table 3) (Loftin and Madison 1991); and 2) there is no unexpected effect of *Practice* on *Total_Sliders* other than an expected main effect (see Table 6) (Piercey 2023). Factorial ANOVA with *Practice* as dependent variable suggests that *Practice* is not explained by *Nature* ($F(1, 137) = 2.16, p = 0.14$), *Contingency* ($F(1, 137) = 0.03, p = 0.86$), or the interaction of *Nature* and *Contingency* ($F(1, 137) = 0.83, p = 0.37$). All results remain nearly identical when I use practice round points for control. This suggests that participants did not figure out any alternative way of gaining points during the practice round. When I use ANOVA without *Practice* as a covariate, I do not find a main effect of *Nature* on *Total_Sliders* ($F(1, 137) = 0.11, p = 0.74$) or an interaction effect of *Nature* and *Contingency* on *Total_Sliders* ($F(1, 137) = 1.68, p = 0.20$). All p-values are two-tailed unless otherwise stated. All variables meet the guidelines of $|\text{skewness}| < 3.0$ and $|\text{kurtosis}| < 10.0$ for normal distribution such that no transformation is necessary (Kline 2011). For a full list of variables with definitions, please refer to Appendix D.

Table 10. Hypotheses Testing - Training Sliders Proportion**Panel A: Estimated Marginal Means (Standard Errors)**

DV = <i>Train_Prop</i> Covariate = <i>Practice</i>	Utilitarian	Hedonic
Piece-rate	0.34 (0.04)	0.33 (0.04)
Goal-based	0.32 (0.03)	0.22 (0.03)

Panel B: Factorial ANCOVA

Source of Variance	SS	df	MS	F	p-value
<i>Nature</i>	0.10	1	0.10	2.18	0.14
<i>Contingency</i>	0.15	1	0.15	3.14	0.08
<i>Nature</i> × <i>Contingency</i>	0.08	1	0.08	1.69	0.20
<i>Practice</i>	0.30	1	0.30	6.38	0.01
Total between-cells variance	0.63	4	0.16	3.15	0.02
Error	6.30	136	0.05		

Panel C: Contrast Analysis for Interaction and Residual Between-Cells Variance Test

Source of Variance	SS	df	MS	F	p-value
Piece_Utilitarian = 1; Piece_Hedonic = 1	0.35	1	0.35	7.50	0.01
Goal_Utilitarian = 1; Goal_Hedonic = -3					
Residual between-cells variance	0.28	3	0.09	1.87	0.14
Total between-cells variance	0.63	4	0.16	3.15	0.02
Error	6.30	136	0.05		

Panel D: Contrast Analysis for Simple Effects

#	Source of Variance	SS	df	MS	F	p-value
1	Piece_Utilitarian = -1; Piece_Hedonic = 1 Goal_Utilitarian = 0; Goal_Hedonic = 0	0.00	1	0.00	0.01	0.90
2	Piece_Utilitarian = 0; Piece_Hedonic = 0 Goal_Utilitarian = -1; Goal_Hedonic = 1	0.21	1	0.21	4.50	0.04

Table 10. Hypotheses Testing - Training Sliders Proportion (Continued)

Note: Table 10 Panel A shows the marginal means and standard errors for *Train_Prop*. *Train_Prop* is the total number of training sliders completed divided by total number of sliders completed over three periods. Table 10 Panel B shows the results of factorial ANCOVA with *Train_Prop* being dependent variable. $N = 141$. Table 10 Panel C shows the contrast analysis for the interaction of *Nature* and *Contingency*, and the residual between-cells variance test (Guggenmos et al. 2018). Table 10 Panel D shows the simple effects of *Nature* under each *Contingency* condition. *Nature* is the dummy variable for reward nature conditions. *Contingency* is the dummy variable for reward contingency conditions. *Practice*, the covariate, is the number of sliders participants completed (i.e., positioned a slider to 50 following the conventional way or positioned a slider to the special position required for gaining points under one of the alternative ways) during the practice round. *Practice* is a suitable covariate to use for hypotheses testing with ANCOVA because 1) it is not significantly correlated with *Nature*, *Contingency*, or *Nature*×*Contingency*, but is significantly correlated with *Train_Prop* (see Table 3) (Loftin and Madison 1991); and 2) there is no unexpected effect of *Practice* on *Train_Prop* other than an expected main effect (see Table 7) (Piercey 2023). Factorial ANOVA with *Practice* as dependent variable suggests that *Practice* is not explained by *Nature* ($F(1, 137) = 2.16, p = 0.14$), *Contingency* ($F(1, 137) = 0.03, p = 0.86$), or the interaction of *Nature* and *Contingency* ($F(1, 137) = 0.83, p = 0.37$). All results remain nearly identical when I use practice round points for control. This suggests that participants did not figure out any alternative way of gaining points during the practice round. When I use ANOVA without *Practice* as a covariate, I do not find a main effect of *Nature* on *Train_Prop* ($F(1, 137) = 1.32, p = 0.25$) or an interaction effect of *Nature* and *Contingency* on *Train_Prop* ($F(1, 137) = 2.16, p = 0.14$). All p-values are two-tailed unless otherwise stated. All variables meet the guidelines of $|\text{skewness}| < 3.0$ and $|\text{kurtosis}| < 10.0$ for normal distribution such that no transformation is necessary (Kline 2011). For a full list of variables with definitions, please refer to Appendix D.

Table 11. Hypotheses Testing - Total Points**Panel A: Estimated Marginal Means (Standard Errors)**

DV = <i>Total_Points</i> Covariate = <i>Practice</i>	Utilitarian	Hedonic
Piece-rate	58.22 (3.34)	53.05 (3.40)
Goal-based	45.72 (2.89)	53.36 (2.96)

Panel B: Factorial ANCOVA

Source of Variance	SS	df	MS	F	p-value
<i>Nature</i>	51.85	1	51.85	0.15	0.70
<i>Contingency</i>	1286.37	1	1286.37	3.76	0.06
<i>Nature</i> × <i>Contingency</i>	1409.94	1	1409.94	4.12	0.04
<i>Practice</i> (i.e., covariate)	23823.16	1	23823.16	69.55	< 0.01
Total between-cells variance	26571.32	4	6642.83	19.39	< 0.01
Error	46587.63	136	342.56		

Panel C: Contrast Analysis for Simple Effects

#	Source of Variance	SS	df	MS	F	p-value
1	Piece_Utilitarian = -1; Piece_Hedonic = 1 Goal_Utilitarian = 0; Goal_Hedonic = 0	400.12	1	400.12	1.17	0.28
2	Piece_Utilitarian = 0; Piece_Hedonic = 0 Goal_Utilitarian = -1; Goal_Hedonic = 1	1164.21	1	1164.21	3.40	0.07

Note: Table 11 Panel A shows the marginal means and standard errors for *Total_Points*. *Total_Points* is the total number of points participants gained during the production round. Table 11 Panel B shows the results of factorial ANCOVA with *Total_Points* being dependent variable. $N = 141$. Table 11 Panel C shows the contrast analysis for the simple effects of *Nature* under each *Contingency* condition. *Nature* is the dummy variable for reward nature conditions. *Contingency* is the dummy variable for reward contingency conditions. *Practice*, the covariate, is the number of sliders participants completed (i.e., positioned a slider to 50 following the conventional way or positioned a slider to the special position required for gaining points under one of the alternative ways) during the practice round. *Practice* is a suitable covariate to use for hypotheses testing with ANCOVA because 1) it is not significantly correlated with *Nature*, *Contingency*, or *Nature* × *Contingency*, but is significantly correlated with *Total_Points* (see Table 3) (Loftin and Madison 1991); and 2) there is no unexpected effect of *Practice* on *Total_Points* other than an expected main effect (see Table 8) (Piercey 2023). Factorial ANOVA with *Practice* as dependent variable suggests that *Practice* is not explained by *Nature* ($F(1, 137) = 2.16, p = 0.14$), *Contingency* ($F(1, 137) = 0.03, p = 0.86$), or the interaction of *Nature* and *Contingency* ($F(1, 137) = 0.83, p = 0.37$). All results remain nearly identical when I use practice round points for control. This suggests that participants did not figure out any alternative way of gaining points during the practice round. When I use ANOVA without *Practice* as a covariate, I do not find a main effect of *Nature* on *Total_Points* ($F(1, 137) = 1.38, p = 0.24$) or an interaction effect of *Nature* and *Contingency* on *Total_Points* ($F(1, 137) = 1.28, p = 0.26$). All variables meet the guidelines of $|\text{skewness}| < 3.0$ and $|\text{kurtosis}| < 10.0$ for normal distribution such that no transformation is necessary (Kline 2011). All p-values are two-tailed unless otherwise stated. For a full list of variables with definitions, please refer to Appendix D.

Table 12. Hypotheses Testing - Training Sliders Proportion in Period 1**Panel A: Estimated Marginal Means (Standard Errors)**

DV = <i>PI_Train_Prop</i> Covariate = <i>Practice</i>	Utilitarian	Hedonic
Piece-rate	0.36 (0.05)	0.41 (0.06)
Goal-based	0.34 (0.05)	0.26 (0.05)

Panel B: Factorial ANCOVA

Source of Variance	SS	df	MS	F	p-value
<i>Nature</i>	0.00	1	0.00	0.04	0.84
<i>Contingency</i>	0.26	1	0.26	2.86	0.09
<i>Nature</i> × <i>Contingency</i>	0.14	1	0.14	1.54	0.22
<i>Practice</i> (i.e., covariate)	0.72	1	0.72	7.89	< 0.01
Total between-cells variance	1.12	4	0.28	3.11	0.02
Error	12.46	136	0.09		

Panel C: Contrast Analysis for Interaction and Residual Between-Cells Variance Test

Source of Variance	SS	df	MS	F	p-value
Piece_Utilitarian = 1; Piece_Hedonic = 1	0.33	1	0.33	3.55	0.06
Goal_Utilitarian = 1; Goal_Hedonic = -3					
Residual between-cells variance	0.79	3	0.26	2.93	0.04
Total between-cells variance	1.12	4	0.28	3.11	0.02
Error	12.46	136	0.09		

Panel D: Contrast Analysis for Simple Effects

#	Source of Variance	SS	df	MS	F	p-value
1	Piece_Utilitarian = -1; Piece_Hedonic = 1	0.04	1	0.04	0.47	0.49
	Goal_Utilitarian = 0; Goal_Hedonic = 0					
2	Piece_Utilitarian = 0; Piece_Hedonic = 0	0.11	1	0.11	1.21	0.27
	Goal_Utilitarian = -1; Goal_Hedonic = 1					

Note: Table 12 Panel A shows the marginal means and standard errors for *PI_Train_Prop*. *PI_Train_Prop* is the total number of training sliders completed divided by total number of sliders completed over the first production period. Table 12 Panel B shows the results of factorial ANCOVA with *PI_Train_Prop* being dependent variable. $N = 141$. Table 12 Panel C shows the contrast analysis for the interaction of *Nature* and *Contingency*, and the residual between-cells variance test (Guggenmos et al. 2018). Table 12 Panel D shows the simple effects of *Nature* under each *Contingency* condition. *Nature* is the dummy variable for reward nature conditions. *Contingency* is the dummy variable for reward contingency conditions. *Practice*, the covariate, is the number of sliders participants completed (i.e., positioned a slider to 50 following the conventional way or positioned a slider to the special position required for gaining points under one of the alternative ways) during the practice round. The pattern of estimated marginal means is displayed in Figure 8. All variables meet the guidelines of $|\text{skewness}| < 3.0$ and $|\text{kurtosis}| < 10.0$ for normal distribution such that no transformation is necessary (Kline 2011). All p-values are two-tailed unless otherwise stated. For a full list of variables with definitions, please refer to Appendix D.

Table 13. Hypotheses Testing - Training Sliders Proportion in Period 2**Panel A: Estimated Marginal Means (Standard Errors)**

DV = <i>P2_Train_Prop</i> Covariate = <i>Practice</i>	Utilitarian	Hedonic
Piece-rate	0.44 (0.06)	0.33 (0.06)
Goal-based	0.32 (0.05)	0.25 (0.05)

Panel B: Factorial ANCOVA

Source of Variance	SS	df	MS	F	p-value
<i>Nature</i>	0.27	1	0.27	2.62	0.11
<i>Contingency</i>	0.34	1	0.34	3.37	0.07
<i>Nature</i> × <i>Contingency</i>	0.01	1	0.01	0.13	0.72
<i>Practice</i> (i.e., covariate)	0.30	1	0.30	3.00	0.09
Total between-cells variance	0.92	4	0.23	2.30	0.06
Error	13.74	136	0.10		

Panel C: Contrast Analysis for Interaction and Residual Between-Cells Variance Test

Source of Variance	SS	df	MS	F	p-value
Piece_Utilitarian = 1; Piece_Hedonic = 1 Goal_Utilitarian = 1; Goal_Hedonic = -3	0.35	1	0.35	3.47	0.06
Residual between-cells variance	0.57	3	0.19	1.90	0.13
Total between-cells variance	0.92	4	0.23	2.30	0.06
Error	13.74	136	0.10		

Panel D: Contrast Analysis for Simple Effects

#	Source of Variance	SS	df	MS	F	p-value
1	Piece_Utilitarian = -1; Piece_Hedonic = 1 Goal_Utilitarian = 0; Goal_Hedonic = 0	0.17	1	0.17	1.73	0.19
2	Piece_Utilitarian = 0; Piece_Hedonic = 0 Goal_Utilitarian = -1; Goal_Hedonic = 1	0.09	1	0.09	0.93	0.34

Note: Table 13 Panel A shows the marginal means and standard errors for *P2_Train_Prop*. *P2_Train_Prop* is the total number of training sliders completed divided by total number of sliders completed over the first production period. Table 13 Panel B shows the results of factorial ANCOVA with *P2_Train_Prop* being dependent variable. *N* = 141. Table 13 Panel C shows the contrast analysis for the interaction of *Nature* and *Contingency*, and the residual between-cells variance test ([Guggenmos et al. 2018](#)). Table 13 Panel D shows the simple effects of *Nature* under each *Contingency* condition. *Nature* is the dummy variable for reward nature conditions. *Contingency* is the dummy variable for reward contingency conditions. *Practice*, the covariate, is the number of sliders participants completed (i.e., positioned a slider to 50 following the conventional way or positioned a slider to the special position required for gaining points under one of the alternative ways) during the practice round. The pattern of estimated marginal means is displayed in [Figure 9](#). All variables meet the guidelines of $|\text{skewness}| < 3.0$ and $|\text{kurtosis}| < 10.0$ for normal distribution such that no transformation is necessary ([Kline 2011](#)). All p-values are two-tailed unless otherwise stated. For a full list of variables with definitions, please refer to [Appendix D](#).

Table 14. Hypotheses Testing - Training Sliders Proportion in Period 3**Panel A: Estimated Marginal Means (Standard Errors)**

DV = <i>P3_Train_Prop</i> Covariate = <i>Practice</i>	Utilitarian	Hedonic
Piece-rate	0.13 (0.04)	0.21 (0.05)
Goal-based	0.31 (0.04)	0.12 (0.04)

Panel B: Factorial ANCOVA

Source of Variance	SS	df	MS	F	p-value
<i>Nature</i>	0.11	1	0.11	1.88	0.17
<i>Contingency</i>	0.06	1	0.06	1.01	0.32
<i>Nature</i> × <i>Contingency</i>	0.61	1	0.61	9.99	< 0.01
<i>Practice</i> (i.e., covariate)	0.03	1	0.03	0.57	0.45
Total between-cells variance	0.81	4	0.20	3.38	0.01
Error	8.29	136	0.06		

Panel C: Contrast Analysis for Interaction and Residual Between-Cells Variance Test

Source of Variance	SS	df	MS	F	p-value
Piece_Utilitarian = 1; Piece_Hedonic = 1	0.28	1	0.28	4.54	0.04
Goal_Utilitarian = 1; Goal_Hedonic = -3					
Residual between-cells variance	0.53	3	0.18	2.94	0.04
Total between-cells variance	0.81	4	0.20	3.38	0.01
Error	8.29	136	0.06		

Panel D: Contrast Analysis for Simple Effects

#	Source of Variance	SS	df	MS	F	p-value
1	Piece_Utilitarian = -1; Piece_Hedonic = 1	0.08	1	0.08	1.38	0.24
	Goal_Utilitarian = 0; Goal_Hedonic = 0					
2	Piece_Utilitarian = 0; Piece_Hedonic = 0	0.73	1	0.73	11.96	< 0.01
	Goal_Utilitarian = -1; Goal_Hedonic = 1					

Note: Table 14 Panel A shows the marginal means and standard errors for *P3_Train_Prop*. *P3_Train_Prop* is the total number of training sliders completed divided by total number of sliders completed over the first production period. Table 14 Panel B shows the results of factorial ANCOVA with *P3_Train_Prop* being dependent variable. $N = 141$. Table 14 Panel C shows the contrast analysis for the interaction of *Nature* and *Contingency*, and the residual between-cells variance test (Guggenmos et al. 2018). Table 14 Panel D shows the simple effects of *Nature* under each *Contingency* condition. *Nature* is the dummy variable for reward nature conditions. *Contingency* is the dummy variable for reward contingency conditions. *Practice*, the covariate, is the number of sliders participants completed (i.e., positioned a slider to 50 following the conventional way or positioned a slider to the special position required for gaining points under one of the alternative ways) during the practice round. The pattern of estimated marginal means is displayed in Figure 10. All variables meet the guidelines of $|\text{skewness}| < 3.0$ and $|\text{kurtosis}| < 10.0$ for normal distribution such that no transformation is necessary (Kline 2011). All p-values are two-tailed unless otherwise stated. For a full list of variables with definitions, please refer to Appendix D.

Appendices

Appendix A. Task Screen for Production Round

By dragging sliders to 50 in alphabetical order on the Training side, you may learn new ways of getting points on the Production side.

0056

Production

AA ● 0
AB ● 0
AC ● 0
AD ● 0
AE ● 0
AF ● 0
AG ● 0
AH ● 0
AI ● 0
AJ ● 0
AK ● 0
AL ● 0
AM ● 0
AN ● 0
AO ● 0
AP ● 0
AQ ● 0
AR ● 0
AS ● 0
AT ● 0

Production

AU ● 0
AV ● 0
AW ● 0
AX ● 0
AY ● 0
AZ ● 0
BA ● 0
BB ● 0
BC ● 0
BD ● 0
BE ● 0
BF ● 0
BG ● 0
BH ● 0
BI ● 0
BJ ● 0
BK ● 0
BL ● 0
BM ● 0
BN ● 0

Production

BO ● 0
BP ● 0
BQ ● 0
BR ● 0
BS ● 0
BT ● 0
BU ● 0
BV ● 0
BW ● 0
BX ● 0
BY ● 0
BZ ● 0
CA ● 0
CB ● 0
CC ● 0
CD ● 0
CE ● 0
CF ● 0
CG ● 0
CH ● 0

Training

TA ● 0
TB ● 0
TC ● 0
TD ● 0
TE ● 0
TF ● 0
TG ● 0
TH ● 0
TI ● 0
TJ ● 0
TK ● 0
TL ● 0
TM ● 0
TN ● 0
TO ● 0
TP ● 0
TQ ● 0
TR ● 0
TS ● 0
TT ● 0

Training

TU ● 0
TV ● 0
TW ● 0
TX ● 0
TY ● 0
TZ ● 0
UA ● 0
UB ● 0
UC ● 0
UD ● 0
UE ● 0
UF ● 0
UG ● 0
UH ● 0
UI ● 0
UJ ● 0
UK ● 0
UL ● 0
UM ● 0
UN ● 0

Training

VO ● 0
UP ● 0
UQ ● 0
UR ● 0
US ● 0
UT ● 0
UU ● 0
UV ● 0
UW ● 0
UX ● 0
UY ● 0
UZ ● 0
VA ● 0
VB ● 0
VC ● 0
VD ● 0
VE ● 0
VF ● 0
VG ● 0
VH ● 0

Appendix B. Task Screen for Practice Round

By dragging sliders to 50 in alphabetical order on the Training side, you may learn new ways of getting points on the Production side.

0056

Production

AA 0
AB 0
AC 0
AD 0
AE 0
AF 0
AG 0
AH 0
AI 0
AJ 0
AK 0
AL 0
AM 0
AN 0
AO 0
AP 0
AQ 0
AR 0
AS 0
AT 0

Production

AU 0
AV 0
AW 0
AX 0
AY 0
AZ 0
BA 0
BB 0
BC 0
BD 0
BE 0
BF 0
BG 0
BH 0
BI 0
BJ 0
BK 0
BL 0
BM 0
BN 0

Production

BO 0
BP 0
BQ 0
BR 0
BS 0
BT 0
BU 0
BV 0
BW 0
BX 0
BY 0
BZ 0
CA 0
CB 0
CC 0
CD 0
CE 0
CF 0
CG 0
CH 0

Training is not
available

Appendix C. Alternative Ways of Gaining Points

Alternative Ways	Points	Training Sliders Required to Reveal
Slider AJ, AO, BA, CD are positioned at 79.	22	12 training sliders positioned at 50: TA, TB, TC, TD, TE, TF, TG, TH, TI, TJ, TK, TL
Slider AB, BC, BE, BR are positioned at 61.	18	8 training sliders positioned at 50: TM, TN, TO, TP, TQ, TR, TS, TT
Slider AC, AT, BI, CH are positioned at 88.	21	11 training sliders positioned at 50: TU, TV, TW, TX, TY, TZ, UA, UB, UC, UD, UE
Slider AX, BQ, BY, CE are positioned at 92.	19	9 training sliders positioned at 50: UF, UG, UH, UI, UJ, UK, UL, UM, UN
Slider AH, AP, AU, BZ are positioned at 65.	23	13 training sliders positioned at 50: UO, UP, UQ, UR, US, UT, UU, UV, UW, UX, UY, UZ, VA
Slider AK, BF, BW, CF are positioned at 83.	17	7 training sliders positioned at 50: VB, VC, VD, VE, VF, VG, VH

Note: Appendix C shows the six alternative ways to gain points, the number of points can be gained by following each alternative way, and the training sliders required to reveal each alternative way. The experiment instruction recommended participants position sliders following the alphabetical order (TA to VH) under the training task. If participants followed the recommendation, they would reveal the six alternative ways from the top to the bottom of the table. If they did not follow the recommended order, there would be many orders they could follow, and they would not necessarily be punished for not following the recommended order.

Appendix D. Variable Definitions

Variable	Definition
<i>Age</i>	Participants' age
<i>Contingency</i>	Dummy variable indicating reward contingency conditions participants were assigned to. Piece-rate = 0; Goal-based = 1.
<i>Enjoyable</i>	Participants' agreement to the statement that "the items that can be purchased with this gift card are enjoyable to me." 7-point Likert Scale (Strongly Disagree = -3; Neither Agree Nor Disagree = 0; Strongly Agree = 3).
<i>Exp_Month</i>	Participants' work experience, in number of months
<i>Fun</i>	Participants' agreement to the statement that "the items that can be purchased with this gift card are fun to me." 7-point Likert Scale (Strongly Disagree = -3; Neither Agree Nor Disagree = 0; Strongly Agree = 3).
<i>Functional</i>	Participants' agreement to the statement that "the items that can be purchased with this gift card are functional to me." 7-point Likert Scale (Strongly Disagree = -3; Neither Agree Nor Disagree = 0; Strongly Agree = 3).
<i>Hedonic_Avg</i>	Average of participants' ratings on the three questions (<i>Fun</i> , <i>Enjoyable</i> , <i>Pleasurable</i>) measuring the hedonic nature of reward.
<i>Nature</i>	Dummy variable indicating reward nature conditions participants were assigned to. Utilitarian = 0; Hedonic = 1.
<i>Nature × Contingency</i>	The interaction of reward nature and reward contingency, calculated as the product of <i>Nature</i> and <i>Contingency</i> .
<i>Nature_Diff</i>	The difference between a participant's average hedonic rating and average utilitarian rating of a gift card, calculated as <i>Hedonic_Avg</i> minus <i>Utilitarian_Avg</i> .
<i>Overlap</i>	Participants' perceived overlap between salary and their gift card reward.
<i>Practical</i>	Participants' agreement to the statement that "the items that can be purchased with this gift card are practical to me." 7-point Likert Scale (Strongly Disagree = -3; Neither Agree Nor Disagree = 0; Strongly Agree = 3).
<i>Pleasurable</i>	Participants' agreement to the statement that "the items that can be purchased with this gift card are pleasurable to me." 7-point Likert Scale (Strongly Disagree = -3; Neither Agree Nor Disagree = 0; Strongly Agree = 3).
<i>P1_Alt</i>	The number of alternative ways to gain points revealed by the end of period 1.
<i>P2_Alt</i>	The accumulated number of alternative ways to gain points revealed by the end of period 2.

<i>P3_Alt</i>	The accumulated number of alternative ways to gain points revealed by the end of period 3.
<i>P1_Total_Points</i>	The total number of points participants gained in period 1.
<i>P2_Total_Points</i>	The total number of points participants gained in period 2.
<i>P3_Total_Points</i>	The total number of points participants gained in period 3.
<i>P1_Total_Sliders</i>	The total number of training and production sliders participants completed in period 1.
<i>P2_Total_Sliderss</i>	The total number of training and production sliders participants completed in period 2.
<i>P3_Total_Sliderss</i>	The total number of training and production sliders participants completed in period 3.
<i>P1_Train_Prop</i>	The proportion of training sliders completed out of all sliders completed in period 1.
<i>P2_Train_Prop</i>	The proportion of training sliders completed out of all sliders completed in period 2.
<i>P3_Train_Prop</i>	The proportion of training sliders completed out of all sliders completed in period 3.
<i>Sex</i>	Participant's sex
<i>Total_Points</i>	The total number of points participants gained during the production round.
<i>Total_Prod_Sliders</i>	The total number of production sliders participants completed during the production round to gain points following the conventional way and the alternative ways.
<i>Total_Sliders</i>	The total number of training and production sliders participants completed during the production round, calculated as <i>Total_Prod_Sliders</i> plus <i>Total_Train_Sliders</i> .
<i>Total_Train_Sliders</i>	The total number of training sliders participants completed during the production round to reveal alternative ways to gain points.
<i>Train_Prop</i>	The proportion of training sliders completed out of all sliders completed, calculated as <i>Total_Train_Sliders</i> divided by <i>Total_Sliders</i> .
<i>Useful</i>	Participants' agreement to the statement that "the items that can be purchased with this gift card are useful to me." 7-point Likert Scale. (Strongly Disagree = -3; Neither Agree Nor Disagree = 0; Strongly Agree = 3)
<i>Utilitarian_Avg</i>	Average of participants' ratings on the three questions (<i>Useful</i> , <i>Practical</i> , <i>Functional</i>) measuring the utilitarian nature of reward.
<i>Valuation_Avg</i>	Average of participants' responses to the four questions measuring the extent participants rely on feelings vs. calculation.

Appendix E. Pilot Study Instrument

PAGE 1

Informed Consent

You are invited to participate in a research study conducted by Pei Wang, PhD Candidate at the University of Waterloo under the supervision of Professor Adam Presslee at the University of Waterloo. In this research study, you will be shown information about gift cards from 17 different vendors. You will be asked to give your opinion about these gift cards. Afterward, you will be asked some basic demographic questions. This study should take you about 10 minutes to complete. The findings from this survey will inform the design of a larger study about reward design and employee effort.

You must be an undergraduate student from the School of Accounting and Finance at the University of Waterloo to participate in this study. Participation in this study is voluntary. You may choose to withdraw from this study at any time without any negative consequences by exiting the questionnaire. However, the information you provide in the study up to that point may still be used. You can skip questions that you do not wish to answer. If you wish to stop participating in the study, please click through to the end of the survey to enter your email address where indicated.

You will receive a \$5 participation fee via e-transfer within a week of participating in the study. For the purpose of e-transfer, your University of Waterloo email information will be collected at the end of the study but will not be linked to your response to the rest of the survey. When publish or release the study findings, I will not disclose any participant's identification information. Your identity will remain confidential.

You will be completing the study by an online survey operated by Qualtrics. Qualtrics has implemented technical, administrative, and physical safeguards to protect the information provided via the services from loss, misuse, and unauthorized access, disclosure, alteration, or destruction. However, no Internet transmission is ever fully secure or error free. Qualtrics temporarily collects your computer IP address to avoid duplicate responses in the dataset but will not collect information that could identify you personally.

Data collected during this study will be retained for at least seven years on a password-protected computer and a secure University of Waterloo drive. Only researchers associated with this project will have access to the data. There are no known or anticipated risks to you as a participant in this study.

If you have any questions regarding this study or would like additional information to assist you in reaching a decision about participation, please contact:

- Professor Adam Presslee, adam.presslee@uwaterloo.ca.
- Pei Wang, p252wang@uwaterloo.ca.

This study has been reviewed and received ethics clearance through the University of Waterloo Research Ethics Board (REB #46347). If you have questions for the Board, contact the Office of Research Ethics, at 1-833-643-2379 (Canada and USA), 1-519-888-4440, or reb@uwaterloo.ca.

Appendix E. Pilot Study Instrument (Continued)

Consent Form

By agreeing to participate in the study, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

YES

NO

click the “→” button to proceed to the instructions.

[Throughout the questionnaire, a participant can always skip questions by clicking the “→” button to proceed, except the comprehension check questions.]

Appendix E. Pilot Study Instrument (Continued)

PAGE 2

Instructions

Please read the instructions carefully. After this page, there will be some comprehension check questions to confirm that you understand the instructions.

In this research study, you will be shown information about gift cards from 17 different vendors. The information will include:

- 1) the vendor name of the gift card,
- 2) the category of the vendor,
- 3) the vendor location that is closest to the university campus,
- 4) the distance between the closet vendor location and the university campus, and
- 5) a picture of the gift card.

For each gift card, you will be asked to indicate the extent you agree to two statements:

- 1) The item(s) that can be purchased with this gift card are fun and exciting to me.
- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me.

You will indicate your opinion with a 7-point scale, where -3 means strongly disagree, +3 means strongly agree, and 0 means neither agree nor disagree.

You will also be asked the **frequency you visit each vendor (online store included)** and your **average spending per visit at each vendor (online store included)**. Visits and spendings at the vendor **online store are included** for these two questions.

Afterward, you will be asked some basic demographic questions.

Appendix E. Pilot Study Instrument (Continued)

PAGE 3

Comprehension Check

Information that you will receive about gift cards includes (select all that apply):

- A. the vendor name of the gift card [correct]
- B. the gift card value
- C. the category of the vendor [correct]
- D. the promotion discount the vendor is offering
- E. the vendor location that is closest to the university campus [correct]
- F. the distance between the closet vendor location and the university campus [correct]
- G. a picture of the vendor store
- H. a picture of the gift card [correct]

For each gift card, you will be asked to indicate the extent you agree to (select all that apply):

- A. The item(s) that can be purchased with this gift card are necessary and exciting to me
- B. The item(s) that can be purchased with this gift card are fun and exciting to me [correct]
- C. The item(s) that can be purchased with this gift card are fun and helpful to me
- D. The item(s) that can be purchased with this gift card are cheap and helpful to me
- E. The item(s) that can be purchased with this gift card are necessary and helpful to me [correct]

For each gift card, you will also be asked (select all that apply):

- A. The frequency you visit the vendor (online store excluded)
- B. The frequency you visit the vendor (online store included) [correct]
- C. Your total annual spending at this vendor (online store included)
- D. Your average spending per visit at this vendor (online store included) [correct]
- E. Your minimum spending per visit at this vendor (online store included)

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 4

Comprehension Check: Passed

Congratulations on passing the comprehension check. Starting on the next page, you will start receiving information about various gift cards and you will be asked your opinions about them. As a reminder, for each gift card, you will be asked to indicate the extent you agree to two statements:

- 1) The item(s) that can be purchased with this gift card are fun and exciting to me.
- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me.

You will indicate your opinion with a 7-point scale, where -3 means strongly disagree, +3 means strongly agree, and 0 means neither agree nor disagree.

You will also be asked the **frequency you visit each vendor** and your **average spending per visit at each vendor**. Visits and spendings at the vendor **online store are included** for these two questions.

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 5 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: Banana Republic

Vendor Name: Banana Republic

Category: Clothing Store

Vendor Location Closet to Campus: 2960 Kingsway Dr, Kitchener, ON N2C 1X1

Distance from Campus to the Closet Vendor Location: 11.7km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The frequency I visit this vendor (online store included)

- a) At least once a week
- b) Less than once a week, but at least once a month
- c) Less than once a month, but at least once a quarter
- d) Less than once a quarter, but at least once a year
- e) Less than once a year

- 4) Average spending per visit of this vendor (online store included) is:

- a) \$0 - \$50
- b) \$50 - \$100
- c) \$100 - \$500
- d) More than \$500

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 6 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: Burger King

Vendor Name: Burger King

Category: Restaurant

Vendor Location Closet to Campus: 150 University Ave W Unit 1a, Waterloo, ON N2L 3E4

Distance from Campus to the Closet Vendor Location: 0.8km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The frequency I visit this vendor (online store included)

- a) At least once a week
- b) Less than once a week, but at least once a month
- c) Less than once a month, but at least once a quarter
- d) Less than once a quarter, but at least once a year
- e) Less than once a year

- 4) Average spending per visit of this vendor (online store included) is:

- a) \$0 - \$50
- b) \$50 - \$100
- c) \$100 - \$500
- d) More than \$500

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 7 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: Cineplex

Vendor Name: Cineplex

Category: Movie Theater

Vendor Location Closet to Campus: 225 Fairway Rd S, Kitchener, ON N2C 1X2

Distance from Campus to the Closet Vendor Location: 14km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The frequency I visit this vendor (online store included)

- a) At least once a week
- b) Less than once a week, but at least once a month
- c) Less than once a month, but at least once a quarter
- d) Less than once a quarter, but at least once a year
- e) Less than once a year

- 4) Average spending per visit of this vendor (online store included) is:

- a) \$0 - \$50
- b) \$50 - \$100
- c) \$100 - \$500
- d) More than \$500

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 8 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: East Side Marios

Vendor Name: East Side Marios

Category: Restaurant

Vendor Location Closet to Campus: 450 King St N, Waterloo, ON N2J 2Z6

Distance from Campus to the Closet Vendor Location: 3.5km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The frequency I visit this vendor (online store included)

- a) At least once a week
- b) Less than once a week, but at least once a month
- c) Less than once a month, but at least once a quarter
- d) Less than once a quarter, but at least once a year
- e) Less than once a year

- 4) Average spending per visit of this vendor (online store included) is:

- a) \$0 - \$50
- b) \$50 - \$100
- c) \$100 - \$500
- d) More than \$500

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 9 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: Foodland

Vendor Name: Foodland

Category: Restaurant

Vendor Location Closet to Campus: 315 Arthur St S, Elmira, ON N3B 3L5

Distance from Campus to the Closet Vendor Location: 16km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3
- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3
- 3) The frequency I visit this vendor (online store included)
 - a) At least once a week
 - b) Less than once a week, but at least once a month
 - c) Less than once a month, but at least once a quarter
 - d) Less than once a quarter, but at least once a year
 - e) Less than once a year
- 4) Average spending per visit of this vendor (online store included) is:
 - a) \$0 - \$50
 - b) \$50 - \$100
 - c) \$100 - \$500
 - d) More than \$500

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 10 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: Foot Locker

Vendor Name: Foot Locker

Category: Shoe Store

Vendor Location Closet to Campus: 550 King St N, Waterloo, ON N2L 5W6

Distance from Campus to the Closet Vendor Location: 5.4km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The frequency I visit this vendor (online store included)

- a) At least once a week
- b) Less than once a week, but at least once a month
- c) Less than once a month, but at least once a quarter
- d) Less than once a quarter, but at least once a year
- e) Less than once a year

- 4) Average spending per visit of this vendor (online store included) is:

- a) \$0 - \$50
- b) \$50 - \$100
- c) \$100 - \$500
- d) More than \$500

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 11 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: FreshCo

Vendor Name: FreshCo

Category: Grocery

Vendor Location Closet to Campus: 425 University Ave E, Waterloo, ON N2K 4C9

Distance from Campus to the Closet Vendor Location: 4.8km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The frequency I visit this vendor (online store included)

- a) At least once a week
- b) Less than once a week, but at least once a month
- c) Less than once a month, but at least once a quarter
- d) Less than once a quarter, but at least once a year
- e) Less than once a year

- 4) Average spending per visit of this vendor (online store included) is:

- a) \$0 - \$50
- b) \$50 - \$100
- c) \$100 - \$500
- d) More than \$500

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 12 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: GAP

Vendor Name: GAP

Category: Retail

Vendor Location Closet to Campus: 550 King St N E8, Waterloo, ON N2L 5W6

Distance from Campus to the Closet Vendor Location: 5.3km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The frequency I visit this vendor (online store included)

- a) At least once a week
- b) Less than once a week, but at least once a month
- c) Less than once a month, but at least once a quarter
- d) Less than once a quarter, but at least once a year
- e) Less than once a year

- 4) Average spending per visit of this vendor (online store included) is:

- a) \$0 - \$50
- b) \$50 - \$100
- c) \$100 - \$500
- d) More than \$500

click the “→” button to proceed.

PAGE 13 [The order of gift card pages is randomized to avoid any order effect]

Distance from Campus to the Closet Vendor Location: 0.75km



- 3 -2 -1 0 1 2 3

- 3 -2 -1 0 1 2 3

- 4) Average spending per visit of this vendor (online store included) is:
- a) \$0 - \$50
 - b) \$50 - \$100
 - c) \$100 - \$500
 - d) More than \$500

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Appendix E. Pilot Study Instrument (Continued)

PAGE 14 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: Indigo

Vendor Name: Indigo

Category: Book Store

Vendor Location Closet to Campus: 550 King St N, Waterloo, ON N2L 5W6

Distance from Campus to the Closet Vendor Location: 5.1km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3
- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3
- 3) The frequency I visit this vendor (online store included)
 - a) At least once a week
 - b) Less than once a week, but at least once a month
 - c) Less than once a month, but at least once a quarter
 - d) Less than once a quarter, but at least once a year
 - e) Less than once a year
- 4) Average spending per visit of this vendor (online store included) is:
 - a) \$0 - \$50
 - b) \$50 - \$100
 - c) \$100 - \$500
 - d) More than \$500

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 15 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: Montana's

Vendor Name: Montana's

Category: Restaurant

Vendor Location Closet to Campus: 310 The Boardwalk, Waterloo, ON N2T 0A6

Distance from Campus to the Closet Vendor Location: 5.8km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The frequency I visit this vendor (online store included)

- a) At least once a week
- b) Less than once a week, but at least once a month
- c) Less than once a month, but at least once a quarter
- d) Less than once a quarter, but at least once a year
- e) Less than once a year

- 4) Average spending per visit of this vendor (online store included) is:

- a) \$0 - \$50
- b) \$50 - \$100
- c) \$100 - \$500
- d) More than \$500

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 16 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: New York Fries

Vendor Name: New York Fries

Category: Restaurant

Vendor Location Closet to Campus: 550 King St N, Waterloo, ON N2L 5W6

Distance from Campus to the Closet Vendor Location: 5.1km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The frequency I visit this vendor (online store included)

- a) At least once a week
- b) Less than once a week, but at least once a month
- c) Less than once a month, but at least once a quarter
- d) Less than once a quarter, but at least once a year
- e) Less than once a year

- 4) Average spending per visit of this vendor (online store included) is:

- a) \$0 - \$50
- b) \$50 - \$100
- c) \$100 - \$500
- d) More than \$500

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 17 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: Old Navy

Vendor Name: Old Navy

Category: Clothing Store

Vendor Location Closet to Campus: 550 King St N, Waterloo, ON N2L 5W6

Distance from Campus to the Closet Vendor Location: 5.1km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The frequency I visit this vendor (online store included)

- a) At least once a week
- b) Less than once a week, but at least once a month
- c) Less than once a month, but at least once a quarter
- d) Less than once a quarter, but at least once a year
- e) Less than once a year

- 4) Average spending per visit of this vendor (online store included) is:

- a) \$0 - \$50
- b) \$50 - \$100
- c) \$100 - \$500
- d) More than \$500

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 18 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: Roots

Vendor Name: Roots

Category: Clothing Store

Vendor Location Closet to Campus: 550 King St N A13, Waterloo, ON N2L 5W6

Distance from Campus to the Closet Vendor Location: 5.1km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The frequency I visit this vendor (online store included)

- a) At least once a week
- b) Less than once a week, but at least once a month
- c) Less than once a month, but at least once a quarter
- d) Less than once a quarter, but at least once a year
- e) Less than once a year

- 4) Average spending per visit of this vendor (online store included) is:

- a) \$0 - \$50
- b) \$50 - \$100
- c) \$100 - \$500
- d) More than \$500

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 19 [The order of gift card pages is randomized to avoid any order effect]

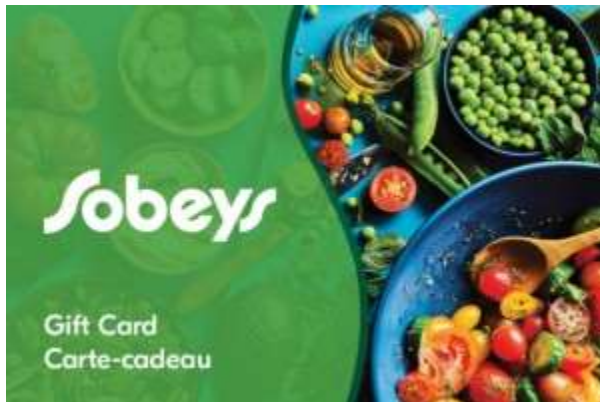
Gift Card: Sobeys

Vendor Name: Sobeys

Category: Grocery

Vendor Location Closet to Campus: 450 Columbia St W, Waterloo, ON N2T 2W1

Distance from Campus to the Closet Vendor Location: 3.2km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The frequency I visit this vendor (online store included)

- a) At least once a week
- b) Less than once a week, but at least once a month
- c) Less than once a month, but at least once a quarter
- d) Less than once a quarter, but at least once a year
- e) Less than once a year

- 4) Average spending per visit of this vendor (online store included) is:

- a) \$0 - \$50
- b) \$50 - \$100
- c) \$100 - \$500
- d) More than \$500

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 20 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: Tim Hortons

Vendor Name: Tim Hortons

Category: Coffee Shop

Vendor Location Closest to Campus: 200 University Ave W Suite 111, Waterloo, ON N2L 3G1

Distance from Campus to the Closest Vendor Location: 1.2km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The frequency I visit this vendor (online store included)

- a) At least once a week
- b) Less than once a week, but at least once a month
- c) Less than once a month, but at least once a quarter
- d) Less than once a quarter, but at least once a year
- e) Less than once a year

- 4) Average spending per visit of this vendor (online store included) is:

- a) \$0 - \$50
- b) \$50 - \$100
- c) \$100 - \$500
- d) More than \$500

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 21 [The order of gift card pages is randomized to avoid any order effect]

Gift Card: Walmart

Vendor Name: Walmart

Category: Grocery

Vendor Location Closet to Campus: 70 Bridgeport Rd E, Waterloo, ON N2J 2J9

Distance from Campus to the Closet Vendor Location: 3.4km



- 1) The item(s) that can be purchased with this gift card are fun and exciting to me:
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are necessary and helpful to me
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The frequency I visit this vendor (online store included)

- a) At least once a week
- b) Less than once a week, but at least once a month
- c) Less than once a month, but at least once a quarter
- d) Less than once a quarter, but at least once a year
- e) Less than once a year

- 4) Average spending per visit of this vendor (online store included) is:

- a) \$0 - \$50
- b) \$50 - \$100
- c) \$100 - \$500
- d) More than \$500

click the "→" button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 22

Post Study Questionnaire

Thank you for providing your opinions about the gift cards. Below are the questions for the post study questionnaire. Information on sex and age is collected in case opinions about gift cards differ across any sex or age groups.

1) Please indicate your sex below.

Male

Female

Intersex

Prefer not to say

2) What is your age?

3) Do you have any comments about this study?

Appendix E. Pilot Study Instrument (Continued)

PAGE 23

[I have set up the survey in a way that participants' email addresses will be recorded separately and it will be impossible to link participants emails and survey responses.]

Please indicate your University of Waterloo email address below so that I can send you the e-transfer of \$5. As a reminder, your email address is not stored with your survey responses so that your identity will remain confidential.

University of Waterloo email address:

click the “→” button to proceed.

Appendix E. Pilot Study Instrument (Continued)

PAGE 24

End of Study

Thank you for participating in this study.

You will receive \$5 within a week in the form of e-transfer via email.

The e-transfer password will be (case-sensitive): **17giftcards**

Please keep a record of this password and do not share it with others. **A separate email with the e-transfer password above will be sent to you shortly before you receive the e-transfer.**

Should you have any comments or questions regarding the study, please contact:

- Professor Adam Presslee, adam.presslee@uwaterloo.ca.
- Pei Wang, p252wang@uwaterloo.ca.

Please also keep a record of the email addresses above. Please email Pei Wang if you have difficulties receiving the e-transfer or if you don't receive the e-transfer within a week after completing this study.

Thank you for your support, help and understanding.

This concludes the study.

Appendix F. Main Experiment Instrument

PAGE 1

Informed Consent – Reward Design and Effort Allocation

You are invited to participate in a research study conducted by Pei Wang, PhD Candidate at the University of Waterloo under the supervision of Professor Adam Presslee at the University of Waterloo. In this research study, you will work on some computerized slider tasks. Afterward, you will be asked some questions about your thought process and some basic demographic questions. This study should take you about 20 minutes to complete. The findings from this study will inform us how reward design impacts employee effort.

To participate in this study, you must be a student from the School of Accounting and Finance at the University of Waterloo. Participation in this study is voluntary. You may choose to withdraw from this study at any time without any negative consequences by exiting the questionnaire. However, the information you provide in the study up to that point may still be used. You can skip questions that you do not wish to answer. If you wish to stop participating in the study, please click through to the end of the survey to enter your email address where indicated.

You will receive a \$5 participation fee in cash when you leave the lab.

You may also receive a gift card depending on your performance during the study, and those who earn a gift card will receive it via email within two weeks of participating in the study. For the purpose of sending you the e-gift card, you will need to fill in a form. You should have received this form from the lab administrator. Please raise your hand and let the lab administrator know if you did not receive the form. Other than your University of Waterloo email address, other information required for the form will be displayed on the final screen of the study. Your University of Waterloo email address will not be linked to your response to the rest of the study. When publishing or releasing the study findings, I will not disclose any participant's identification information. Your identity will remain confidential.

You will be completing the study by an online survey operated by Qualtrics. Qualtrics has implemented technical, administrative, and physical safeguards to protect the information provided via the services from loss, misuse, and unauthorized access, disclosure, alteration, or destruction. However, no Internet transmission is ever fully secure or error-free.

Data collected during this study will be retained for at least seven years on a password-protected computer and a secure University of Waterloo drive. Only researchers associated with this project will have access to the data. There are no known or anticipated risks to you as a participant in this study.

If you have any questions regarding this study or would like additional information to assist you in reaching a decision about participation, please contact:

- Professor Adam Presslee, adam.presslee@uwaterloo.ca.
- Pei Wang, p252wang@uwaterloo.ca.

Appendix F. Main Experiment Instrument (Continued)

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board (REB #46419). If you have questions for the Board, contact the Office of Research Ethics, at 1-833-643-2379 (Canada and USA), 1-519-888-4440, or reb@uwaterloo.ca.

Consent Form

By agreeing to participate in the study, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

YES

NO

click the “→” button to proceed to the instructions.

[Throughout the questionnaire, a participant can always skip questions by clicking the “→” button to proceed, except the comprehension check questions.]

Appendix F. Main Experiment Instrument (Continued)

PAGE 2

Instructions

Before you begin, please make sure that you have received the form from the lab administrator. If you do not have it, please raise your hand and let the lab administrator know.

Please read the instructions carefully. **You will be given some questions to check your understanding of the instructions.**

In this research study, you will go through **one practice round** and **three formal rounds**. These rounds involve two tasks, a **production task** and a **training task**.

You will first learn about the production task.

Production Task

Under the production task, you will be given **60 sliders**. Each slider will be labeled with double letters from AA to CH in alphabetical order (i.e., AA, AB, ..., AZ, BA, BB, ..., CG, CH). The label of sliders will remain the same each round. Each slider will have a range of **0 to 100** and its **starting position will be at 0**.

You will gain **1 point for each slider positioned at 50**. The label of a slider will turn green when it is positioned at 50. Importantly, your points will be calculated when each round ends so that dragging one slider back and forth to hit position 50 multiple times during a round will NOT allow you to gain multiple points. Below is an example of two sliders, AA and AB. Slider AA has been dragged to 50, and Slider AB is in its starting position of 0:



There are alternative ways to gain points under the production task (other than positioning sliders to 50). **These alternative ways may allow you to gain points more efficiently.** These alternative ways can be revealed by working on the training task (described next).

Next Step

On the next page, you will be given a comprehension check question to test your understanding of the instructions on current page. If you fail to answer the question correctly, you will be given an opportunity to review the correct answers.

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

PAGE 3

Comprehension Check 1 of 4

[If participants fail to answer this question correctly, they will be shown correct answers.]

Which of the following is correct about **production task**? (Select ALL that apply)

- A. I can gain multiple points by dragging a slider back and forth to hit position 50 multiple times under production task.
- B. There are alternative ways to gain points, which may allow me to gain points more efficiently. [correct]
- C. I will gain 1 point for each slider positioned at 50. [correct]
- D. All sliders under the production task are labeled with numbers from 1 to 60.

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

PAGE 4

Instructions (Continued)

Please read the instructions carefully. **You will be given some questions to check your understanding of the instructions.**

In this research study, you will go through **one practice round** and **three formal rounds**. These rounds involve two tasks, a **production task** and a **training task**.

Now you will learn about the training task.

Training Task

Under the training task, you will be given **60 sliders**. Each slider is labeled with double letters from TA to VH in alphabetical order (i.e., TA, TB, ..., AZ, UA, UB, ..., VG, VH). The label of sliders will remain the same each round. Each slider will have a range of **0 to 100** and its **starting position will be at 0**.

By positioning sliders to 50, you will **NOT gain points directly**, but you may reveal those alternative ways of gaining points mentioned earlier. **The more sliders you drag to 50, the more alternative ways you may reveal.** When an alternative way of gaining points is revealed, it will be displayed in a **text box on the top of the screen**. Please make sure to check the text box as you work on the training task so that you don't miss it when an alternative way is revealed. It is recommended that you work on sliders in **alphabetical order under the training task**. Dragging one slider back and forth to hit position 50 multiple times will not allow you to reveal anything. The label of a slider will turn green when it is positioned at 50.

Next Step

On the next page, you will be given a comprehension check question to test your understanding of the instructions on current page. If you fail to answer the question correctly, you will be given an opportunity to review the correct answers.

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

PAGE 5

Comprehension Check 2 of 4

[If participants fail to answer this question correctly, they will be shown correct answers.]

Which of the following is correct about **training task**? (Select ALL that apply)

- A. The more sliders I drag to 50 under the training task, the more alternative ways of gaining points I may reveal. [correct]
- B. I can reveal multiple alternative ways of gaining points by dragging a slider back and forth to hit position 50 multiple times under the training task.
- C. All sliders under the training task are labeled with double letters from TA to VH. [correct]
- D. It is recommended that I drag sliders to 50 following alphabetical order under the training task. [correct]

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

PAGE 6

Instructions (Continued)

Please read the instructions carefully. **You will be given some questions to check your understanding of the instructions.**

In this research study, you will go through **one practice round** and **three formal rounds**. These rounds involve two tasks, a **production task** and a **training task**.

Now you will learn about the practice round.

Practice Round

During the practice round, you will have **60 seconds** to work on the **production task**. The **training task will NOT be available**. However, the position of the text box (for displaying revealed alternative ways of gaining points) and the training task will be shown to you. At the end of practice round, you will be shown the number of points you gained. **Your performance during the practice round will NOT impact your compensation.**

Next Step

On the next page, you will be given a comprehension check question to test your understanding of the instructions on current page. If you fail to answer the question correctly, you will be given an opportunity to review the correct answers.

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

PAGE 7

Comprehension Check 3 of 4

[If participants fail to answer this question correctly, they will be shown correct answers.]

Which of the following is correct about **practice round**? (Select ALL that apply)

- A. The points I gain during the practice round will impact my compensation.
- B. I will work on both the production task and the training task during the practice round.
- C. I will be given 60 sliders under the production task. [correct]
- D. The round will last 30 seconds.
- E. The round will last 60 seconds. [correct]

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

PAGE 8

Instructions (Continued)

Please read the instructions carefully. **You will be given some questions to check your understanding of the instructions.**

In this research study, you will go through **one practice round** and **three formal rounds**. These rounds involve two tasks, a **production task** and a **training task**.

Now you will learn about the three formal rounds.

Three Formal Rounds

During **each** of the three formal rounds, you will have **60 seconds** to allocate your effort between the **production task** and the **training task**. The two tasks will be **available simultaneously** and be presented **side by side on the same screen**, with a clear line in between to separate them. The points you gain will **accumulate over the three formal rounds**. At the end of each formal round, you will be shown the **number of points you gained during that round** and the **accumulated number of points you have at that time**. Your compensation will depend on the **accumulated number of points you have at the end of the round 3**. More details on your compensation will be provided later.

At the beginning of rounds 2 and 3, the position of **all sliders** under the **production task** will be **reset to 0**. **All sliders** under the **training task** will be in the **same position as when the previous round ends**. For instance, if sliders TA and TB are positioned to 50 at the end of round 1, these two sliders will also be 50 when round 2 begins.

Next Step

On the next page, you will be given a comprehension check question to test your understanding of the instructions on current page. If you fail to answer the question correctly, you will be given an opportunity to review the correct answers.

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

PAGE 9

Comprehension Check 4 of 4

[If participants fail to answer this question correctly, they will be shown correct answers.]

Which of the following is correct about **three formal rounds**? (Select ALL that apply)

- A. The points I gain during the three formal rounds will impact my compensation. [correct]
- B. I will work on both the production task and the training task during the three formal rounds. [correct]
- C. The production task and the training task will be displayed on two separate screens.
- D. At the beginning of formal round 2 and 3, the position of each of the 60 sliders under the training task will be carried over from the end of previous round. [correct]
- E. The round will last 90 seconds.
- F. At the end of each formal round, a performance summary will show me the points I gain during the round and the accumulated total points I have at the time. [correct]

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

PAGE 10

Comprehension Check: Passed

Congratulations on passing the comprehension check!

On the next page, you will go through the **60-seconds** practice round so that you become familiar with moving sliders. As a reminder, during the practice round, you will be given **60 sliders under production task**, and there will be **no training task available** during the practice round. Each slider under the production task is labeled in double letters, from AA to CH. You will receive **1 point for each slider positioned at 50** when the round ends. At the end of the practice round, you will automatically advance to the next screen where you will be able to view the total points you gained during the practice round. Importantly, **your performance during the practice round will not impact your compensation.**

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

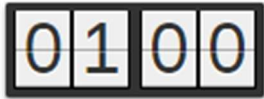
PAGE 11

Practice Round

[The textbox is displayed on top of screen so that participants know where the revealed alternative ways to gain points will be displayed.]

By dragging sliders to 50 in alphabetical order under the Training task, you may reveal new ways of getting points under the Production task.

[Below is the timer for 1-minute countdown.]



Production	Production	Production
AA ●————→0	AU ●————→0	BO ●————→0
AB ●————→0	AV ●————→0	BP ●————→0
AC ●————→0	AW ●————→0	BQ ●————→0
AD ●————→0	AX ●————→0	BR ●————→0
AE ●————→0	AY ●————→0	BS ●————→0
AF ●————→0	AZ ●————→0	BT ●————→0
AG ●————→0	BA ●————→0	BU ●————→0
AH ●————→0	BB ●————→0	BV ●————→0
AI ●————→0	BC ●————→0	BW ●————→0
AJ ●————→0	BD ●————→0	BX ●————→0
AK ●————→0	BE ●————→0	BY ●————→0
AL ●————→0	BF ●————→0	BZ ●————→0
AM ●————→0	BG ●————→0	CA ●————→0
AN ●————→0	BH ●————→0	CB ●————→0
AO ●————→0	BI ●————→0	CC ●————→0
AP ●————→0	BJ ●————→0	CD ●————→0
AQ ●————→0	BK ●————→0	CE ●————→0
AR ●————→0	BL ●————→0	CF ●————→0
AS ●————→0	BM ●————→0	CG ●————→0
AT ●————→0	BN ●————→0	CH ●————→0

Training is not
available

[Participants can click the “→” button to proceed if they want to skip the practice round]

Appendix F. Main Experiment Instrument (Continued)

PAGE 12

Practice Round Performance Summary

Your practice round performance is summarized below. Please proceed when you are ready.

The number of points gained in this round: [display the number of points gained]

The number of points you gained in this round will not impact your compensation.

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

PAGE 13

Compensation

Thank you for finishing the practice round. This current page and the next page will inform you of your compensation.

Regardless of your performance, you will receive **5 dollars in cash** for your participation when you leave the computer lab.

[Hedonic Reward Nature Condition]

In addition, you may receive a **Cineplex e-gift card** depending on the points you gain over the three rounds.



What would you like to purchase with a Cineplex e-gift card?

[Participants will type their answers here.]

[Utilitarian Reward Nature Condition]

In addition, you may receive a **FreshCo e-gift card** depending on the points you gain over the three rounds.



What would you like to purchase with a FreshCo e-gift card?

[Participants will type their answers here.]

Appendix F. Main Experiment Instrument (Continued)

PAGE 14

Compensation (Continued)

[Hedonic Reward Nature Condition]

Recall from the previous screen that you may receive a **Cineplex e-gift card** depending on the points you gain over the three rounds.

[Utilitarian Reward Nature Condition]

Recall from the previous screen that you may receive a **FreshCo e-gift card** depending on the points you gain over the three rounds.

[All conditions]

Please indicate on a 7-point scale the extent you agree/disagree with the following statements [the order of these six questions will be randomized]:

- 1) The item(s) that can be purchased with this gift card are **fun** to me.
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 2) The item(s) that can be purchased with this gift card are **enjoyable** to me.
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 3) The item(s) that can be purchased with this gift card are **pleasurable** to me.
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 4) The item(s) that can be purchased with this gift card are **useful** to me.
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

- 5) The item(s) that can be purchased with this gift card are **practical** to me.
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

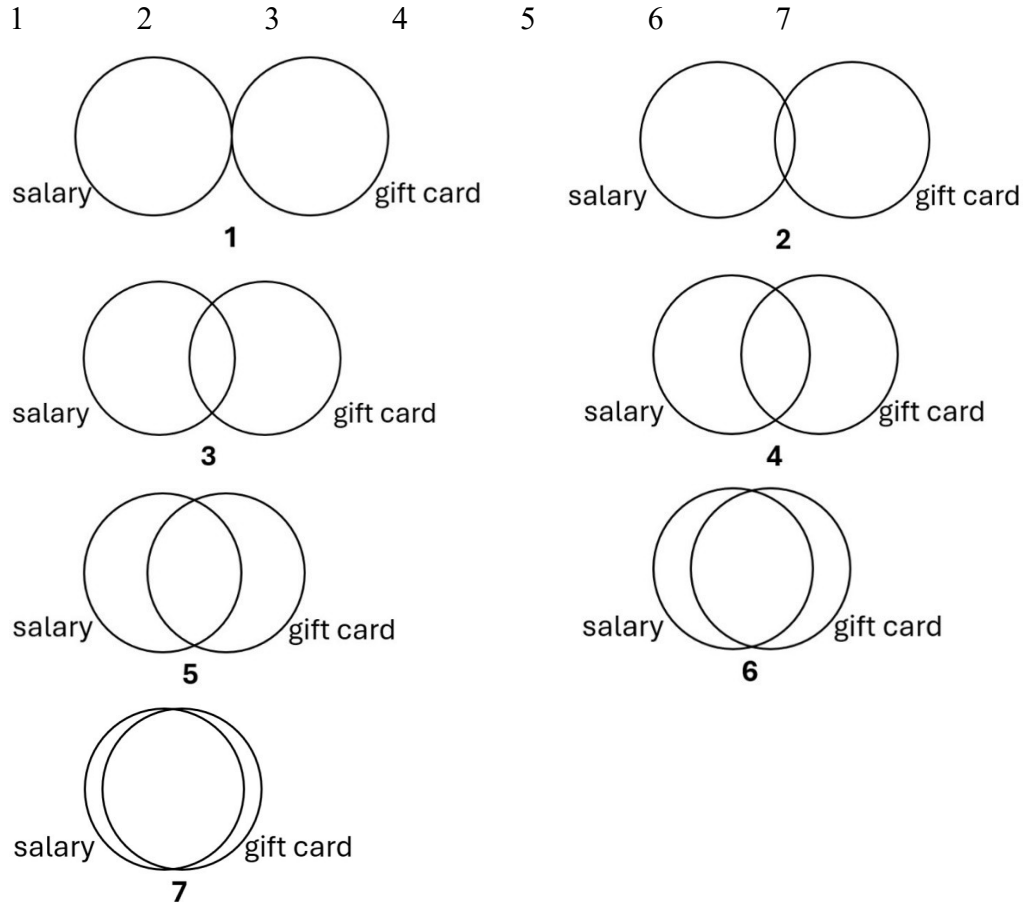
-3 -2 -1 0 1 2 3

- 6) The item(s) that can be purchased with this gift card are **functional** to me.
(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

Appendix F. Main Experiment Instrument (Continued)

Below are two circles, one representing salary and the other representing the gift card reward. The greater the overlap between the two circles, the more similar those items are to one another. Which picture below best describes how you think about the two items?



click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

PAGE 15

Compensation (Continued)

Thank you for sharing your opinion about the gift card for your reward. This screen will explain in detail how your gift card value will be tied to your performance - the accumulated total number of points you gain over the three formal rounds.

[Hedonic Reward Nature, Piece-Rate Reward Contingency Condition]

The value of your **Cineplex** gift card will equal to a **\$5 minimum plus \$1 for every 10 points you gain**. For instance, if you gain 55 points over the three formal rounds, the value of your gift card reward will equal to $\$5 + \$1 * 5 = \$10$.

[Utilitarian Reward Nature, Piece-Rate Reward Contingency Condition]

The value of your **FreshCo** gift card will equal to a **\$5 minimum plus \$1 for every 10 points you gain**. For instance, if you gain 55 points over the three formal rounds, the value of your gift card reward will equal to $\$5 + \$1 * 5 = \$10$.

[Hedonic Reward Nature, Goal-Based Reward Contingency Condition]

The value of your Cineplex gift card reward will be \$Y if you gain at least X points over the three formal rounds. You will not receive any Cineplex gift card if you fail to gain X points over the three formal rounds.

[Utilitarian Reward Nature, Goal-Based Reward Contingency Condition]

The value of your FreshCo gift card reward will be \$Y if you gain at least X points over the three formal rounds. You will not receive any FreshCo gift card if you fail to gain X points over the three formal rounds.

[Following prior literature (e.g., Bonner and Sprinkle 2002; Kelly et al. 2015), the number of points X required for performance goal will be the 80th percentile number of points participants gain under the Piece-Rate condition, rounded down to the nearest ten. When participants gain at least X points, the gift card value $Y = \$5 + \$1 * X/10$.]

Appendix F. Main Experiment Instrument (Continued)

PAGE 16

Compensation (Continued)

[Hedonic Reward Nature Condition]

Regarding the **Cineplex gift card** reward, please indicate the extent you agree/disagree with the following statement:

[Utilitarian Reward Nature Condition]

Regarding the **FreshCo gift card** reward, please indicate the extent you agree/disagree with the following statement:

[All conditions]

The way the gift card value is determined involves high uncertainty.

(-3 = strongly disagree, 3 = strongly agree, 0 = neither agree nor disagree)

-3 -2 -1 0 1 2 3

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

PAGE 17

Before The Three Formal Rounds

Thank you for sharing your opinion about your compensation. Starting from the next page, you will go through three formal rounds.

As a reminder:

During each formal round, you will be given 60 sliders under the production task and 60 sliders under the training task. The two tasks are presented side by side for your convenience. You will have 1 minute to work on these sliders. A countdown timer will be displayed on top of the screen.

Under the production task, each slider is labeled in double letters, from AA to CH. At the end of each round, your points will be calculated based on the position of each slider under the production task. You will receive 1 point for each slider positioned at 50. There are other ways to gain points, but you can only reveal them by positioning sliders to 50 on the training side.

Under the training task, each slider is labeled in double letters, from TA to VH. As mentioned above, you can reveal other ways to gain points by positioning sliders to 50 on the training side. However, you will not gain any point for any slider positioned to 50 on the training side. If you choose to work on sliders on the training side, you are recommended to follow the alphabetical order, from TA to VH.

At the end of each round, you will automatically advance to the next screen where you will be shown: 1) the total points you gain during that round, 2) the accumulated total points you have gained at that point, and 3) your gift card value based on your accumulated total points.

[Hedonic Reward Nature, Piece-Rate Reward Contingency Condition]

The value of your Cineplex gift card will equal to a \$5 minimum plus \$1 for every 10 points you gain.

[Utilitarian Reward Nature, Piece-Rate Reward Contingency Condition]

The value of your FreshCo gift card will equal to a \$5 minimum plus \$1 for every 10 points you gain.

[Hedonic Reward Nature, Goal-Based Reward Contingency Condition]

The value of your Cineplex gift card reward will be \$Y if you gain at least X points over the three formal rounds. You will not receive any Cineplex gift card if you fail to gain X points over the three formal rounds.

[Utilitarian Reward Nature, Goal-Based Reward Contingency Condition]

The value of your FreshCo gift card reward will be \$Y if you gain at least X points over the three formal rounds. You will not receive any FreshCo gift card if you fail to gain X points over the three formal rounds.

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

PAGE 18

Round 1

By dragging sliders to 50 in alphabetical order under the Training task, you may reveal new ways of getting points under the Production task.

[when slider TA, TB, TC, TD, TE, TF, TG, TH, TI, TJ, TK, TL each has value of 50, display message in box: "Gain 22 points if slider AJ, AO, BA, CD each has a value of 79."

When slider TM, TN, TO, TP, TQ, TR, TS, TT each has value of 50, display message in box: "Gain 18 points if slider AB, BC, BE, BR each has a value of 61."

When slider TU, TV, TW, TX, TY, TZ, UA, UB, UC, UD, UE each has value of 50, display message in box: "Gain 21 points if slider AC, AT, BI, CH each has a value of 88."

When slider UF, UG, UH, UI, UJ, UK, UL, UM, UN each has value of 50, display message in box: "Gain 19 points if slider AX, BQ, BY, CE each has a value of 92."

When slider UO, UP, UQ, UR, US, UT, UU, UV, UW, UX, UY, UZ, VA each has value of 50, display message in box: "Gain 23 points if slider AH, AP, AU, BZ each has a value of 65."

When slider VB, VC, VD, VE, VF, VG, VH each has value of 50, display message in box: "Gain 17 points if slider AK, BF, BW, CF each has a value of 83."



[The timer for 1-minute countdown]

Production			Training		
AA	●	0	TA	●	0
AB	●	0	TB	●	0
AC	●	0	TC	●	0
AD	●	0	TD	●	0
AE	●	0	TE	●	0
AF	●	0	TF	●	0
AG	●	0	TG	●	0
AH	●	0	TH	●	0
AI	●	0	TI	●	0
AJ	●	0	TJ	●	0
AK	●	0	TK	●	0
AL	●	0	TL	●	0
AM	●	0	TM	●	0
AN	●	0	TN	●	0
AO	●	0	TO	●	0
AP	●	0	TP	●	0
AQ	●	0	TQ	●	0
AR	●	0	TR	●	0
AS	●	0	TS	●	0
AT	●	0	TT	●	0
AU	●	0	TU	●	0
AV	●	0	TV	●	0
AW	●	0	TW	●	0
AX	●	0	TX	●	0
AY	●	0	TY	●	0
AZ	●	0	TZ	●	0
BA	●	0	UA	●	0
BB	●	0	UB	●	0
BC	●	0	UC	●	0
BD	●	0	UD	●	0
BE	●	0	UE	●	0
BF	●	0	UF	●	0
BG	●	0	UG	●	0
BH	●	0	UH	●	0
BI	●	0	UI	●	0
BJ	●	0	UJ	●	0
BK	●	0	UK	●	0
BL	●	0	UL	●	0
BM	●	0	UM	●	0
BN	●	0	UN	●	0
BO	●	0	UO	●	0
BP	●	0	UP	●	0
BQ	●	0	UQ	●	0
BR	●	0	UR	●	0
BS	●	0	US	●	0
BT	●	0	UT	●	0
BU	●	0	UU	●	0
BV	●	0	UV	●	0
BW	●	0	UW	●	0
BX	●	0	UX	●	0
BY	●	0	UY	●	0
BZ	●	0	UZ	●	0
CA	●	0	VA	●	0
CB	●	0	VB	●	0
CC	●	0	VC	●	0
CD	●	0	VD	●	0
CE	●	0	VE	●	0
CF	●	0	VF	●	0
CG	●	0	VG	●	0
CH	●	0	VH	●	0

[Participants can click the "→" button to proceed if they want to skip this round]

Appendix F. Main Experiment Instrument (Continued)

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Round 1 Performance Summary

Your round 1 performance is summarized below:

The number of points gained in round 1: [display number of points gained in round 1]

The accumulated total number of points gained: [display accumulated total number of points gained]

[Hedonic Reward Nature Condition]

Your Cineplex gift card value based on your accumulated total number of points gained:
[display the gift card value calculated]

[Utilitarian Reward Nature Condition]

Your FreshCo gift card value based on your accumulated total number of points gained:
[display the gift card value calculated]

[All conditions]

Please proceed to the next round when you are ready.

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

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Round 2

By dragging sliders to 50 in alphabetical order under the Training task, you may reveal new ways of getting points under the Production task.

[when slider TA, TB, TC, TD, TE, TF, TG, TH, TI, TJ, TK, TL each has value of 50, display message in box: “Gain 22 points if slider AJ, AO, BA, CD each has a value of 79.”]

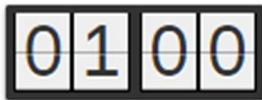
When slider TM, TN, TO, TP, TQ, TR, TS, TT each has value of 50, display message in box: “Gain 18 points if slider AB, BC, BE, BR each has a value of 61.”

When slider TU, TV, TW, TX, TY, TZ, UA, UB, UC, UD, UE each has value of 50, display message in box: “Gain 21 points if slider AC, AT, BI, CH each has a value of 88.”

When slider UF, UG, UH, UI, UJ, UK, UL, UM, UN each has value of 50, display message in box: “Gain 19 points if slider AX, BQ, BY, CE each has a value of 92.”

When slider UO, UP, UQ, UR, US, UT, UU, UV, UW, UX, UY, UZ, VA each has value of 50, display message in box: “Gain 23 points if slider AH, AP, AU, BZ each has a value of 65.”

When slider VB, VC, VD, VE, VF, VG, VH each has value of 50, display message in box: “Gain 17 points if slider AK, BF, BW, CF each has a value of 83.”]



[The timer for 1-minute countdown]

Production			Training		
AA	AU	BO	TA	TU	UO
AB	AV	BP	TB	TV	UP
AC	AW	BQ	TC	TW	UQ
AD	AX	BR	TD	TX	UR
AE	AY	BS	TE	TY	US
AF	AZ	BT	TF	TZ	UT
AG	BA	BU	TG	UA	UU
AH	BB	BV	TH	UB	UV
AI	BC	BW	TI	UC	UW
AJ	BD	BX	TJ	UD	UX
AK	BE	BY	TK	UE	UY
AL	BF	BZ	TL	UF	UZ
AM	BG	CA	TM	UG	VA
AN	BH	CB	TN	UH	VB
AO	BI	CC	TO	UI	VC
AP	BJ	CD	TP	UJ	VD
AQ	BK	CE	TQ	UK	VE
AR	BL	CF	TR	UL	VF
AS	BM	CG	TS	UM	VG
AT	BN	CH	TT	UN	VH

[Participants can click the “→” button to proceed if they want to skip this round]

Appendix F. Main Experiment Instrument (Continued)

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Round 2 Performance Summary

Your round 2 performance is summarized below:

The number of points gained in round 2: [display number of points gained in round 2]

The accumulated total number of points gained: [display accumulated total number of points gained]

[Hedonic Reward Nature Condition]

Your Cineplex gift card value based on your accumulated total number of points gained:
[display the gift card value calculated]

[Utilitarian Reward Nature Condition]

Your FreshCo gift card value based on your accumulated total number of points gained:
[display the gift card value calculated]

[All conditions]

Please proceed to the next round when you are ready.

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

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Round 3

By dragging sliders to 50 in alphabetical order under the Training task, you may reveal new ways of getting points under the Production task.

[when slider TA, TB, TC, TD, TE, TF, TG, TH, TI, TJ, TK, TL each has value of 50, display message in box: “Gain 22 points if slider AJ, AO, BA, CD each has a value of 79.”]

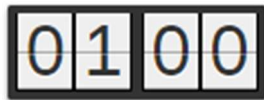
When slider TM, TN, TO, TP, TQ, TR, TS, TT each has value of 50, display message in box: “Gain 18 points if slider AB, BC, BE, BR each has a value of 61.”]

When slider TU, TV, TW, TX, TY, TZ, UA, UB, UC, UD, UE each has value of 50, display message in box: “Gain 21 points if slider AC, AT, BI, CH each has a value of 88.”]

When slider UF, UG, UH, UI, UJ, UK, UL, UM, UN each has value of 50, display message in box: “Gain 19 points if slider AX, BQ, BY, CE each has a value of 92.”]

When slider UO, UP, UQ, UR, US, UT, UU, UV, UW, UX, UY, UZ, VA each has value of 50, display message in box: “Gain 23 points if slider AH, AP, AU, BZ each has a value of 65.”]

When slider VB, VC, VD, VE, VF, VG, VH each has value of 50, display message in box: “Gain 17 points if slider AK, BF, BW, CF each has a value of 83.”]



[The timer for 1-minute countdown]

Production			Training		
AA ● → 0	AU ● → 0	BO ● → 0	TA ● → 0	TU ● → 0	UO ● → 0
AB ● → 0	AV ● → 0	BP ● → 0	TB ● → 0	TV ● → 0	UP ● → 0
AC ● → 0	AW ● → 0	BQ ● → 0	TC ● → 0	TW ● → 0	UQ ● → 0
AD ● → 0	AX ● → 0	BR ● → 0	TD ● → 0	TX ● → 0	UR ● → 0
AE ● → 0	AY ● → 0	BS ● → 0	TE ● → 0	TY ● → 0	US ● → 0
AF ● → 0	AZ ● → 0	BT ● → 0	TF ● → 0	TZ ● → 0	UT ● → 0
AG ● → 0	BA ● → 0	BU ● → 0	TG ● → 0	UA ● → 0	UU ● → 0
AH ● → 0	BB ● → 0	BV ● → 0	TH ● → 0	UB ● → 0	UV ● → 0
AI ● → 0	BC ● → 0	BW ● → 0	TI ● → 0	UC ● → 0	UW ● → 0
AJ ● → 0	BD ● → 0	BX ● → 0	TJ ● → 0	UD ● → 0	UX ● → 0
AK ● → 0	BE ● → 0	BY ● → 0	TK ● → 0	UE ● → 0	UY ● → 0
AL ● → 0	BF ● → 0	BZ ● → 0	TL ● → 0	UF ● → 0	UZ ● → 0
AM ● → 0	BG ● → 0	CA ● → 0	TM ● → 0	UG ● → 0	VA ● → 0
AN ● → 0	BH ● → 0	CB ● → 0	TN ● → 0	UH ● → 0	VB ● → 0
AO ● → 0	BI ● → 0	CC ● → 0	TO ● → 0	UI ● → 0	VC ● → 0
AP ● → 0	BJ ● → 0	CD ● → 0	TP ● → 0	UJ ● → 0	VD ● → 0
AQ ● → 0	BK ● → 0	CE ● → 0	TQ ● → 0	UK ● → 0	VE ● → 0
AR ● → 0	BL ● → 0	CF ● → 0	TR ● → 0	UL ● → 0	VF ● → 0
AS ● → 0	BM ● → 0	CG ● → 0	TS ● → 0	UM ● → 0	VG ● → 0
AT ● → 0	BN ● → 0	CH ● → 0	TT ● → 0	UN ● → 0	VH ● → 0

[Participants can click the “→” button to proceed if they want to skip this round]

Appendix F. Main Experiment Instrument (Continued)

PAGE 23

Round 3 Performance Summary

Your round 3 performance is summarized below:

The number of points gained in round 3: [display number of points gained in round 3]

The accumulated total number of points gained: [display accumulated total number of points gained]

[Hedonic Reward Nature Condition]

Your Cineplex gift card value based on your accumulated total number of points gained:
[display the gift card value calculated]

[Utilitarian Reward Nature Condition]

Your FreshCo gift card value based on your accumulated total number of points gained:
[display the gift card value calculated]

[All conditions]

Please proceed to the post study questionnaire when you are ready.

click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

PAGE 24

Post Study Questionnaire

[The order of both questions on this page will be randomized]

Please indicate on a 7-point scale how motivated you were to work on **production task**?

(1 = not motivating at all; 7 = highly motivating)

1 2 3 4 5 6 7

Please indicate on a 7-point scale how motivated you were to work on **training task**?

(1 = not motivating at all; 7 = highly motivating)

1 2 3 4 5 6 7

Appendix F. Main Experiment Instrument (Continued)

PAGE 25

Post Study Questionnaire (Continued)

[The order of all the questions on this page will be randomized.]

When evaluating your potential reward and deciding how hard to work on the tasks, would you rely more on a **cost–benefit analysis** or **your feelings**? Please indicate your answer on the 11-point scale below:

0 - Only analyze costs & benefits

1

2

3

4

5 - Equally rely on cost-benefit analysis and feelings

6

7

8

9

10 - Only rely on feelings

When evaluating your potential reward and deciding how hard to work on the tasks, would you be more **practical** or **emotional**? Please indicate your answer on the 11-point scale below:

0 - Extremely practical

1

2

3

4

5 - Equally practical and emotional

6

7

8

9

10 - Extremely emotional

Appendix F. Main Experiment Instrument (Continued)

When evaluating your potential reward and deciding how hard to work on the tasks, would you rely more on **objective facts** or **subjective feelings**? Please indicate your answer on the 11-point scale below:

0 - Only rely on objective facts

1

2

3

4

5 – Equally rely on objective facts and subjective feelings

6

7

8

9

10 = Only rely on subjective feelings

When evaluating your potential reward and deciding how hard to work on the tasks, would you view your work as more of an **economic exchange** or a **social exchange**? Please indicate your answer on the 11-point scale below:

0 - Only economic exchange

1

2

3

4

5 – Equally as an economic exchange and a social exchange

6

7

8

9

10 - Only a social exchange

Click the “→” button to proceed.

Appendix F. Main Experiment Instrument (Continued)

PAGE 26

Post Study Questionnaire: Continued

Please indicate your sex below.

- A. Male
- B. Female
- C. Intersex
- D. Prefer not to say

What is your age?

How many months of work experience do you have (co-op included)?

Do you have any comments about this study?

Appendix F. Main Experiment Instrument (Continued)

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End of Study

Thank you for participating in this study.

Your gift card vendor is: [display “Cineplex” for hedonic condition or “FreshCo” for utilitarian condition].

Your gift card reward value is: [display the gift card reward value].

When you entered the lab, you should have received a form from the lab administrator. Please fill in the form with the information displayed above. For Line Item 1 on the form, please write down your gift card vendor; for Line Item 2 on the form, please write you're your gift card reward value. Please also write down your uwaterloo email address. It is important that you fill in the form with **accurate information**.

Once you fill in the form, please raise your hand. **The lab administrator will come to verify the information you put in the form and collect the form.** If you earned a gift card reward, you will receive it within two weeks via email.

[To view the form, please refer to the document named “Gift Card Form”. The purpose of this form is to ensure that I can send participants their gift card rewards later on without linking their email to their responses.]

Please keep the study content confidential. Thank you for your support, help, and understanding.

Should you have any comments or questions regarding the study, please contact:

- Professor Adam Presslee, adam.presslee@uwaterloo.ca.
- Pei Wang, p252wang@uwaterloo.ca.

The contact information above is also available on the form – you can keep that portion with you. **Please email Pei Wang if you earned a gift-card reward but don't receive it within two weeks after participating in this study.**

Once the administrator verifies the information you have on the form, you can **collect the \$5 participation fee from the administrator and exit the lab.**