INCENTIVE SCHEMES, GOAL LEVEL AND PERFORMANCE TARGET PRIORITIZATION IN A MULTI-DIMENSIONAL TASK

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ABSTRACT

In this study we examine the effect of incentive scheme interdependency (whether multiple performance targets were linked together or independently associated with performance incentive) and the level of goal difficulty (difficult or easy) on task performance in a multi-dimensional task. We found that subjects who were given an independent incentive scheme and difficult goals had the greatest level of relative performance discrepancy between task dimensions (a proxy for individuals' unequal attention allocation between performance targets), as well as the lowest level of overall task performance. Further analysis of goal commitment and strategy selection showed that these subjects had a greater tendency to adopt an "unbalanced" task strategy by focusing on one performance dimension at the expense of another. In addition, we also found that for a multi-dimensional task, the positive goal-performance relationship predicted by Goal Setting Theory existed only under a linked incentive scheme. With an independent incentive scheme, the goal level-performance relationship was found to be negative. Finally, while subjects who were given a linked incentive scheme and difficult goals achieved the highest level of overall task performance, they received the lowest level of average incentive payment. Our results have important implications for both researchers and designers of multiple performance measurement systems such as the balanced scorecard.

Keywords: Multiple performance measures, incentive scheme, goal difficulty, Balanced Scorecard

1. INTRODUCTION

An important role of managerial accounting information is motivating employees to achieve better performance (Bonner and Sprinkle 2002). Sometimes referred to as the "decision-influencing" function, managerial accounting information is implicated in performance evaluation and incentive schemes to encourage employees to engage in organizationally desirable behaviours (Sprinkle 2003; Bonner, Hastie and Sprinkle 2000). The literature generally suggests that different types of incentive schemes (e.g. flat rate or piece rate schemes) have different effects on task performance, especially when combined with goal setting (e.g. Bonner and Sprinkle 2002; Lee, Locke and Phan 1997; Fatseas and Hirst 1992). Understanding the effect of incentive schemes on performance is important, and as Bonner and Sprinkle (2002: 331) have argued "…accountants not only play a major role in designing compensation plans but also in determining the specific attributes of these plans".

While there has been extensive research on the role of financial incentives on individual performance, most research studies have focused exclusively on uni-dimensional tasks (Sprinkle 2003). Yet employees at all levels of an organization often perform several tasks or alternatively, tasks with several dimensions as part of their jobs (e.g. Renn and Fedor 2001; Hemmer 1996). For example, a production worker may need to manage simultaneously both production efficiency and product quality. Indeed, the adoption of multi-dimensional performance management systems such as the Balanced Scorecard (BSC) has meant that employees are increasingly given multiple performance goals (e.g. Emsley 2003; Kaplan and Norton 1996). As a result, an understanding of how individuals behave under a multi-dimensional context becomes increasingly important. One important difference between uni-dimensional tasks and multi-dimensional tasks is that individuals given multiple performance targets need to *prioritize* these various work goals by deciding how to allocate their attention between them. An inappropriate performance incentive scheme, however, may result in employees prioritizing performance measures in a less than optimal manner (e.g. Smith 2002; Datar, Kulp and Lambert 2001). Because of this concern, Sprinkle (2003), in his recent review of experimental managerial accounting research, called for more research studies to investigate the effect of incentive schemes in a multi-dimensional task setting.

Previous research has also shown that different types of incentive schemes affect task performance differently depending on the level of goal difficulty associated with the task. In the psychology literature, the Goal Setting Theory has long established the important role of goal difficulty in motivating individuals in a variety of work tasks (Locke and Latham 1990). Most of these studies, however, focused on the goal-performance relationship with a single goal, and as such did not need to consider the way individuals prioritize their performance targets. In this study, we investigate the effect of the *interdependency attribute* of incentive schemes, that is, whether the various performance measure are linked together or independently related to the incentive scheme, and the level of *performance target difficulty*, on individuals' performance target prioritization and task performance. Specifically, we conducted an experiment involving the manipulation of the type of incentive scheme (either an independent incentive scheme or a linked incentive scheme) and the level of goal difficulty (difficult or easy), using a multi-dimensional task. We found that the relative performance discrepancy between task dimensions (a proxy for individuals' unequal attention allocation between performance targets), was greatest when individuals were given an independent incentive scheme and when they were assigned difficult goals. In addition, these individuals also achieved the lowest level of overall task performance. Furthermore, we also found that, for a multi-dimensional task, the positive goal-performance relationship consistently reported by the Goal Setting Theory existed only under a linked incentive scheme. With an independent incentive scheme however, the relationship between goal level and task performance was found to be negative. Finally, while subjects who were given a linked incentive scheme and difficult goals achieved the highest level of overall task performance, they received the lowest level of average incentive payment.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Incentive schemes, performance target prioritization and task performance

2.1.1 Incentive schemes and task performance

Accounting researchers have long been interested in the effect of financial incentives on individual performance. Bonner et al. (2000) examined 131 experimental studies across a variety of disciplines and concluded that both the type of incentive systems and the nature of tasks employed influenced the effectiveness of financial incentives in motivating the task performance of individuals. In particular, Bonner et al. (2000) argued that the four generic types of incentive schemes, namely flat rate, piece-rate, tournament and quota schemes, elicited different levels of effort from individuals, as a consequence of the particular financial and non-financial attributes of these incentive schemes. More recently, Bonner and Sprinkle (2002) conducted a cross-disciplinary review of research studies investigating the effect of financial incentives, and confirmed that a range of incentive scheme variables, such as rewarded dimensions and the level of pay also played an important role in influencing individual task performance.

Most of the studies examined by Bonner et al. (2000) and Bonner and Sprinkle (2002), however, focused on uni-dimensional tasks. The relationship between incentive schemes and performance under a multi-dimensional task is less clear. Bonner and Sprinkle (2002) therefore suggested that future research needs to investigate whether incentive schemes could affect individuals' allocation of effort between different performance targets in multi-dimensional tasks, or between different work tasks, and to what extent an inappropriate allocation of effort could reduce overall firm value.

2.1.2. Performance target prioritization in multi-dimensional tasks

One important difference between uni-dimensional and multi-dimensional tasks is that, for the latter, individuals need to consider how to assign different priorities between performance targets, especially when they are under pressure to perform (Locke, Smith, Erez, Chan and Schaffer 1994). For example, individuals need to decide whether to allocate their attention equally between different performance targets, or to focus more of their attention on particular targets, possibly at the expense of other task dimensions. In this study, the process of allocating attention between multiple performance targets is referred to as "performance target prioritization".

To the extent that a more "balanced" approach is more consistent with organizational objectives (as prescribed by literature on tools such as the BSC), greater differences in attention allocation between performance targets will result in "incongruent prioritization" and can be considered dysfunctional behaviour. For example, if both efficiency and process quality are important to increase the overall production level, an employee who allocates most of his/her attention to efficiency and very little attention to quality will be behaving in a way that is incongruent with organizational goal. In the extreme case, an individual may focus all his/her attention on efficiency and completely ignore quality, resulting in a highly "unbalanced" approach to a task. Given that a greater level of attention allocated to a target is likely to result in an individual allocating a greater amount of resources (e.g. time, effort and financial resources) towards the associated task dimension, he/she is also likely to attain a higher level of performance on efficiency compared to quality. Thus an unbalanced task approach will also result in greater discrepancies in performance associated with different task dimensions. As overall task performance is often the composite of performance on various task dimensions, a high level of performance discrepancy between task dimensions, in turn, may also result in lower overall task performance.

A number of past studies examining multi-dimensional tasks has shown that individuals' performance target prioritization decisions depend on their explicitly assigned goals (e.g. Abdel-Hamid, Sengupta and Swett 1999; Staw and Boettger 1990; Locke and Bryan 1969), goal weightings (both assigned and self-determined weighting, e.g. Edmister and Locke 1987) and feedback sign (e.g. Tuttle and Harrell 2001). Very few studies, however, have consider the effect of incentive schemes on performance target prioritization decisions of individuals. One exception is Kernan and Lord (1990), who conducted an experiment where they assigned subjects two tasks of equal difficulty. They found that subjects who received financial incentives (attached separately to each task) set higher personal goals and higher priority for the task with the lower performance-goal discrepancy (i.e. smaller distance between actual performance level and goal level), as well as the task associated with higher expectancies. Further, these subjects also allocated more effort (measured on a self-report scale) to the task with higher priority. Kernan and Lord (1990)'s result therefore suggested that subjects were more likely to prioritize their performance targets in the presence of performance contingent economic incentives.

More recently, Tuttle and Harrell (2001) conducted a survey-experiment, which asked information system professionals to allocate 20 hours per week of their time between the two goals of achieving high quality service and reducing costs.[1] They found that the introduction of performance incentives associated with a secondary goal (i.e. the goal that was assigned lower priority by a fictitious company director) caused subjects to divert their time away from the primary goal to the secondary goal. Similar to Kernan and Lord (1990), Tuttle and Harrell (2001)'s result suggest that financial incentives play an important role in affecting individuals' decisions to prioritize their resources and attention among multiple performance targets. Furthermore, findings from both studies imply that individuals who receive a performance incentive tend to assign different priorities to different performance targets.

A different result, however, was obtained by Erez, Gopher and Arzi (1990). Using a "dual task framework", where experimental subjects had to perform a different task with each hand simultaneously, Erez et al. (1990) rewarded subjects based on their

[1] One limitation of their study, however, was a lack of actual payment to experimental subjects, which may have reduced both the realism of the design and the motivational effect of incentive payments.

ability to maintain an equal distance between goal level and performance for each task. *Inter alia*, they found that subjects were more likely to maintain a balanced performance between two tasks when an incentive was present. A major difference between Erez et al. (1990) and the two previously discussed studies (Tuttle and Harrell 2001; Kernan and Lord 1990) is that Erez et al. (1990) adopted an incentive scheme that encouraged individuals to follow a balanced approach to their performance targets, while the other two studies either rewarded individuals on one performance target only (Tuttle and Harrell 2001), or rewarded two different performance targets separately (Kernan and Lord 1990). Thus these three studies together imply that the type of incentive scheme may be an important factor affecting the manner in which individuals approach a multi-dimensional task and prioritize different performance targets. Findings from these studies are also consistent with some recent analytical studies using the agency theory framework, which propose that the weight associated with various performance targets in an agent's compensation contract can directly affect the agent's effort allocation between different task dimensions (e.g. Smith 2002; Datar, Kulp and Lambert 2001).

2.1.3 The interdependency function of incentive schemes: "Linked" incentive scheme versus "Independent" incentive scheme

In a recent review on the effects of financial incentives on performance, Bonner et al. (2000) suggested that incentive schemes vary on both their financial attributes and non-financial attributes. Financial attributes refer to whether the incentive scheme is linked to a global level of performance or an individual unit of performance, while non-financial attributes refer to whether the incentive scheme incorporates an explicit goal level (such as in the case of a quota system). In the current study, we propose that managers facing multi-dimensional tasks need to consider another attribute of incentive schemes – the nature of the *interdependency function* between different performance dimensions; that is, the extent to which different performance targets or task dimensions are "linked" within the incentive scheme. Specifically, an incentive scheme could incorporate incentives that are assigned to different performance dimensions separately (an "independent" incentive scheme), or incentives that are awarded only when individuals have achieved certain minimum levels on all performance targets or have met a set of minimum hurdles (a "linked" incentive scheme). For example, if an employee is responsible for both productivity and quality, an incentive scheme can either reward the employee separately on these two performance dimensions (e.g. a separate bonus for productivity and quality), or reward the employee using on a "linked" system based on whether the employee can simultaneously attain a certain level of performance in terms of both productivity and quality.

An example of an independent incentive scheme was one adopted by McDonald's Corporation where managers receive separate bonuses for optimum labour crew expense, attainment of cost objectives, sales growth as well as quality-service-cleanliness rating (Kaplan and Atkinson 1998). A drawback of an independent incentive scheme, however, is that employees are rewarded even if they ignore (or perform poorly on) some of the important dimensions of their tasks. Thus, when proposing the BSC concept, Kaplan and Norton (1996) suggest that one way to encourage managers to maintain the balance among different targets is to establish a threshold such that managers will earn no incentive if their performance falls short of any of the targets.[2] Global Financial Services, for example, adopted this approach in the early 1990s where bank managers need to attained minimum "hurdles" for several measures before they were eligible for bonuses (Ittner, Larcker and Meyer 2003).

In the research literature, most experimental studies investigating the effect of incentive schemes on performance tend to adopt implicitly the linked incentive scheme approach, where subjects are rewarded based on the amount of good output (e.g. the number of correctly coded answers, see Moussa 2000, 1996; Chow 1983), which in effect is a composite measure of both quality and quantity dimensions of the task. On the other hand, the study by Kernan and Lord (1990) discussed earlier used an "independent" incentive scheme where subjects could receive a bonus associated with one performance target even though a second performance target was not reached. To the best of our knowledge, none of the past studies have directly investigated a "linked" incentive scheme[3] or compared the effects of an independent scheme versus a linked scheme.

In the current study, we propose that the interdependency function of an incentive scheme will affect the way individuals prioritize different performance targets. Specifically, compared to a *linked* goal-contingent incentive scheme, an *independent* goal-contingent incentive scheme[4] allows individuals to allocate their attention

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[2] In between these two extremes are incentive schemes based on a composite performance index or an average score. This means that while performance on different task dimensions are linked together by a formula, employees could still receive some incentive payment even though not all performance targets are met.

[3] While Erez et al. (1990) did investigate the effect of an incentive scheme that rewarded individuals' abilities to maintain a balanced performance between two tasks, their incentive scheme did not directly reward individuals' level of performance, but the *difference* in performance associated with two targets.

[4] In the current study we focus only on goal-contingent, bonus-type incentive scheme ("quota scheme" referred to by Bonner et al. (2000)). The interdependency function of incentive schemes (e.g. linked or independent schemes), however, may also be associated with other financial and non-financial attributes of incentive schemes, but these alternatives are beyond the scope of our current study.

differently between performance measures without being penalised by the incentive scheme. That is, even if an individual chooses to allocate all his/her attention towards selected performance targets, at the expense of other task dimensions, he/she can still receive some reward. Under a linked incentive scheme, however, individuals would not be able to receive any reward unless they allocate their attention in such a way that they are able to attain all performance targets.

Furthermore, the interdependency nature of a linked incentive scheme also suggests to individuals that, from the organization's perspective, it is undesirable to attain one performance target at the expense of another. On the other hand, an independent incentive scheme might convey the message that the different task dimensions are independent of each other, and therefore it is acceptable to attain only some of the performance targets.

Nonetheless, even though an independent incentive scheme may allow individuals an opportunity to earn reward without attaining all their performance targets, it does not necessarily mean that individuals given an independent incentive scheme will not attempt all performance targets. In fact, it is expected that most individuals will try to attain all their performance targets, as more bonuses are preferable to fewer bonuses. Individuals, however, are more likely to prioritize their performance targets when the opportunity presented by an independent incentive scheme is combined with *pressure* to prioritize, such as when their goals are very difficult. This potential role of goal difficulty will be discussed in the following section.

2.3. The level of goal difficulty and performance targets prioritization

In addition to performance incentive schemes, another variable that has been found to affect the effort-performance relationship significantly is the level of difficulty associated with the performance target, or goal level. Goal Setting Theory (GST, Locke and Latham 1990) proposes a positive relationship between goal level and task performance, often referred to as the "goal difficulty function". In fact, the goal difficulty function is considered to be one of the most robust findings in the motivation literature (Campbell 1984). There is also some evidence suggesting that the degree of goal difficulty influences an individual's pattern of attention allocation between task dimensions. For example, Wright, George, Farnsworth and McMahan (1993) found that individuals, who were highly committed to assigned difficult goals, were less likely to engage in extra-role activities (i.e. activities that were not goal relevant). The authors explained their results by arguing that when goals increased in difficulty, individuals' resources (e.g. time and attention) were taxed and as a result, individuals were pushed to make a trade-off between attending to role-prescribed activities and extra-role activities.

While subjects in Wright et al. (1993)'s study were given a multi-dimensional task, they were assigned only one performance target. The single-goal context might suggest to subjects that the extra-role task dimension was not considered important by the management and, therefore, they were more willing to focus their effort towards the goal-relevant task dimension. In other words, the lack of an explicit goal for the extra-role task dimension may have resulted in individuals assigning it a very low priority and, therefore, little attention to it. Gilliland and Landis (1992), in contrast, investigated the role of goal difficulty under a multiple-goal setting, by assigning subjects both quality-related and quantity-related performance targets in a task involving making stock portfolio recommendations. They found that, under the difficult task condition and when assigned an easy quantity goal, the quality performance of subjects also given a difficult quality goal was significantly higher than those who were given an easy quality goal. When subjects were assigned a difficult quantity goal, however, the quality performance did not differ between the difficult and easy goal conditions. Their results suggest that, in a multi-goal context, subjects' behaviour is affected not only by the level of difficulty of individual performance targets, but also by the *overall*, or *combined difficulty* of all performance targets. For example, a difficult quantity goal combined with a difficult quality goal may result in a very high level of overall difficulty, making it problematic for individuals to complete their task.

Further, subjects in Gilliland and Landis (1992)'s study who were assigned a difficult quality goal performed better when they were assigned an easy quantity goal than when they were assigned a difficult quantity goal. This result further suggests that, when faced with high overall goal difficulty (as a result of two difficult task goals), subjects seemed to have directed at least some of their effort away from the quality goal towards the difficult quantity goal. It is not clear, however, whether subjects in Gilliland and Landis (1992)'s study were attempting to prioritize their effort by focusing on their quantity goals or striving to adopt a "balanced" approach by achieving both quality and quantity goals simultaneously.

Another study that directly considered the effect of overall difficulty of multiple targets on performance is Erez et al. (1990). As discussed earlier, these researchers adopted a dual task framework where subjects were asked to perform two distinct tasks simultaneously. *Inter alia*, they found that subjects' ability to maintain an equal goal level-performance discrepancy between two tasks decreased with overall goal difficulty. This suggests that subjects might have been assigning different priorities to their two separate task goals when overall difficulty was high. The interpretation of Erez et al. (1990)'s finding, however, is limited by their task design, where one of the two tasks assigned to subjects in the difficult overall goal treatment was itself more difficult than the other task. Thus a subject's dual task performance could be driven by the inherently higher goal-performance discrepancy of one task, rather than reflecting the individual's approach to performance target prioritization.

While the previous studies do not provide conclusive evidence on the role of goal difficulty on performance target prioritization, they do suggest that individuals might find it hard to attain all targets simultaneously when faced with high overall goal difficulty (e.g. a combination of difficult targets associated with various task dimensions). On the other hand, if the multiple performance targets were easy, then individuals could potentially achieve all their multiple performance goals without having to explicitly consider assigning different priorities to different targets.

2.4. The interaction between goal difficulty and incentive schemes interdependency

In the current study, we propose an interactive effect of incentive scheme and goal difficulty on individuals' performance target prioritization. The interaction effects of incentive scheme and the level of goal difficulty on task performance have been well documented in previous studies. In particular, previous studies in uni-dimensional task contexts have consistently found that individuals will reject a difficult or unattainable performance target if it is associated with a bonus type goal contingent incentive system (e.g. Lee, Locke, and Phan 1997; Fatseas and Hirst 1992; Mowen, Middlemist and Luther 1981). When explaining their results, Mowen et al. (1981) argued that individuals reject the difficult goal under a goal-contingent incentive scheme because their effort will not be rewarded if the goal is not reached. Wright et al. (1993) further argue that goal-contingent incentive schemes have "negative utility" until performance reaches the specified goal level, because individuals have to incur the "cost" of expanding effort without receiving a corresponding extrinsic reward until the goal level has been reached. Consequently, individuals are more likely to reject a difficult goal under a bonus scheme.

We propose that within a multi-dimensional task context, the combination of a high level of overall goal difficulty and a goal-contingent incentive scheme may also result in the rejection of one or more of the performance targets. Unlike a single goal environment, however, if an individual "gives up" one of their multiple performance targets, attention can be potentially re-directed towards other performance targets. Indeed, in criticizing some of the goal setting theory research, Bandura (1997) suggests that individuals may be more willing to give up a difficult goal if they perceive that their effort could be more fruitfully employed. Importantly, when faced with difficult goals and given an independent incentive scheme, individuals who reject one or more performance targets and redirect their attention to other performance targets will have an opportunity to receive some reward, as failure to achieve performance against some targets will not preclude the receipt of a reward. On the other hand, in the case of individuals who receive a linked incentive scheme, they will perceive no benefit in prioritizing their performance targets in such a way, as their bonus payment is contingent upon a balanced approach to the overall task. As discussed earlier, unequal prioritization of performance targets is likely to result in individuals achieving different levels of performance on different task dimensions. Thus our first hypothesis is as follows:

> *H1: When faced with multiple performance targets, individuals who are given difficult performance targets and an independent incentive scheme will have the highest level of relative performance discrepancy between task dimensions, compared to those who receive easy performance targets and/or a linked incentive scheme.*

Furthermore, to the extent that all the multiple performance targets are associated with dimensions that are important to task completion, an "unbalanced approach" to the task (e.g. where some task dimensions are ignored or given very little attention) will result in lower overall task performance. Thus our second hypothesis is:

> *H2: When faced with multiple performance targets, individuals who are given difficult performance targets and an independent incentive scheme will have the lowest overall task performance compared to those who receive easy performance targets and/or linked incentive scheme.*

3. RESEARCH METHOD

3.1. Research Design

A 2x2 between-subject experimental design was employed to test the above hypotheses. The two independent variables were the type of incentive system (either an independent incentive system or a linked incentive system) and goal level (difficult or easy). The dependent variables were the relative performance discrepancy between two task dimensions (Accuracy and Average Solution Time), and overall task performance. The operationalisation of these variables will be discussed in more detail later.

3.2. Overview of Experiment

Subjects in the experiment assumed the role of a customer service consultant in a call centre of a fictitious Internet service provider. The experimental task involved a computer-based decoding task where subjects had to decode 3-digit numbers by performing a series of simple calculations (e.g. "add one to first and third digit", thus turning 123 into 224), then "translating" the answers into corresponding alphabets before submitting their answers. An example of the decoding task is included in Appendix A. The decoding task was an analogue for a call centre environment. Call centre consultants are often required to answer sets of generic customer enquiries, which involve solving simple problems according to standard procedures (similar to the transformation of numbers in the current task) and entering customer details into a database based on specific codes required by the systems (similar to the translation of numbers into alphabets and submitting the solutions).[5] For example, a customer might contact a call centre consultant with regard to changing a billing address. To respond to this request, a call centre consultant needs to follow some standard procedures (e.g. asking for passwords to establish customer identify), and then enter the relevant information and code into the computer system. At the same time, call centre consultants also face a number of performance measures such as the average length of call time and data entry accuracy (e.g. Cleveland and Mayben 2000).[6]

In the current experiment, subjects were required to process customer enquiries and enter their responses via a computer interface. Each "customer enquiry" was represented by a set of three 3-digit numbers, which appeared on the computer screen. Subjects were told to solve (i.e. decode) the customer enquiry by inputting their answers into the corresponding "customer solution box" on screen. Once the solution for the customer enquiry had been entered and submitted (by clicking a "submit" button), the screen was refreshed and a new customer enquiry appeared, and the process continued.

Subjects were given a 2.5-minute training session[7], followed by 5 four-minute experimental sessions (i.e. subjects had a total of 20 minutes to try to reach their performance targets)[8]. At the end of each experimental session subjects were shown a performance report on-screen containing information including the subjects' performance in previous and current sessions, their overall performance[9], performance

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[5] These types of work procedures are consistent with the authors' observations during their visits to a number of call centres in a telecommunication company.
[6] The context of a call centre was chosen because a call centre environment represents a typical situation where individual employees have to perform well on a variety of performance measures set out in their personal scorecards, such as call quality and average call time.
[7] Based on a pilot study, 2.5 minutes was found to be sufficient time for subjects to understand the task and to become familiar with the computer interface and controls.
[8] To avoid "end-game behaviour", subjects were not told how many experimental sessions they needed to complete. They were simply told that they had to complete "a number of" experimental sessions.
[9] As will be discussed later, subjects' incentive was tied to their overall performance, which is the average over all experimental trials.

targets, and whether their overall performance is meeting their targets. Subjects had the autonomy to spend as much time as they wished reading through this information, and continued to the next experimental trial only when they were ready (by clicking a "continue" button). The two task dimensions involved in the experimental task were Accuracy (a quality-type task dimension) and Average Solution Time (or AST, an efficiency-type task dimension). A screen shot of a typical performance report is shown in Appendix B.

3.3. Operationalisation of independent and dependent variables

3.3.1. Independent variable

Goal difficulty

The first independent variable was goal difficulty. Subjects were either assigned two difficult performance targets (i.e. a difficult Accuracy target and a difficult AST target) or two easy performance targets. The degree of goal difficulty assigned was based on a pilot study using the same task but without any incentive schemes or goal manipulation (i.e. based on do-your-best goals). Subjects in the difficult goal condition were given an Accuracy target of 87% or above and an AST of 46 seconds or faster (representing approximately the 90th percentile in the pilot study[10]). Subjects in the easy goal condition were given an Accuracy target of 51% or higher and AST of 81 seconds or lower (both representing the 10th percentile in the pilot study).

Type of incentive schemes

The second independent variable, type of incentive scheme, was operationalised by informing subjects that they would be compensated by either an independent reward scheme with two components, each associated with one dimension of their task ("independent incentive scheme" treatment) or one reward scheme that tied together the two dimensions of their task ("linked incentive scheme" treatment). Both incentive schemes represented goal-contingent bonus systems, where subjects could receive a bonus only if they reached or exceeded their assigned performance targets. If subjects managed to exceed their performance targets, they could also receive additional "variable-rate" compensation in additional to their bonus (discussed in detail below).[11]

Specifically, subjects in the ***independent incentive scheme*** treatment were told that their compensation would be based on two incentive reward components, one reward component based on their Accuracy performance, and another based on their AST performance. Subjects were further told that the two reward components were independent such that the compensation they could receive under the Accuracy reward component would not affect compensation that they could receive under the AST reward component, and vice versa. The total compensation subjects received at the end of the experiment would therefore be the sum of the compensation earned under each of the two components. Subjects under this scheme would receive either $10.80 or $3.60 bonus (depending on whether they were in the difficult goal treatment or easy goal treatment) if they attained their Accuracy target, and an additional $10.80

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[10] Based on the pilot study, we selected the level of performance closest to the 90th percentile and 10th percentile for the difficult goals and easy goals respectively (consistent with previous studies such as Knight, Durham and Locke 2001; Lee, Locke and Phan 1997).

or $3.60 if they attained their AST target. In addition, subjects would also receive 20 cents for every percentage point above their Accuracy target (which was measured as a percentage) and 20 cents for every second faster than their AST target (which was measured in seconds). The key features of independent scheme are summarized in Table 1.

To make the calculations easier subjects were also given two tables listing the amount of compensation they could receive at various levels of performance under each component[12]. An example of the independent incentive scheme table is shown in Appendix C.

[INSERT TABLE 1 HERE]

Subjects in the ***linked incentive scheme*** treatment were told that their compensation was based on an incentive scheme that linked their Accuracy performance to their AST performance, such that subjects must perform at specified levels of performance (as listed in a "payment table") for both task dimensions to receive their compensation. Subjects in this treatment received either $21.60 (difficult targets) or $7.20 (easy targets) if they simultaneously attained both their Accuracy and AST targets. Further, subjects would receive additional 40 cents for simultaneously

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[11] There are different types of bonus schemes, for example, a "one-off" bonus scheme where individuals receive a bonus when a target is achieved, or a "step-wise" bonus scheme where individuals receive a different level of bonus depending on which level of target they can achieve, or a bonus-plus-variable rate scheme similar to the one used in this study. The bonus-plus-variable rate type bonus scheme was used in the current study as it is one of the more common types of bonus scheme used in the previous literature (e.g. Lee et al. 1997; Wright 1989). Furthermore, the aim of the current study is to compare the effect of incentive schemes that encourage different prioritization behaviours; and a bonus-plus-variable rate scheme is more likely to provide a stronger test, as individuals pursuing a certain course of action will have an incentive to continue their effort beyond the performance targets.

[12] To make the incentive scheme easier to understand, subjects were not given the formula, but rather, they were only given a table listing the expected incentive payment associated with each level of performance (as shown in Appendix C).

achieving one percentage point exceeding their Accuracy target *and* one second faster than their AST target.[13] The key features of the linked scheme are summarized in Table 1. To facilitate incentive calculations, subjects were provided with a table listing the different level of performance and incentives that they could achieve. An example of the linked incentive scheme is shown in Appendix D. As can be seen in Table 1 and Appendix D, if a subject achieved Accuracy performance of 89% and AST performance of 41 seconds, the subject would receive $22.40. The subject would not receive $23.20 even though his/her AST performance was 41 seconds, because his/her Accuracy performance was below the required 91% associated with the reward level of $23.20. In other words, the subject must "balance" the two performance dimensions according to incentive table to achieve maximum incentive payment. A higher level of performance against one target but a lower level of performance against a second target will result in a lower incentive payment. If, for example, the subject lowered his/her AST to 42 seconds and increased his/her Accuracy performance to 90%, then he/she would earn $22.80 (an extra 40 cents). Furthermore, if a subject could not achieve either or both performance targets, then the subject would not receive any incentive payment.

[13] The incentive schemes were designed in such a way that the compensation corresponding to each level of performance was comparable across the different schemes. As a result, subjects in the linked incentive scheme treatment would receive twice the amount if they attained both their performance targets compared to those in the independent incentive scheme treatment (as the former had to attain both performance targets to receive their bonus.) Similarly, the "variable-rate" of the linked incentive scheme subjects was also twice that of the independent incentive scheme subject (40 cents vs. 20 cents).

3.3.2. Dependent variables

Relative performance discrepancy

Relative performance discrepancy refers to the relative difference between a subject's AST performance and his/her Accuracy performance. We compute relative performance discrepancy by using the following formula:

> Relative performance discrepancy (PD) =
> | (AST performance – AST mean)/standard deviation of AST performance – (Accuracy performance – Accuracy mean)/standard deviation of Accuracy performance |

One potential limitation of using PD as a proxy measure for performance target prioritization is that the differences in performance between two task dimensions may not represent how subjects allocated their attention between these two task dimensions. Consequently, in the post-test questionnaire we asked subjects to indicate the relative amount of attention they paid to the two performance targets, by allocating 100% between their Accuracy target and AST target. We found a significant and positive relationship between the level of attention allocated to the Accuracy target and subjects' Accuracy performance (r=0.217, p=0.036), as well as a negative and significant relationship between subjects' the level of attention allocated to AST target and AST performance (r=-0.248, p=0.016)[14]. This provides further confidence in the claim that the performance discrepancy measure does act as a surrogate for subjects' performance target prioritization decisions.

Overall task performance

Our second dependent variable is overall task performance. Overall task performance was measured by the aggregated number of correct customer enquiries ("correct enquiries") completed by the end of the five experimental trials. "Correct enquiries" was selected because it represents the overall performance of individuals in terms of processing the enquiries accurately and efficiently, thereby encompassing both task dimensions. Also, correct enquiries also represents the aggregated "good outputs" of the task, and is therefore likely to be the ultimate goal of an organization with respect to this task. Further, previous studies that have used decoding tasks in their research design often adopt similar measures (e.g. number of correctly coded answers) as their dependent variable (e.g. Moussa 2000; Chow 1983). The cumulative performance over the five experimental trials was used to allow subjects the opportunity to utilize their performance feedback to improve their performance over time. This is particularly important with our manipulation of goal difficulty, as goals are likely to affect performance only when combined with feedback (Locke and Latham 1990). Subjects in our experiment are likely to recognize how difficult their performance targets are only when they receive regular feedback indicating whether or not they are achieving their performance targets.

3.4. Research Subjects

A total of 108 undergraduate students (all volunteers) participated in the experiment[15]. All subjects were enrolled in either introductory or final-year management accounting courses at a major university. Twelve subjects answered manipulation check questions incorrectly and were later excluded from analysis, resulting in 96 useable data sets. Chi-square analysis reveals no significant differences in age, gender and work

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[14] For AST, the lower the number the shorter the average solution time and therefore the better the performance.

[15] Subjects were promised $3 flat rate plus up to $30 incentive payment depending on their task performance during the experiment. In addition, they also had a chance to win (on a random basis) one of three $50 bookshop coupons (to give further incentive to participate).

experience across the four treatment cells, indicating that the random allocation of subjects was successful.

3.5. Research Procedures

The experimental task was operationalised via a computer program. Before subjects entered the computer laboratory the program was loaded and treatment specifications (i.e. different target levels) were randomly set up on all computers. In addition, an instruction booklet, including details of the assigned incentive system, was placed next to each workstation, together with pencils and paper for working.

When subjects arrived, they were randomly allocated to sit in front of a workstation. Subjects were then asked to read through and sign the university ethics statement, after which they were given 15 minutes to read through the instruction booklet. The instruction booklet consisted of three parts. Part A provided an overview of the experimental procedure, including screen shots showing how a customer enquiry was to be processed. Part B detailed the definition of the two performance measures, as well as a screen shot displaying the format of the performance report. Finally, Part C explained the incentive scheme, including tables outlining the level of incentive associated with different levels of performance (refer to Appendix C and D). At the end of Part C, subjects were also asked to complete a "quiz" where they had to calculate the compensation for three fictitious people based on their performance. This quiz was designed to ensure that subjects could understand how their particular incentive scheme worked. Once the subjects had completed the quiz, the researcher checked their answers and if the answers were incorrect, explained the incentive schemes again on a one-to-one basis.[16] After all subjects had completed their quiz, they were asked to proceed to the training session. The two and a half minute training session was designed to allow subjects to familiarise themselves with the program[17]. Once the training session was complete, subjects commenced the actual experimental trials (5 four-minute trials).

At the end of the experiment, subjects were asked to complete a post-test questionnaire. The questionnaire included a number of manipulation check questions, as well as questions to collect demographic details. Once subjects had completed the questionnaire, they received a "receipt" to allow them to collect their incentive payment in the following week. The entire experimental session lasted approximately one hour.

3.6. Manipulation check and post-test measures

The post-test questionnaire included three manipulation check questions. The first question asked subjects to indicate whether they received an independent or linked incentive scheme. Twelve subjects either failed to answer this question or answered incorrectly and were excluded from the later analysis. The second and third questions asked subjects to indicate (on a 7-point scale) the degree of difficulty they experienced with their two performance targets. The level of difficulty reported by the high goal difficulty group for their Accuracy target was 5.00, which was significantly higher (p=0.00) than that reported by the low goal difficulty group (mean = 3.60). Similarly, the degree of difficulty for AST reported by the high goal

[16]Only a small minority of subjects answered the quiz questions incorrectly the first time.
[17]The difference in performance during the training session was not significantly different between treatment groups (p>0.1), suggesting that subjects' ability to complete the task did not differ between groups.

difficulty group (mean = 5.00) was also significantly (p=0.00) higher than that reported by the low goal difficulty group (mean = 3.92). This suggests that the manipulation of goal difficulty was successful.

In addition, as discussed earlier, subjects were asked to estimate the relative amount of attention paid to the two performance targets. Furthermore, subjects were also asked to indicate, on two five-point scales, the extent of their commitment to their Accuracy and AST targets.[18] Finally, subjects were asked to indicate the nature of their task strategy by indicating whether they concentrated mostly on the AST target, the Accuracy target, or used a balanced approach.

4. RESULTS

4.1. Hypothesis One

H1 predicts that individuals, who are given difficult performance targets and an independent incentive scheme, will have the highest level of relative performance discrepancy (PD) between task dimensions, compared to those who receive an easy performance targets and/or a linked incentive scheme. Table 2 presents the descriptive statistics for PD.

[INSERT TABLE 2 HERE]

As can be seen in Table 2, subjects in the independent/difficult condition had the highest level of PD (mean of 2.439) compared to subjects in the independent/easy

[18] Specifically, the two questions asked subjects to indicate whether they agreed with the statements "I am strongly committed to pursuing my Accuracy (AST) goal." The 5-point scales were anchored on (1=strong agree) and (7=strongly disagree), which is consistent with an earlier study by Klein et al. (2001).

treatment (mean=0.930), the linked/easy treatment (1.384) and the linked/difficult treatment (mean=1.340).

[INSERT TABLE 3 HERE]

The ANOVA analysis[19] in Table 3 (Panel A) shows a significant interaction effect (F=16.182, p=0.000), suggesting that the type of incentive scheme and the level of goal difficulty interacted to affect individuals' PD. Further, planned Bonferroni contrasts (refer to Table 3 Panel B) revealed the nature of the interaction with significant differences between the independent/difficult treatment and the other three treatments (F=25.950, p=0.000). Thus H1 was supported.

Table 3 Panel A also shows a significant main effect for goal difficulty (F=14.406, p=0.000). The significant main effect, however, seems to have been driven mostly by subjects in the two independent incentive scheme treatments, as the average PD of the linked/easy treatment was very similar to the average PD in the linked/difficult treatment (refer to descriptive statistics in Table 2). This assertion was supported by the statistically insignificant difference in PD between the two linked incentive scheme treatments using Scheffe's post-hoc test (refer to Table 3 Panel B).

[19] When analysing standardised performance discrepancy one case was found to be an outlier and was excluded from analysis. The ANOVA for percentile performance discrepancy was re-run after excluding the outlier and the result was qualitatively the same.

Thus overall, our result suggest that individuals are more likely to allocate their effort differently to different performance dimensions when they are given an independent incentive scheme, as well as difficult performance targets.[20]

4.2. Hypothesis Two

H2 predicts that the overall performance by subjects who receive difficult goals and an independent incentive scheme will be higher than subjects who are given easy goals and/or a linked incentive scheme. Table 4 shows the descriptive statistics for overall task performance represented by accumulated "number of correct enquiries", and Table 5 Panel A shows subjects' performance in each experimental trial. As can be seen from Table 4, the number of correct enquiries is lowest for the independent/difficult subjects (mean=9.500) compared to the other three treatments (means=14.652, 11.640 and 14.583). An overall ANOVA (with the five experimental trails as a within-subjects variable, goal difficulty and type of incentive scheme as between-subject variables) shows a significant between subjects interaction effect (F=18.896, p=0.000, refer to Table 5 Panel B). Further, a planned Bonferroni contrast reveals a significant difference between subjects who received independent incentive scheme and difficult goals, and the other three treatment groups (F=14.728, p=0.000). Thus H2 was supported.

[INSERT TABLE 4 HERE]

[INSERT TABLE 5 HERE]

[20] In addition to the use of PD as a measure of performance target prioritisation, we also analysed the result using another proxy measure, namely, relative percentile difference between the two task dimensions. Statistical result using this measure was qualitatively similar to those reported above.

Furthermore, Table 5 Panel B also shows significant within-subject effect (F=23.488, p=0.000, indicating that subject's performance improved over the 5 trials), as well as interaction between trials and the type of incentive scheme (F=4.450, p=0.002). Figure 1 depicts the between-trial performance, and shows that the performance of subjects given an independent incentive scheme (represented by the lines IE and ID) fluctuated between trials to a greater extent compared to those given a linked incentive scheme (lines LE and LD, which show consistent upward trends). This difference in performance trend may be the result of subjects in the independent scheme treatment having greater difficulties in deciding on an appropriate task strategy (to adopt a balanced approach, to focus on the Accuracy target or to focus on the AST target), and therefore less able to sustain consistent performance.

[INSERT FIGURE 1 HERE]

4.3. Further Analysis: Goal-performance relationship under different incentive schemes

Further analysis also reveals a very different goal-performance relationship under the two types of incentive schemes (refer Figure 2). Under the linked incentive scheme, overall task performance was higher for the difficult goal condition, and the difference is statistically significant (F=5.102, p=0.026, refer to Table 6). This result is consistent with GST, which posits a positive relationship between goal level and performance. Under the independent incentive scheme, however, Figure 2 shows a higher level of overall task performance for subjects given easy goals compared to those with difficult goals. This difference is again statistically significant (F=14.995, p=0.000). This inverse relationship between goal level and performance is inconsistent with the predictions of GST.

[INSERT FIGURE 2 HERE]

[INSERT TABLE 6 HERE]

One possible explanation for this unusual finding is that under an independent incentive scheme, subjects were asked to direct their effort towards two different goals. In contrast, under a linked incentive scheme, the fact that the two performance targets were tied together meant subjects were effectively asked to work towards one overall performance goal with two dimensions. Our results imply that under the latter situation, individuals behave in a way that is consistent with GST – a theory that has mostly been examined in the single goal context. Under the independent incentive scheme, however, individuals, when faced with multiple performance goals, were more likely to prioritize their performance targets when the overall goal difficulty was high, and to the extent that both performance goals were important for overall task completion, the positive goal-performance relationship did not eventuate. Of particular interest is the unequal allocation of attention by these subjects actually resulted in lower performance by subjects who received difficult goals.

4.4. Goal commitment and task strategy

4.4.1. Goal Commitment

As discussed earlier, we asked subjects to indicate their commitment to both their Accuracy target and AST target in the post test questionnaire. Goal commitment can be defined as "…the extension of effort, over time, towards the accomplishment of an original goal and emphasizes an unwillingness to abandon or to lower the original goal" (Wright et al. 1994: 796). An examination of goal commitment may therefore provide us with further insights into subjects' performance target prioritization process. For example, a low commitment to one performance target may imply that the subject has assigned it a lower priority. The descriptive statistics for goal commitment are summarized in Table 7.

[INSERT TABLE 7 HERE]

Overall, subjects were highly committed to their two performance targets (means of 3.66 and 3.38 (on a 5-point scale) for commitment to Accuracy and AST respectively). We conducted ANOVA for both commitment values, and found an overall significant difference for commitment to AST ($F=3.348$, $p=0.023$) but not commitment to Accuracy ($p>0.1$). In particular, Table 7 shows that the level of AST commitment is especially low for the independent/difficult treatment (mean=2.826), compared to the other three groups (mean=3.435, 3.600 and 3.625). A Scheffe's post-hoc contrast reveals that this difference is significant ($F=9.467$, $p=0.003$), implying that subjects in the independent/difficult condition, who had engaged in the highest degree of performance target prioritization, have reduced commitment to their AST target in favour of their Accuracy target.

To investigate this further, we examined the reported attention allocation scores of the 24 subjects in the independent/difficult treatment and found that 15 subjects reported allocating a greater level of attention to their Accuracy target, while only 7 subjects reported allocating a greater level of attention to their AST target, and 2 subjects reported allocating equal attention to both targets. This thus further supports the argument that the modal subject in the this treatment prioritized his/her performance targets by focusing on their Accuracy target at the expense of their AST performance.

Thus, while they were able to achieve a higher level of accuracy, overall performance suffered as they worked more slowly.

4.4.2. Task strategy

In addition to goal commitment, subjects were also asked to indicate the task strategy they used during the experiment, by specifying whether they concentrated mostly on their AST target, their Accuracy target, or adopted a "balanced approach" and focused on both targets simultaneously. The result (refer to Table 8) indicated that slightly more than half of the subjects under the linked scheme selected a balanced approach, while less than half of the subjects under the independent scheme did so. In particular, only 32% of subjects in the independent/difficult treatment used a balanced approach when completing their task. We then conducted Chi-square analysis by coding subjects' responses dichotomously (either focus on one target or adopted a balanced focus). Our analysis indicated that the strategy choice by the independent/difficult group was marginally significantly different from the other three groups (χ=3.275, p=0.07). Furthermore, the most popular strategy for the independent/difficult subjects was an Accuracy focus (45%), which was consistent with our finding relating to goal commitment and attention allocation scores discussed earlier, thus further supporting the notion that these subjects prioritized their performance targets by assigning greater priority to their Accuracy target.

[INSERT TABLE 8 HERE]

4.5. Analysis of monetary rewards

Finally, we analyzed the amount of monetary incentive rewarded to subjects (refer Table 9).

[INSERT TABLE 9 HERE]

Table 9 Panel A reveals a number of interesting results. Despite the significantly lower performance by subjects in the independent/difficult treatment, they did not receive the lowest level of monetary rewards. Rather, the lowest level of payment was made to subjects in the linked/difficult treatment, who were in fact the highest performers of the four groups.[21] In fact, while independent/easy and linked/difficult subjects achieved similar overall task performance, the former achieved a significantly higher level of incentive payment. To further investigate the "cost effectiveness" of the different incentive schemes, Table 9 Panel B reports the average payment per correct enquiry (a measure similar to "cost per unit of output"). As indicated in Table 9 Panel B, subjects in the linked/difficult treatment received the lowest level of payment per correct enquiry ($0.206), followed by subjects in the independent/difficult treatment ($0.685), linked/easy treatment ($1.043) and finally the independent/easy treatment ($1.342). This result is of concern as it implies that under the linked incentive scheme, high performers were not appropriately rewarded.

The performance-incentive relationship found in the current study may be partially due to the design of the experiment, where performance targets for the difficult goal condition were set relatively high. It is possible that a closer relation between performance and incentive payment will be obtained if the performance targets had been set at a lower level, and suggests that the degree of standard tightness is an important variable in a multiple performance measurement system.

5. DISCUSSION AND CONCLUSION

5.1. Results summary and contributions

In this study we have investigated the effect of different types of incentive schemes and the level of goal difficulty on task performance in a multi-dimensional task. We found that subjects who received an independent incentive scheme and high goal difficulty exhibited the highest level of performance discrepancy, as well as the lowest level of task performance. Further analysis of goal commitment and strategy selection showed that these subjects had a greater tendency to adopt an "unbalanced" task strategy by focusing on one performance dimension at the expense of another. In addition, our results also demonstrate that the positive goal-performance relationship predicted by GST does not always hold under a multi-dimensional task context. Our findings showed that under an independent incentive scheme, subjects actually performed better when given two easy goals compared to two difficult goals. Finally, we also found evidence that under the linked incentive scheme, individuals with higher performance did not receive corresponding higher financial incentives, suggesting that the incentive scheme was less equitable from the viewpoint of individual employees.

Our study contributes to the current research in three main ways. First, we have

[21] The average payment for subjects in the linked incentive/difficult goal treatment was $3, as none of the subjects managed to achieve both performance targets.

highlighted an important control issue that arises from the use of multiple performance measurement systems, namely individual employees' tendency to *prioritize performance targets*. Using discrepancies between target performance as a proxy for the way individuals allocate attention between performance targets, we showed that less-than-optimal prioritization can result in lower overall task performance. Our second contribution is our introduction of an *interdependency function* between performance measures as an important consideration when designing performance incentive schemes, and we demonstrated that incentive scheme interdependency had significant effects on task performance. Finally, we also contribute to GST by examining whether the goal difficulty-performance relationship continues to operate under multiple-goal context, thus shedding some light on the general applicability of GST in a multi-dimensional task.

Our results also have important implications for the design of multiple performance measurement systems. It has been argued that explicitly assigned weights may be inappropriate in a multi-dimensional task, as it may lead to "game-playing" by individuals, and that there is a likelihood that not all relevant task dimensions have been captured by the performance measures (Ittner et al. 2003; Bonner and Sprinkle 2002). Yet the absence of explicit weights may result in individuals allocating their attention to various performance aspects in a way that is inconsistent with the organization's objective, or "sub-optimal" in the sense of reducing overall task performance. Indeed, designers of multiple performance measurement systems such as the BSC need to consider the potential effect of "dysfunctional prioritization" where individuals' performance target prioritization is not congruent with organizations' strategic priorities.

Moreover, our study suggests that the choice of incentive schemes and performance targets not only affects the level of performance, but also has a "directional effect" influencing the way in which individuals allocate their attention in a multi-dimensional task. Management accountants should therefore take this into account when designing appropriate incentive schemes for a multi-dimensional task.

5.2. Limitations and future research avenues

Our study, however, has a number of limitations. First of all, we did not directly look at the actual process of prioritization – that is, how individuals actually allocated their attention between task dimensions. Instead we use performance discrepancy as a proxy for the prioritization process. The strong correlation between self-report attention allocation and task performance, however, gives us confidence that our proxy was appropriate. Second, we have only investigated two performance dimensions, in a relatively simple task setting. Future research can utilize more complex tasks that involve three or more task dimensions. We speculate that as the number of task dimensions increases, individuals may be even more likely to use elements of the performance management environment such as incentive schemes and performance targets as "cues" to decide how to prioritize various performance measures, placing further importance on the need to design such systems carefully.

In addition, future research can investigate other factors that may influence an individual's prioritization process. For example, in this study we highlighted the incentive scheme attribute of interdependency. Future research can investigate how other incentive scheme attributes may interact with incentive scheme interdependency to influence performance and prioritization, such as the timing of incentive payment, and other financial and non-financial attributes of incentive schemes as proposed by Bonner et al. (2000), for example, the use of a quota scheme compared to a piece rate scheme.

Another research avenue relates to the effect of multiple goals on task performance. Our result suggests that propositions from traditional GST do not always apply under multi-dimensional task settings. Future research can investigate other goal attributes and their relations to task performance under multi-dimensional tasks, such as goal specificity and goal commitment.

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Table 1: Formula for the two types of incentive schemes

<table>
<tr><th>Independent incentive scheme</th><th>Linked incentive scheme</th></tr>
<tr><td>Under "Accuracy component":
If $X_{Accuracy} \geq T_{Accuracy}$, $P_{Accuracy} = (X_{Acurracy} - T_{Accuracy})*0.2 + B_{Independent}$
If $X_{Accuracy} < T_{Accuracy}$, $P_{Accuracy} = 0$

Under "AST component"*:
If $X_{AST} \leq T_{AST}$, $P_{AST} = (T_{AST} - X_{AST}) * 0.2 + B_{Independent}$
If $X_{AST} > T_{AST}$, $P_{AST} = 0$

Total payment to subjects under an independent scheme is:
$P_{Independent} = P_{Accuracy} + P_{AST}$</td><td>If $X_{Accuracy} \geq T_{Accuracy}$ AND $X_{AST} \leq T_{AST}$, then:

$P_{Linked} = (X_{Accuracy} - T_{Accuracy}) * 0.4 + B_{Linked}$, or
$P_{Linked} = (T_{AST} - X_{AST}) * 0.4 + B_{Linked}$
} Whichever is lower

If $X_{Accuracy} < T_{Accuracy}$ OR $T_{AST} > X_{AST}$, OR both, then:
$P_{Linked} = 0$</td></tr>
<tr><td colspan="2">Where:
P_{AST}, $P_{Accuracy}$ = Payment, in dollars, under each reward component
$P_{Independent}$, P_{Linked} = Payment, in dollars, under independent, linked incentive scheme
X_{AST}, $X_{Accuracy}$ = AST performance (in seconds), and Accuracy performance (in %)
T_{AST}, $T_{Accuracy}$ = AST target (in seconds), and Accuracy target (in seconds)
$B_{Independent}$ = bonus payment (independent scheme), which was $3.60 for easy goal, and $10.80 for difficult goal
B_{Linked} = bonus payment (linked scheme), which was $7.20 for easy goal, and $21.60 for difficult goal</td></tr>
</table>

*As AST is measured in seconds, the lower the value (i.e. shorter Average Solution Time), the better the performance. Incentive payment was therefore awarded if subjects' AST fell below the target AST

Table 2: Descriptive Statistics for Performance Discrepancy

	Independent Incentive Scheme	Linked Incentive Scheme	Total
Easy Goals	0.930 *(0.715)* n = 23	1.384 *(0.943)* n = 25	1.166 *(0.864)* n = 48
Difficult Goals	2.439 *(1.279)* n = 24	1.340 *(0.723)* n = 24	1.890 *(1.168)* n = 48
Total	1.701 *(1.282)* n = 47	1.363 *(0.834)* n = 49	1.528 *(1.085)* n = 96

Table 3: Hypothesis Analysis

Panel A: ANOVA

	MS	d.f.	F	P
Incentive scheme	2.492	1	2.788	0.098
Goal Difficulty	12.879	1	14.406	0.000
Incentive * Difficulty	14.467	1	16.182	0.000
Error	0.894	92		

Panel B: Contrasts*

	MS	d.f.	F	p
Bonferroni planned contrast				
Independent incentive scheme/difficult goals vs. other treatments	20.419	1	25.950	0.000
Scheffe's Post-hoc contrast				
Linked incentive scheme/easy goal vs. linked incentive scheme/difficult goal	0.024	1	0.030	>0.1

*The contrasts were analyzed after excluding the outlier as discussed in footnote 11.

Table 4: Descriptive Statistics for Overall Task Performance (Accumulated Number of Correct Enquiries)

	Independent Incentive Scheme	**Linked Incentive Scheme**	**Total**
Easy Goals	14.652 *(3.880)* n = 23	11.640 *(4.061)* n = 25	13.087 *(4.217)* n = 48
Difficult Goals	9.500 *(5.158)* n = 24	14.583 *(4.995)* n = 24	12.042 *(5.642)* n = 48
Total	12.021 *(5.223)* n = 47	13.082 *(4.734)* n = 49	12.562 *(4.982)* n = 96

Table 5: Trial by Trial analysis of Number of Correct Enquiries

Panel A: Trial-by-Trial Descriptive Statistics

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average
Indep/Easy	2.348 *(1.112)*	3.000 *(1.044)*	2.826 *(0.937)*	3.348 *(1.335)*	3.130 *(0.968)*	2.930 *(0.776)*
Indep/Diff	1.500 *(1.216)*	2.167 *(1.167)*	1.875 *(1.262)*	1.750 *(1.359)*	2.208 *(1.560)*	1.900 *(1.032)*
Linked/Easy	1.280 *(0.843)*	2.000 *(1.354)*	2.400 *(1.190)*	2.840 *(1.281)*	3.120 *(1.301)*	2.328 *(0.812)*
Linked/Diff	2.042 *(1.233)*	2.917 *(1.139)*	2.833 *(1.274)*	3.167 *(1.494)*	3.625 *(1.345)*	2.917 *(0.999)*
Average	1.781 *(1.172)*	2.510 *(1.248)*	2.479 *(1.222)*	2.771 *(1.483)*	3.021 *(1.392)*	2.513 *(0.996)*

Panel B: ANOVA Table

	MS	d.f.	F	P
Between (Treatment)				
Incentive scheme	25.716	1	1.237	0.269
Goal Difficulty	29.248	1	1.407	0.239
Incentive * Difficulty	392.882	1	18.896	0.000
Error	20.791	92		
Within (Trials)				
Trials	20.318	4	23.488	0.000
Trials * Incentive	3.849	4	4.450	0.002
Trial * Difficulty	1.643	4	1.900	0.110
Trial * Incentive * Difficulty	0.303	4	0.351	0.843
Error	0.865	368		

Table 6: Further Analysis – Scheffe's post-hoc contrasts on overall task performance (number of correct enquiries)

	MS	d.f	F	p
Goal-performance relationship under linked incentive scheme				
Linked incentive scheme/easy goal vs. Linked incentive scheme/difficult goal	106.080	1	5.102	0.026
Goal-performance relationship under independent incentive scheme				
Independent incentive scheme/easy goals vs. Independent incentive scheme/easy goal	311.761	1	14.995	0.000

Table 7: Goal Commitment*

Panel A Descriptive Statistics for Goal Commitment

	Independent Incentive Scheme		**Linked Incentive Scheme**		**Total**	
Commitment to:	**Accuracy goal**	**AST goal**	**Accuracy goal**	**AST goal**	**Accuracy goal**	**AST goal**
Easy Goals	3.652 *(1.071)*	3.435 *(0.992)*	3.680 *(0.802)*	3.600 *(0.816)*	3.667 *(0.930)*	3.521 *(0.899)*
Difficult Goals	3.870 *(1.180)*	2.826 *(1.193)*	3.458 *(0.977)*	3.625 *(0.924)*	3.660 *(1.089)*	3.234 *(1.127)*
Total	3.761 *(1.119)*	3.130 *(1.128)*	3.571 *(0.890)*	3.162 *(0.862)*	3.663 *(1.006)*	3.379 *(1.023)*

* Goal commitment was measured on 5-point scales, with higher numbers indicating higher commitment.

Table 8: Task Strategy

	Focus on one target		Subtotal	Balanced approach	Total
	Focus on Accuracy	Focus on AST			
Independent/ Easy	6 *(26%)*	6 *(26%)*	12 *(52%)*	11 *(48%)*	23 *(100%)*
Independent/ Difficult	10 *(45%)*	5 *(23%)*	15 *(68%)*	7 *(32%)*	22 *(100%)*
Linked/ Easy	6 *(26%)*	5 *(22%)*	11 *(48%)*	12 *(52%)*	23 *(100%)*
Linked/ Difficult	5 *(21%)*	6 *(25%)*	11 *(46%)*	13 *(54%)*	24 *(100%)*
Total	27 *(29%)*	22 *(24%)*	49 *(53%)*	43 *(47%)*	92* *(100%)*

*2 subjects from the independent/difficult treatment and 2 subjects in the linked/easy treatment group did not complete the strategy question.

Table 9: Monetary incentives awarded to subjects

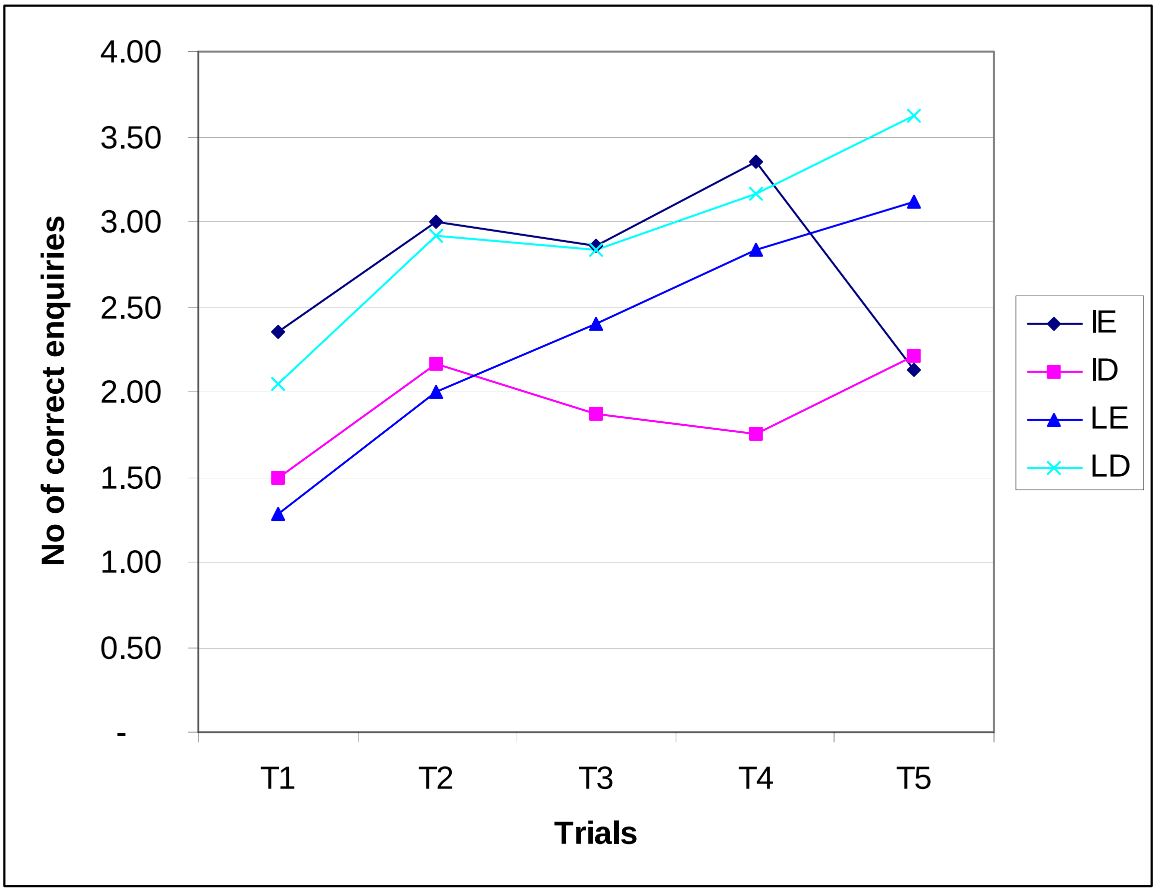
Panel A: Descriptive statistics on monetary rewards

	Independent Incentive Scheme ($)	**Linked Incentive Scheme ($)**	**Total ($)**
Easy Goals	19.670 *(4.179)* n = 23	12.136 *(6.602)* n = 25	15.746 *(6.700)* n = 48
Difficult Goals	6.508 *(5.630)* n = 24	3.000 *(0.000)* n = 24	4.754 *(4.322)* n = 48
Total	12.949 *(8.271)* n = 47	7.661 *(6.564)* n = 49	10.250 *(7.872)* n = 96

Panel B: Average payment per correct customer enquiry

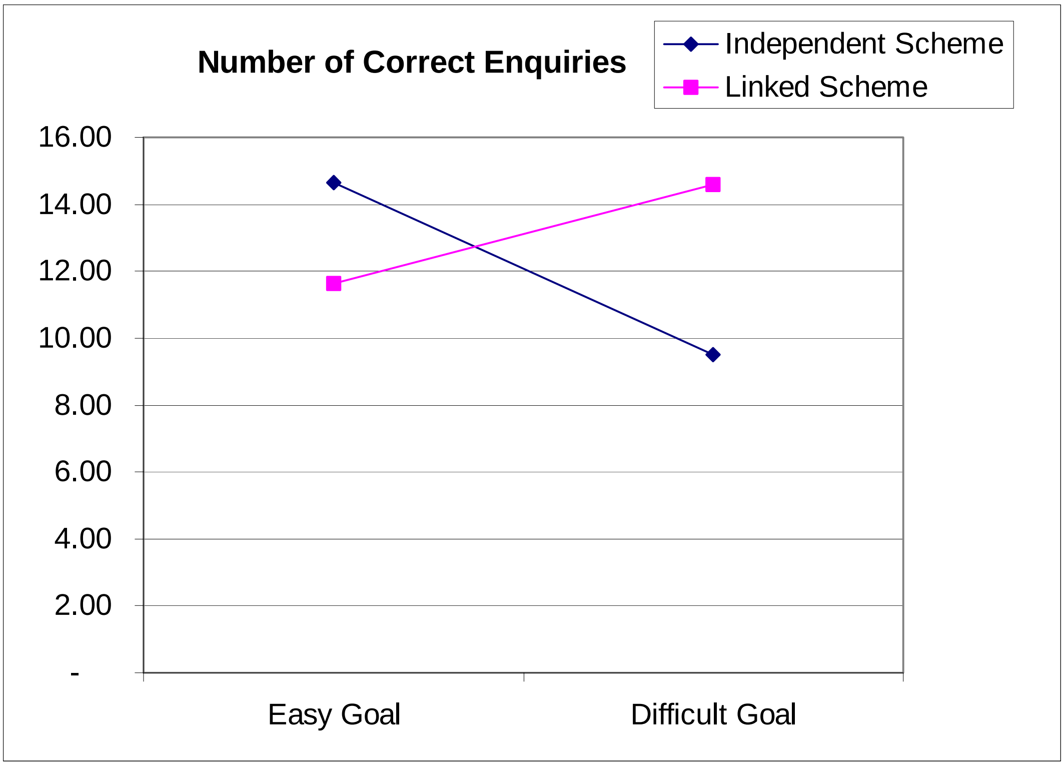
	Independent Incentive Scheme ($)	**Linked Incentive Scheme ($)**
Easy Goals	1.342	1.043
Difficult Goals	0.685	0.206

Figure 2: Task performance over the five experimental trials

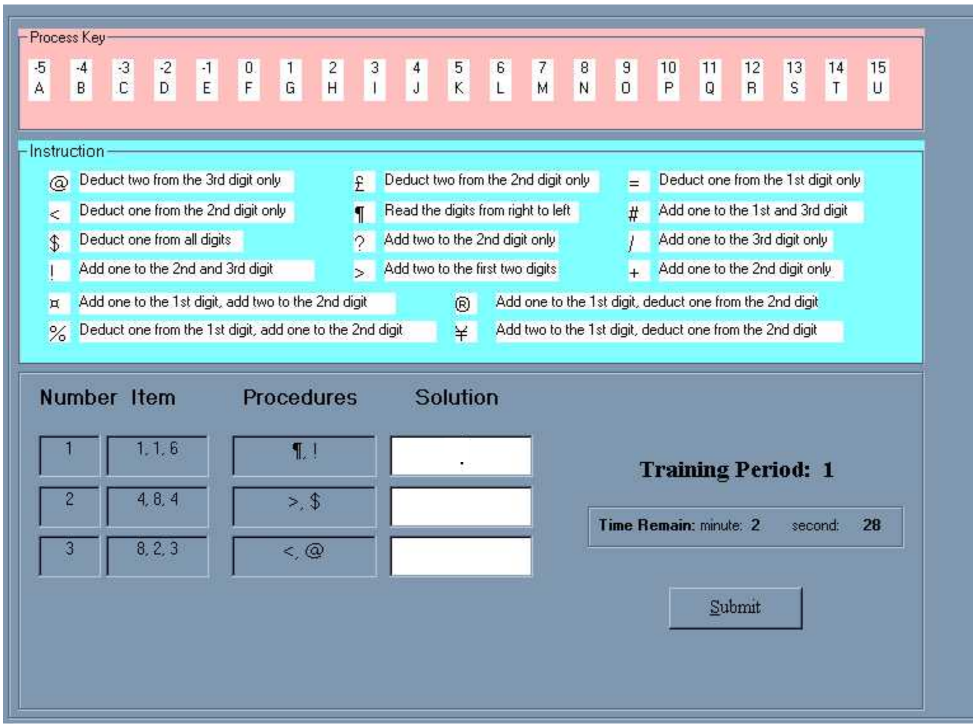


IE = independent incentive scheme/easy goal
ID = independent incentive scheme/difficult goal
LE = linked incentive scheme/easy goal
LD = linked incentive scheme/difficult goal
T1, T2…T5 = trial 1, trial 2…trial 5

Figure 1: Interaction Effect of Overall Task Performance



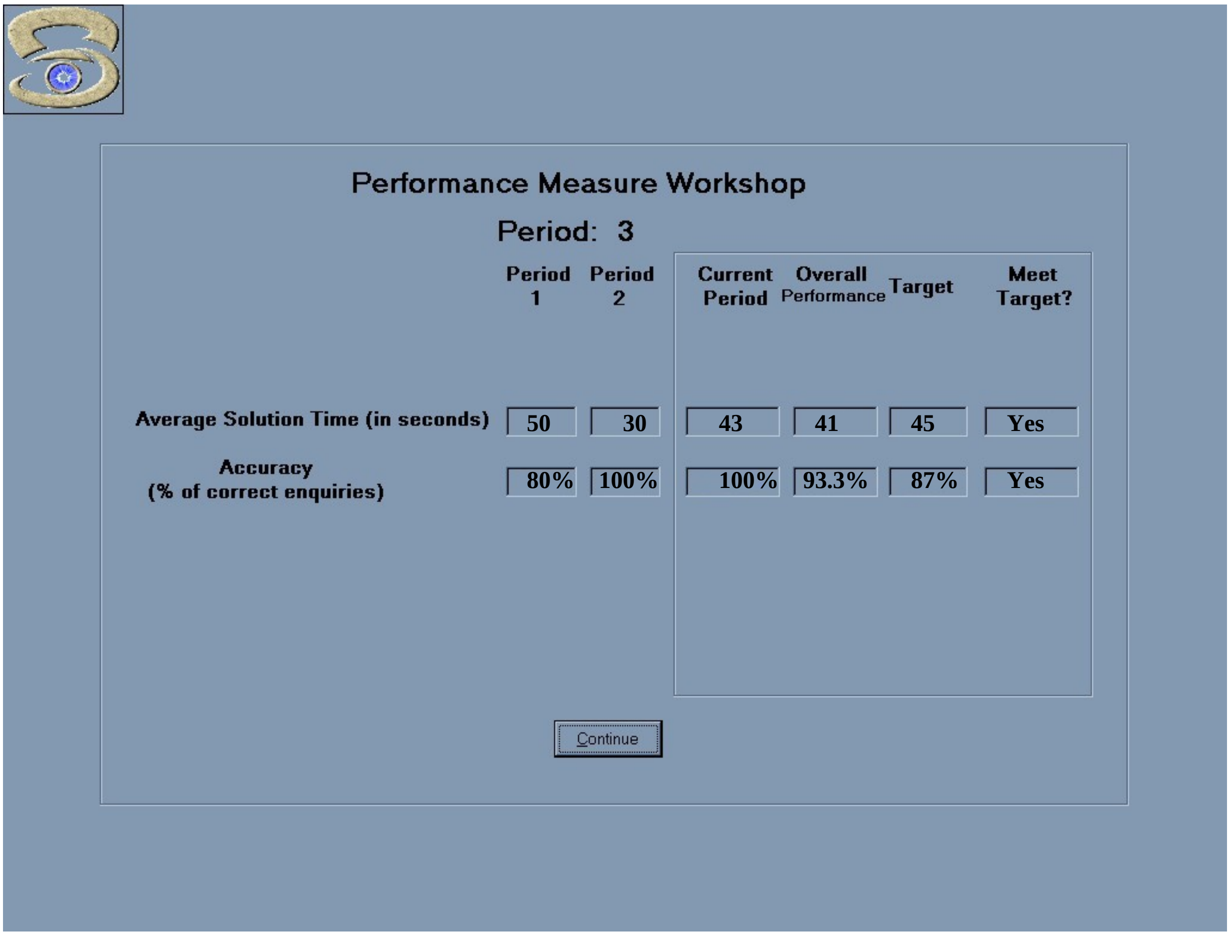
Appendix A: Screen shot of Customer Enquiry Processing Input Screen (Training Period)



Solution for the above customer enquiry is:

Item 1 = LHH
Item 2 = KOI
Item 3 = NGG

Appendix B: Screen shot of Performance Report (Difficult goal)



Appendix C: Independent Incentive Schemes (Difficult goal)

Your overall Accuracy performance	What you will get (in cents):
86% or lower	**0**
87%	**1080**
88%	1100
89%	**1120**
90%	1140
91%	**1160**
92%	1180
93%	**1200**
94%	1220
95%	**1240**
96%	1260
97%	**1280**
98%	1300
99%	**1320**
100%	1340

Your overall AST performance	What you will get (in cents):
46 seconds or higher (slower)	**0**
45	**1080**
44	1100
43	**1120**
42	1140
41	**1160**
40	1180
39	**1200**
38	1220
37	**1240**
36	1260
35	**1280**
34	1300
33	**1320**
32	1340
and so on…	

For example, if an individual achieved 89% Accuracy and 40 seconds AST, the total compensation will be 1120+1180 = 2300 cents ($23).

Appendix D: Linked Incentive Schemes (Easy goal)

Your overall AST performance		Your overall Accuracy performance	What you will get (in cents):
Higher (slower) than 81 seconds AST or lower than 51% Accuracy			**0**
81	**AND**	**51%**	**720**
80	AND	52%	760
79	**AND**	**53%**	**800**
78	AND	54%	840
77	**AND**	**55%**	**880**
76	AND	56%	920
75	**AND**	**57%**	**960**
74	AND	58%	1000
73	**AND**	**59%**	**1040**
72	AND	60%	1080
71	**AND**	**61%**	**1120**
70	AND	62%	1160
69	**AND**	**63%**	**1200**
68	AND	64%	1240
67	**AND**	**65%**	**1280**
66	AND	66%	1320
65	**AND**	**67%**	**1360**
64	AND	68%	1400
63	**AND**	**69%**	**1440**
62	AND	70%	1480
61	**AND**	**71%**	**1520**
60	AND	72%	1560
59	**AND**	**73%**	**1600**
58	AND	74%	1640
57	**AND**	**75%**	**1680**
56	AND	76%	1720
55	**AND**	**77%**	**1760**
54	AND	78%	1800
53	**AND**	**79%**	**1840**
52	AND	80%	1880
51	**AND**	**81%**	**1920**
50	AND	82%	1960
49	**AND**	**83%**	**2000**
48	AND	84%	2040
47	**AND**	**85%**	**2080**
46	AND	86%	2120
45	**AND**	**87%**	**2160**
44	AND	88%	2200
43	**AND**	**89%**	**2240**
42	AND	90%	2280
41	**AND**	**91%**	**2320**
40	AND	92%	2360
39	**AND**	**93%**	**2400**
38	AND	94%	2440
37	**AND**	**95%**	**2480**

For example, if an individual achieved 81% Accuracy and 45 seconds AST, the total compensation will be 1920 cents ($19.20).