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DISENTANGLING THE EFFECTS OF GOAL DIFFICULTY AND SPECIFICITY: NORMATIVE CALIBRATION AND SELF-REGULATORY PROCESSES

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DISENTANGLING THE EFFECTS OF GOAL DIFFICULTY AND SPECIFICITY: NORMATIVE CALIBRATION AND SELF-REGULATORY PROCESSES

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ABSTRACT

DISENTANGLING THE EFFECTS OF GOAL DIFFICULTY AND SPECIFICITY: NORMATIVE CALIBRATION AND SELF-REGULATORY PROCESSES

By

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This study examines the effects of goal difficulty and specificity as conceptualized in goal setting theory (Locke & Latham, 1990a). Three dominant self-regulation theories are reviewed first. Then, a close examination of experimental design assumptions in goal setting theory is undertaken. This is followed by a discussion of goal setting theory's current explanation of the effects of goal difficulty and specificity, which is integrated with the self-regulation literature. The results of the present study suggest that there is still much to learn about the effects of attributes of goals on task performance as the results do not follow predictions derived from goal setting theory. Implications of present findings for future research are discussed.

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INTRODUCTION

Goal Setting Theory (GST) has been one of the most researched theories in industrial/organizational psychology, and the effects of setting goals have been one of the most valuable applications of industrial/organizational psychology knowledge used in organizations (Locke & Latham, 1990a). The two most commonly investigated findings in GST deal with the relation between attributes of goals and task performance. One finding is that there is a linear relationship between the difficulty of goals and task performance such that more difficult goals lead to higher task performance (Locke & Bryan, 1967). A second finding is that specific, difficult goals lead to higher task performance than vague, difficult goals (e.g., "do your best"; Locke, Shaw, Saari, & Latham, 1981). However, despite the fact that the effects of setting goals have been replicated in numerous laboratory and field experiments (for a review see Latham & Locke, 1991; Locke & Latham, 1990b; Locke & Latham, 2002), goal setting research has not addressed well the underlying mechanisms that account for these effects. This study will closely examine and elaborate the explanation offered by GST on why specific, difficult goals lead to better task performance than vague, difficult goals.

The current explanation as to why specific, difficult goals lead to better task performance than vague, difficult goals rest on goal specificity (Locke & Latham, 1985). For GST, this is a natural explanation as goal difficulty may potentially be equal across the two conditions (see Locke & Latham, 1990a, pp. 29-31), and therefore, goal specificity must be responsible for the effect. However, GST is not clear about how goal specificity influences the motivational process. In fact, the large majority of goal setting

studies have only investigated the simple effect between specific, difficult goals and vague, difficult goals, while only a handful of studies have attempted to tease apart the effects of goal difficulty and goal specificity on process variables (e.g., personal goal setting) and task performance (e.g., Locke, Chah, Harrison, & Lustgarten, 1989).

The purpose of the present study is to disentangle the effects of goal difficulty and goal specificity and to better articulate how goal difficulty and goal specificity exhibit unique and interactive effects on the self-regulatory process that can account for effects on task performance. Since GST is one among a class of self-regulatory models, a brief overview of human self-regulatory systems is provided first, followed by more detailed analyses of three dominant self-regulatory theories -- Social Cognitive Theory (SCT), Control Theory (CT), and GST – to establish the theoretical foundation. Moreover, given that GST is an inductive theory, it is important to closely examine the experimental paradigm that has been most frequently utilized and its design assumptions because of the possible role it plays in the explanation as to why specific, difficult goals lead to better task performance than vague, difficult goals. Thus, after discussing the properties of three dominant self-regulatory theories, a close consideration of GST experimental design assumptions is undertaken. Finally, an integrated model and an alternative explanation as to why specific, difficult goals lead to better task performance than vague, difficult goals are offered.

Theoretical Foundation

Self-Regulation Theories in General

There are many theories that share the same self-regulatory elements, and hence, these theories have come to be labeled as theories of self-regulation (Karoly, 1993).

Some of the self-regulation theories include SCT, CT, and GST. Generally, the self-regulatory framework is composed of several key components. First, an individual sets a goal that she would like to achieve. Then, the individual takes action (i.e., behaves) to achieve that goal. A reiterative process is set into place by receiving feedback (e.g., knowledge of score information) regarding the effects of one's behavior (e.g., task performance). Then, the individual examines the discrepancy between his goal and the feedback information. This is followed by a reaction to the discrepancy where the individual assesses his satisfaction with the current performance level. The reactions lead to a reevaluation of the current goal and the current goal is adjusted to be higher, lower, or kept at the current level, while effort is adjusted accordingly as well. Finally, when the individual is given another chance of taking action (e.g., performing on a given task) the self-regulatory process begins anew.

The important things to note from the self-regulatory process is that an individual needs to have goals relevant to particular behaviors (e.g., task performance) and needs to receive feedback on those particular behaviors in order for the goals to affect future such behaviors. The opportunity to have multiple instances to exhibit behaviors is something that is stressed in the three self-regulatory theories discussed below.

Social Cognitive Theory

SCT states that perceived future events are utilized as present motivators and regulators of behavior (e.g., task performance; Bandura, 1991). The self-regulatory process is described by three phases. Self-observation, also known as the self-monitoring sub-function, is the initial phase that provides information for the later two phases such as providing realistic information for setting goals and evaluating one's progress toward

those goals. Two factors that affect self-observation are the temporal proximity of feedback and how informative the outcome feedback is (Bandura, 1991).

Self-evaluation, also known as the judgmental sub-function, is the process of comparing information obtained in the self-observation phase to personal goals or external standards. It is important to note that three pieces of information are required to evaluate one's own performance: the attained performance level (i.e., receiving informative feedback), one's personal standards, and the performance of others (Bandura, 1991). These three pieces of information are best explained by Bandura's (1991) example:

> "For example, a student who achieves a score of 115 points on an examination, and whose aspiration is to be in the upper 10% of a certain group, would have no basis for meaningful self-appraisal without knowing how others have performed" (p.254).

The last phase of the self-regulation process in SCT is self-reaction. In the task performance domain of goal setting studies, performance standards regulate task performance by deploying self-incentives to reward satisfactory task performance. In other words, people are motivated by the anticipated satisfaction of the goals that they desire. Bandura (1991) argues that motivational effects come from the evaluation of one's own behavior and not the goals that people set. Furthermore, in order to provide a basis for self-reactive influences, two conditions must be satisfied. The first condition is that if a goal is adopted, then one needs to know how one is doing. The second condition is that if one knows how one is doing, then one needs to have a goal. Simply stated, self-

reactive influences will have a motivational impact if and only if one has adopted a goal and one knows how one is doing (i.e., performing).

Self-efficacy, one's beliefs regarding one's capabilities to perform on a given task, is central to the self-regulatory process described in SCT (Bandura, 1991). Generally, those who are more self-efficacious will set higher goals and be committed to these goals (Wood & Bandura, 1989). Furthermore, performance discrepancies are interpreted differently depending on the level of one's self-efficacy. If one is of low self-efficacy, then one generally gives up in the face of failure. However, if one is of high self-efficacy, then performance discrepancies are met with more exerted effort (Bandura & Cervone, 1986). Additionally, self-efficacy is construed as a dynamic construct that is updated as experience is acquired and information is updated (Gist & Mitchell, 1992). The role of social comparison, such as that induced by normative information, can have an effect on self-efficacy, which in turn, affects task performance (Bandura, 1991).

To summarize, SCT of self-regulation requires multiple opportunities to perform in order for the three self-regulatory sub-functions to be useful. The crucial components of this self-regulatory system are the availability of feedback information and performance standards. Feedback information is used in the self-monitoring sub-function of SCT, while performance standards are used in the judgmental sub-function of SCT. Both, feedback information and performance standards, are required to provide a basis for self-reactive influences.

Control Theory

CT details the process of self-regulation via a negative feedback loop (Miller, Galanter, & Pribram, 1960; Carver & Scheier, 1982; Carver & Scheier, 1990).

Generally, it is conceived that there is an input which is compared to some standard, either externally or internally set. An output (i.e., a behavior) is produced which is aimed at reducing the discrepancy between the standard and task performance. This process iterates until the discrepancy between task performance and the standard has been eliminated. Once a discrepancy is eliminated, it is proposed that an individual can focus her attention on other goals (Carver & Scheier, 1998). That is, in this conceptualization, it can be considered that there also exists a positive feedback loop such that once a goal is achieved for one task, the individual moves on to another task. Finally, the negative feedback loop can be operative at various levels of the goal hierarchy (Carver & Scheier, 1982).

If the individual continually fails to reduce the performance discrepancy, then the individual will tend to disengage from the task (Carver & Scheier, 1981). This is a somewhat different prediction from SCT since one's disengagement from a task in SCT depends on self-efficacy. If one's self-efficacy is high, then, in the presence of a performance discrepancy, the individual will exert more effort to perform better. However, if one is of low self-efficacy, then one will tend to disengage from the task.

The point of convergence of CT with SCT is that it includes assigned or personal goals and feedback is necessary in order to adjust action (i.e., task performance). Again, this is another example of a self-regulatory system where multiple opportunities, feedback, and performance standards are necessary to affect task performance.

Goal Setting Theory

As noted earlier, the formulation of GST was most clearly stated in Locke and Latham (1990) when they summarized the research findings of hundreds of goal setting

studies. The basic tenet of the theory is that goals lead to action (e.g., task performance). Furthermore, it is stated that the attributes of goals have differential effects on task performance (Austin & Vancouver, 1996). The two most researched attributes of goals have been goal difficulty and goal specificity, and there are two main findings from goal setting experiments that have been replicated numerous times (Locke & Latham, 1990a). First, goals that are high in difficulty for the given task lead to better task performance than goals that are of easy goal difficulty. Meta-analytic findings indicate that the effect size (*d*) is about .58 (Wood, Mento, & Locke, 1987). The second common finding in GST experiments is that goals of high specificity and difficulty (e.g., precisely stated quantitative goals) lead to higher task performance than goals of high difficulty but low specificity (e.g., 'do your best'). A meta-analysis of this common finding indicates that the effect size is around .43 (Wood et al., 1987).

Given that these findings relate to goals that are assigned to individuals, the process of how the assigned goals affect task performance is the remaining part of GST. The assignment of goals affects personal goals that are set by individuals, which, in turn, affect task performance. That is, the effect of an assigned goal on task performance is mediated by personal goals. In addition, GST stipulates that in the presence of feedback, which is simply knowledge of score, the effect of goals on task performance is stronger than in the absence of feedback. Hence, feedback moderates the relationship between goals and task performance. It needs to be noted that in most goal setting experiments that the high goal difficulty and specificity group receives feedback in the form of actual task performance results, whereas the high goal difficulty and low specificity group either does not receive any feedback regarding task performance results or receives feedback on

task performance results where each performance trial is of a varying length as compared to previous and future performance trials. Notice that this experimental design element is inconsistent within a self-regulatory framework, because in order to provide necessary elements of self-regulation both goals and clear feedback information need to be available to the individual (Bandura, 1991).

Two other variables that moderate the relationship between goals and task performance are goal commitment and task complexity. Goal commitment, from the earliest goal setting studies, has been proposed to be a moderator of goal difficulty and task performance. A meta-analysis has shown that this moderation effect explained about 3% of the variance in task performance (Donovan & Radosevich, 1998). This should not be considered to be a trivial amount of variance explained given that it is an interaction effect. The importance of a significant interaction is that main effects cannot be interpreted without considering the interaction. Goal specificity has been proposed and demonstrated to be a determinant of goal commitment (Hollenbeck & Klein, 1987; Wright & Kacmar, 1994). Wright and Kacmar (1994) demonstrated that specific goals had significantly higher goal commitment than non-specific goals.

In terms of task complexity, it has been demonstrated that the effects of level of goal difficulty on task performance is stronger when tasks of a simple nature are utilized. However, this does not mean that the non-significant relationships are found on more complex task. On the contrary, the effect sizes are still in the medium range: $d = .41$ when comparing specific, difficult goals versus vague, difficult goals (Wood et al., 1987). The effect size on tasks that are less complex is $d = .77$ (Wood et al., 1987).

Finally, GST includes self-efficacy as an important process variable in linking assigned goals to task performance. The theory states that assigned goals will affect self-efficacy, which in turn, affects personal goals and task performance (Locke & Latham, 1990a). The inclusion of self-efficacy as an important variable in the model links GST with SCT.

To summarize, GST incorporates a self-regulatory framework in that it contains the necessary elements (e.g., feedback) of self-regulation and proposes relationships with key self-regulatory processes (e.g., personal goals). However, goal setting studies have consistently treated specific, difficult goal conditions differently from vague, difficult goal conditions in that only the former received clear score information (i.e., feedback). Feedback information is an important design element in self-regulation as it is expressed in all three theories of self-regulation that both feedback and goals are necessary for self-regulation to affect behaviors (e.g., task performance).

Recap of Self-Regulation Theories

SCT, CT, and GST all contain similar components of the self-regulatory process. That is, all include some conceptualization of a goal, discuss the importance of feedback, and discuss the adjustment of personal goals to increase task performance. The following section focuses in on an examination of the design assumptions that have been utilized in GST. Again, the design assumptions are of utmost importance to GST as the results from experiments have built the theory. If there are problematic or questionable design assumptions, then the processes and explanations offered by GST come into question.

Critique of Goal Setting Experiments

GST to its authors is a motivational technique that can be used to increase task performance (Bryan & Locke, 1967). However, GST is an inductive theory which implies that the results of experiments guided theoretical propositions. That is, the theoretical propositions offered by GST were built experiment by experiment. In fact, the authors of GST, Locke and Latham (1990), most completely described the theoretical propositions of the theory after about 25 years of intensive research in this area, although excluding the research that was conducted since the beginning of the twentieth century (e.g., Taylor, 1911; Lewin, Dembo, Festinger, & Sears, 1944). Given that GST was built from the ground up, it is important to examine the design assumptions that have been utilized to build the theory because the experimental results will have direct implications for the theoretical propositions and explanations of GST. If the designs of goal setting experiments are not carefully thought out, then the common effects that are found in GST could be a result of the design assumptions rather than the theoretical propositions and explanations espoused in GST. Given that, one of its authors has been quick to criticize any experiment that does not follow his guidelines to good experimental design for goal setting studies (Locke, 1991; Locke, 1994; Locke & Latham, 1990a). These guidelines may have an unintended effect in that the same design assumptions are recommended to be utilized to direct research on GST, and therefore, potential mechanisms may be missed. Thus, this section contests some of these guidelines, and furthermore, critiques other aspects of the experimental design paradigm that have been used in GST.

Goal Setting Theory Guidelines to 'Good' Experimental Design and their Critique

One of the principal guidelines to good experimental design in goal setting theory is to not let 'do your best' participants set their own goals (Locke & Latham, 1990a; Locke, 1991; Locke, 1994). These participants should either receive no feedback regarding their performance or they should be given feedback based on varying lengths of work periods (Locke, Cartledge, & Koeppel, 1968). However, this provides unequal conditions between the specific, difficult goal group and vague, difficult goal group.

Feedback is an integral part to assessing one's progress toward his goals whether the goals are assigned or self-set (Bandura, 1991; Carver & Scheier, 1982; Locke & Latham, 1990a). Naturally, the lack of feedback information in 'do your best' conditions in goal setting studies does not give participants the opportunity to self-monitor. Notice that for a 'do your best' goal condition it would seem natural to provide feedback information to participants as participants would be able to evaluate their best on the metric of task performance for the given task. That is, if feedback information is provided to 'do your best' participants, then participants would be able to use their previous task performance results as standards to evaluate a 'do your best' goal.

Giving an assigned goal, whether it is a specific, difficult goal or a 'do your best' goal, requires an interpretation by the participants of what that goal means given the task that they are asked to work on. Those in the specific, difficult group have to find out what the assigned numeric goal means on the given task. Is this a goal that can be achieved at first attempt on the task or is this a goal that will require several performance attempts to achieve? If participants given the 'do your best' goal are not given feedback information regarding task performance, then these participants have no method of

translating their externally set goal, 'do your best,' to an internally set goal standard. GST proposes that if participants do not receive feedback there will be little or no further effect of goals from that of the initial effect the goals had on task performance (Locke & Latham, 1990a), which is in alignment with other self-regulatory theories (e.g., see SCT in Bandura, 1991). This is because feedback makes clear the range of task performance for a particular task. Again, notice that the issue of translating an externally set goal to an internally set goal is also present in specific, difficult goal conditions of goal setting studies. If specific, difficult goal participants were not given feedback on their performance results, then they too would not be able to interpret the meaning of their assigned goal relative to the metric of task performance.

The issue of translating externally set goals to internally set goals is important to examine. Note that most tasks in GST require some sort of quantitative output as the measure of task performance (Locke & Latham, 1990a). Hence, the specific, difficult group is given an advantage in that their assigned goal is already in the form of a quantitative measure whereas the 'do your best' group starts out with the qualitative goal to 'do your best.' The 'do your best' group has to take their goal and translate it into a quantitative score before they can start striving for that difficult goal. Providing feedback information will give the 'do your best' goal group the opportunity to translate their externally set goal to an internally set quantitative goal.

Locke (1991) goes on to advise that the second step in good goal setting procedure is to measure the personal goal set by the participants themselves in response to the assigned goal that was given to them. According to GST, goal difficulty is what is affecting task performance (Locke et al., 1989). Given that, and if personal goals are

measured, then it would be interesting to examine the level of goal difficulty that the 'do your best' group sets. If the 'do your best' group is setting easy goals, then, according to GST, the specific, difficult group will outperform the 'do your best' group as the specific, difficult group has a more difficult goal. Note also that knowledge of score information influences personal goal setting, which has been shown to be more highly correlated with task performance than assigned goals (Locke, 1994).

The third rule of good procedure for goal setting studies is making sure that the specific, difficult group actually receives difficult goals such that no more than 10% of subjects can reach them (Locke, 1991). Notice that the assigned goal for the specific, difficult group is in relation to other people. In other words, it is a normative standard. That is, most goal setting studies have compared a specific, difficult assigned goal, set in relation to a normative reference, to a 'do your best' goal where people were not given an equivalent feedback system to assess the meaning of their assigned goal. Even if the 'do your best' goal group is given feedback, then the comparison of the specific, difficult goal group to the 'do your best' goal group would reflect a comparison between a normatively referenced assigned goal and a self-referential assigned goal (Naylor & Ilgen, 1984).

Goal Setting Experiments in General and their Critique

There are several other questions to be answered about the experimental design elements of goal setting studies that are not part of the guidelines offered by Locke and Latham (1990), Locke (1991), and Locke (1994). The questions pertain to the types of tasks that have been used, the statistical analyses that have been done, and the lack of

discussion that a difficult, specific goal is a combination of two goal attributes (i.e., difficulty and specificity).

The most common types of tasks that have been used in the goal setting literature have been what most researchers would classify as simple tasks (see Wood et al., 1987, Figure 1). In fact, four of the six most commonly used tasks in goal setting literature at the time of Locke and Latham's (1990) review were "listing nouns, objects, uses," "arithmetic/computation," "assembly," and "perceptual speed." These tasks do not always lend themselves to a clean goal difficulty and goal specificity manipulation. For instance, in the several reaction time tasks that have been used with GST, it is usually required for the difficult goal group to respond quickly to some stimulus, whereas the easy goal group would respond more slowly. The problem is that it is not easy to assess which assigned goals are, in fact, most difficult. In the reaction time tasks that have been used, participants have been asked to respond as fast as the given reaction time (i.e., assigned goal; Locke et al., 1989). However, it is a bit arbitrary to determine which goal is, in fact, more difficult. Is a response time of .3 seconds more difficult than a response time of .5 seconds? Participants see a red light, and then they depress a key to respond. Locke et al. (1989) operationalized more difficult as responding more quickly. However, it can certainly be argued that waiting to respond to hit the exact target of .5 seconds is more difficult than waiting to respond to hit the exact target of .3 seconds. If this is the case, then better task performance (i.e., reaction time) is arbitrary as well. The most plausible conclusion that can be made is that asking participants to respond to a stimulus leads to *different* task performance and not *better* task performance.

As noted previously, most goal setting studies have not looked at the independent effects of goal difficulty and specificity. In one of the few studies to treat them as distinct, Locke et al. (1989) conducted a 3 (goal specificity) x 3 (goal difficulty) study to separate the effects of goal specificity and goal difficulty on a reaction time task. In Study 1, the same participants were used across goal difficulty levels whereas different participants were used across goal specificity levels. The researchers first ran those in the vague specificity condition across all goal difficulty levels. Participants were alternatively asked to respond as fast as possible, moderately fast, and slowly. The order of presentation of goal difficulty levels was counterbalanced. To set the other two levels of goal specificity, the researchers used the performance of the vague specificity group across the three goal difficulty levels. Medium specificity was considered to be non-overlapping ranges of reaction times across the goal difficulty conditions whereas high specificity was considered to be the middle point of these ranges across the goal difficulty conditions except that the difficult, specific condition was set at the 90th percentile of the vague, difficult condition (see Table 1 in Locke et al., 1989).

Given the prior discussion on utilizing reaction time tasks to investigate GST effects, quicker reaction times are not necessarily more difficult. Waiting longer to depress a key in specified seconds can be considered to be more difficult than waiting for a shorter time. Examining the means and standard deviations across goal difficulty in the vague specificity group shows that there was considerable overlap in the distributions of the three levels of goal difficulty. However, examining the means and standard deviations across goal difficulty in the high specificity group shows that there was still much overlap in the distributions of three levels of goal difficulty. The researchers argue

that specificity decreases the variance in performance, but it is difficult to disambiguate what these results mean due to the ambiguities in the task in terms of goal difficulty. It could just as well be interpreted that as the reaction time was specified to be slower the standard deviation increased. In other words, the higher standard deviation for the slower times could have been a result of the fact that people had trouble (i.e., difficulty) judging the appropriate time to depress the key. In fact, the results indicate that not only was there a difference in variance across specificity levels, but also, a difference in variance across difficulty levels in that slower reaction times led to greater variance (see Table 3). Furthermore, there was also a difference across goal difficulty but not goal specificity when assessing *intra-individual* variability in reaction times in the same direction as that of the *inter-individual* variability analysis. This gives more credence to the idea that participants had a difficult time judging when to press the key for the slower time versus the faster time. Locke et al. (1989) ponder how goal 'difficulty' affected performance in this task. They proposed that the fast reaction time (high goal difficulty) group could only respond too slowly where as the slow reaction time (low goal difficulty) group could respond too slowly or too fast with respect to the assigned reaction time. In other words, the slow reaction time group had a more difficult time of achieving their goal.

Finally, the specific, difficult to 'do your best' comparison was marginally significant. The researchers set the goal for the specific, difficult group at the 90^{th} percentile of reaction time for the vague, difficult ('do your best') group. This analysis may be confounded as it would have been more appropriate to select a specific, difficult goal from data that were not part of the analysis of that study.

In Study 2 of Locke et al. (1989) participants had to list improvements to the business program at their university. This time the design was completely between-subjects of 3 (goal specificity) x 3 (goal difficulty). The other difference was that the specific, difficult group was assigned a goal at the mean of the vague, difficult group. Given this, it was not surprising that there was no significant difference between the specific, difficult group and the vague, difficult (list a large number of improvements) group. In fact, the vague, difficult group had a higher mean than the specific, difficult group, although not significantly so. It is interesting to note that feedback was built into the task (as the participants could see the number of improvements they had listed), and therefore, the 'do your best' group had guidance on how they were performing. The pattern of means in this experiment is such that there was an interaction between goal difficulty and goal specificity. The relationship of goal difficulty on task performance was strongest in the high specificity condition in that higher goals led to better task performance.

The lack of discussion on the interaction or combinative nature of specific, difficult goals is surprising. A core finding from goal setting studies is that more difficult goals lead to better task performance than less difficult goals. However, if a 'do your best' goal is potentially the same level of goal difficulty as a specific, difficult goal (see Locke & Latham, 1990a, pp. 29-31), then it cannot be that goal difficulty is what is contributing to differential task performance between specific, difficult and vague, difficult goal groups. Locke et al. (1989) say that goal specificity does not have an affect on task performance, but rather that it affects task performance variability. However, a natural explanation is that goal difficulty and goal specificity have an interactive effect on

task performance as there should be a steeper positive slope from low to high goal difficulty when goal specificity is high as compared to when goal specificity is low.

A final commentary on goal setting experiments is that many studies have been cross-sectional or have treated the data as cross-sectional. In other words, even if participants were performing a task for several trials, the data were averaged across trials and these means were analyzed. This is important because treating the data as repeated measures could address some of the questions of the process of how the core findings of GST occur through mediating variables such as personal goals and self-efficacy.

The critique of goal setting experiments is important because different experimental designs allow for different theoretical conclusions regarding the effects of goals on task performance in an inductive theory such as GST. If a general self-regulatory framework (i.e., feedback, goals, and multiple performance instances) is utilized, then knowledge of score information is important for the vague, difficult goal group. Otherwise, vague, difficult goals should not have any effect on task performance beyond the initial effect (Locke & Latham, 1990a; Bandura, 1991). Note further that if people are given the opportunity to view their knowledge of score information and be aware of normative information regarding task performance, then one can choose whether to set personal goals around a self-referential point or a normative point. If one does not have knowledge of score information or some other source (e.g., normative task information) that can be used as a reference point, then it would be difficult for an individual to understand the metric of task performance, and thus, their self-regulation would be impeded.

Integration

This section will pull together the key conclusions from the critique of GST experimental design assumptions, interpret these conclusions with respect to the common self-regulatory framework, and highlight how this study will bridge the gap between current GST design assumptions and explanation of GST effects with a general self-regulatory design and the alternative explanation that the self-regulatory design offers.

Table 1 cites explanations across several publications by the authors of GST as to why specific, difficult goals lead to better task performance than vague, difficult goals. The offered explanation rests on the notion that the ambiguity of vague, difficult goals (e.g., "do your best") allows individuals to interpret many levels of task performance as their best (Locke & Latham, 1990a; Locke & Latham, 2002). However, given the critique of experiments on GST discussed above, other experimental designs can provide further clarification for the observed effects.

Table 1. Current explanations of why specific, difficult goals lead to higher task performance than vague, difficult goals.

Reference	Quote
Locke & Latham (1985), pp.206-207	"Specific goals direct activity more effectively and reliably than vague or general goals (Locke, Mento, & Katcher, 1978). Telling someone to 'do as well as you can' is an ambiguous statement in that it does not make clear exactly what the person is to do...Contrary to what many believe, people do not do their best when their goal is to do just that. This is because a mind set of doing one's best is not specific enough to produce maximum performance."
Locke, Chah, Harrison, and Lustgarten (1989), pp.271-272	"Logically one would expect that specificity, divorced from level, would affect the degree of variability in performance as opposed to level of performance across individuals. Vague goals can be interpreted in many different ways by different people; as goals become more specific the leeway for interpretation is progressively reduced."

Locke, Chah, Harrison, and Lustgarten (1989), p.284	"The explanation must be that because do your best is a high yet vague goal, it can be interpreted in different ways depending on the context...Normally some interpretations of do your best will be more challenging than others. Making high level goals specific reduces this variance in interpretation and "biases" it toward the high side, i.e., ensures that all or most individuals will interpret the goal to mean that a very high level of performance is called for. Further the high degree of specificity makes it harder for any given individual to redefine the meaning of the goal during performance, since performance lapses that would be acceptable under a do best goal would be seen as failures under a specific, high goal...Goal specificity serves a directive function by indicating exactly what acceptable performance consists of, while goal level serves an energizing function by mobilizing the effort required to attain the required performance."
Locke & Latham, (1990), pp. 30-31	" Our explanation is that the ambiguity of difficult goals (this refers to "do your best" goals) allows people to give themselves the benefit of the doubt in evaluating their performance; thus, a wide range of performance levels may be interpreted as being compatible with doing one's best."
Latham & Locke (1991), p.215	"The consistent superiority of the former (specific, difficult goals) is attributed to the fact that vague goals are compatible with many different outcomes, including ones that are lower than the person's actual best...Maximum effort is not aroused under a do best goal. This is because the ambiguity inherent in doing one's best allows people to give themselves the benefit of the doubt in evaluating their performance."
Locke & Latham (2002), p.706	"In short, when people are asked to do their best, they do not do so. This is because do-your-best goals have no external referent and thus are defined idiosyncratically. This allows for a wide range of acceptable performance levels, which is not the case when a goal level is specified."

First, if a self-regulatory framework is taken to experimental design, then one missing component in most goal setting studies has been the lack of clear knowledge of score information for the 'do your best' goal group. Vague, difficult goal participants have been given either feedback on performance trials of varying length or have not been given feedback at all (Locke & Latham, 1990a). The three dominant theories of self-regulation, which includes GST, all emphasize the importance of feedback. In fact, GST

researchers argue that goals without feedback do not have any effect on task performance (Erez, 1977; Locke & Latham, 1990a). Thus, goal setting studies have not given vague, difficult goal participants an important component of regulating their behavior. Notice that the design assumptions of GST were made to prevent vague, difficult goal participants from setting personal goals as setting personal goals was considered to alter the goal specificity manipulation (Locke & Latham, 1990a). At the same time, though, Locke et al. (1989) found that providing feedback to vague, difficult goal participants did not alter their results (Locke et al., 1989). Then, to disentangle the effects of goal difficulty and goal specificity, it would be important to investigate at what level vague, difficult goal participants set personal goals. Although, GST does not indicate the difference in difficulty levels between specific, difficult goals and vague, difficult goals, operationally the difficulty levels have been treated as being the same (e.g., Locke et al., 1989). However, this has not been clearly investigated as of yet and measuring personal goals will indicate if the equivalent goal difficulty level assumption is tenable.

If personal goals are measured and multiple opportunities are given to perform, then the explanation offered by GST as to the observed effect comes into question. That is, given enough performance trials with knowledge of score information, participants would not waiver in their interpretation of what a 'do your best' goal is, but rather, they would be aware that their highest achieved performance score up to a particular trial, is at least, their best performance on the given task. Thus, the variability of interpretation of what a 'do your best' goal means for any particular individual will be constrained in a self-regulatory framework of experimental design because feedback allows participants to discover the range of task performance.

In terms of assigned goals, there is a difference in the referent standard between assigned goal conditions. A specific, difficult goal has typically been set to the 90th percentile of task performance (Locke & Latham, 1990a). That is, the specific, difficult goal is a normative referent. On the other hand, a vague, difficult goal (e.g., 'do your best'; 'list as many as you can') refers to the self when it is assigned. If feedback is not provided, then it is difficult for individuals to assess how they are performing with respect to their self-referenced goal. Additionally, if personal goals are not measured for the vague, difficult goal group, then it is unknown where on the scale of task performance the vague, difficult goal falls. That is, it is not known if the level of goal difficulty will be the same as that for the specific, difficult goal set at the 90th percentile of task performance. Thus, the different referent standards may be an explanation as to the observed effect as the two goal conditions may not be of equivalent goal difficulty.

The tasks utilized by Locke et al. (1989) confounded (Study 1; reaction time task) or constrained (Study 2; listing task) the effect of goal difficulty on task performance. Thus, the independent and interactive roles of goal difficulty and goal specificity are not easily discernible from those studies. Given the assumptions of GST, goal difficulty and goal specificity should interact to affect task performance as the simple effect between high and low goal difficulty is greater when goal specificity is high as compared to a smaller simple effect when goal specificity is low. This interaction effect is not mentioned in GST, and Locke et al. (1989) decline to elaborate on it in their studies. However, such an explanation provides a clearer interpretation of the role of goal specificity in affecting task performance.

Despite the espoused mediating role of self-efficacy and personal goals in GST, most analyses in goal setting studies have collapsed across time. Thus, GST researchers have not fully accounted for the effects of assigned goals on self-regulatory processes. This is an important assessment to investigate the lasting effects of assigned goals. For example, it is expected that individuals given goals of high difficulty will set higher personal goals than individuals given goals of low difficulty. However, as individuals in the low goal difficulty condition achieve their assigned goals, they may increase their personal goals, whereas individuals in the high goal difficulty condition may lower their personal goals if they cannot achieve their assigned goals. In the presence of feedback individuals told to do their best may incrementally adjust their personal goals, perhaps, eventually outperforming the specific, difficult goal group as time passes. Thus, it is important to investigate the effects of assigned goals over time on process variables that have shown to affect task performance.

Individuals need social information to assess their achievements and progress (Bandura, 1991). That is, information regarding how others have performed the particular task at hand gives another opportunity for an individual to assess his performance levels. Indeed, everyday achievements are assessed on a relative scale. For instance, organizations promote individuals who are performing highly relative to their peers. In goal setting studies, specific, difficult goals are taken from the 90^{th} percentile of task performance. Thus, a standard is given that only 10 percent of individuals have achieved. However, as mentioned previously, vague, difficult goals are self-referenced. So, it would be interesting to investigate what personal goals individuals will choose when given vague, difficult goals in the presence of normative information. Additionally,

the presence of normative information allows vague, difficult goal participants to be on the same relative scale as the specific, difficult goal participants. That is, vague, difficult goal participants will be calibrated to a normative scale of task performance versus simply being calibrated to a self-referenced scale of task performance. In fact, this study sets out to demonstrate that calibration moderates the relationship between goal difficulty, goal specificity, and task performance.

The design assumptions in GST leave out potentially important theoretical mechanisms that can provide explanations for why specific, difficult goals lead to better task performance than vague, difficult goals. Immediately, it is evident that one potentially important theoretical mechanism that can be gained from a broader self-regulatory framework is being able to calibrate one's performance goals to a standard of performance. That is, the lack of knowledge of score information in the vague, difficult goal condition prohibits these participants from calibrating their goals (e.g., "do your best") to some referential standard.

The explanation offered here rests on the notion that participants have trouble calibrating vague, difficult goals to the task that they are performing on, and hence, their task performance suffers compared to the specific, difficult goal group. Notice, though, that knowledge of score information for the vague, difficult goal group only calibrates individuals to a self-referential standard of performance. In other words, the combination of a vague, difficult goal (e.g., "do your best") and knowledge of score information calibrates an individual to their previous task performance results. However, in the presence of normative task performance information, an individual in the vague, difficult goal group can be calibrated to other individuals' performance results on the given task

(Bandura, 1991). In this case, the performance standard is not self-referential task performance, but rather, the performance standard is normative task performance. Thus, the ambiguity of the vague, difficult goal is not related to one's interpretation of what that goal means, as it is proposed in the current explanation by Locke and Latham (2002), but rather, in one's translation of such a goal into a task performance standard.

Model Development and Hypotheses

Model and Independent Variables

Goal Difficulty. The difficulty of a goal, if the goal is quantitative, is assessed on a normative continuum where the majority of people performing a given task can achieve easy goals and only a small minority of people can achieve difficult goals. Thus, when quantitative goals are assigned to individuals, these goals are on a normative difficulty continuum. Goal setting research has consistently demonstrated that goal difficulty for quantitative goals has a linear relationship to task performance within achievable performance levels (Locke, 1982). The difficulty of qualitatively stated goals has generally been assessed on an implicit continuum of difficulty for a given task (e.g., Locke et al., 1989). If the task was to list improvements that can be made to a university, then an easy goal could be to list a "small" number of improvements where a difficult goal could be to list a "large" number of improvements to the university. Although there has been much less research on qualitatively stated goals than quantitatively stated goals, the research that exists indicates that the relationship between goal difficulty and task performance is still linear (Locke & Bryan, 1968; Locke, Mento, & Katcher, 1978). Locke and Latham (1990) propose that the effect of goal difficulty on task performance is mediated by personal goals and self-efficacy.

Goal Specificity. Goal specificity serves as a proxy for the clarity of a goal. That is, a point goal is very specific, a range of quantitative goals is somewhat specific, and a verbal goal is not very specific. There have been few studies that have examined the independent effects of goal specificity in the goal setting literature. Two studies that did separate goal specificity from goal difficulty argued that goal specificity does not affect task performance per se, but rather, it affects the variance of task performance (Experiment 1 and Experiment 2 from Locke et al., 1989). Locke and Latham have made the same argument in theoretical works (Locke & Latham, 1990a; Latham & Locke, 1991). Research by Wright and Kacmar (1994) indicates that goal specificity can affect goal commitment such that specific goals lead to higher goal commitment than non-specific goals. Furthermore, Wright and Kacmar (1994) demonstrate that goal specificity is related to personally set goal change such that specific goals lead to smaller goal changes than non-specific goals.

Normative Information. Normative information displays where different levels of task performance fall in the distribution of task performance of a group of people who have performed the task. Normative information effects have been argued to be important because normative information can result in social comparisons, which relates to the setting of goals around those social comparisons (Bandura, 1991; Mitchell, Rothman, & Liden, 1985; Festinger, 1954). As Bandura (1991) points out, behavior is more easily self-regulated when there are clear indicators of adequacy. Normative information regarding task performance provides an individual the opportunity to assess where her task performance falls relative to other people who have performed the task, and thus, provide an opportunity to assess her task performance on a normative scale for

the task. Normative information more clearly defines the metric of task performance for an individual than does only receiving feedback regarding one's past performance. This is because normative information gives the range of possible outcomes that have been achieved by others whereas only receiving feedback regarding one's past performance gives the range of outcomes achieved by a particular individual. Bandura and Jourden (1991) also demonstrated that different social comparison conditions have differential effects on self-regulatory processes such as goals, self-efficacy, and self-satisfaction. Those participants who experienced progressive mastery (i.e., this group was outperformed by a comparison group early in the study, but then performed better than the comparison group later in the study) demonstrated the greatest gains in self-efficacy, goals, self-satisfaction, and task performance over three time assessments.

Meyer and Gellatly (1988) in Study 1 demonstrated that assigned goals affected perceived norms (i.e., student's belief regarding the average performance of other students on the task), which, in turn, influenced performance expectancy and performance valence. This is evidence that assigned goals can serve as indicators of what other people have achieved on a given task. That is, in fact, a specific, difficult goal is an indicator of what other people have achieved on a given task because specific, difficult goals are set at the 90^{th} percentile of task performance. In Study 2, Meyer and Gellatly (1988) manipulated assigned goals (i.e., easy, specific vs. difficult, specific vs. no goal) and normative information on a brainstorming task such that people in the low norm condition were told that the average score on the given task was 1 point higher than the easy, specific assigned goal and people in the high norm condition were told that the average score on the given task was the same as the difficult, specific assigned goal. The

third norm group was not given norm information. The results indicated that the performance norm manipulation influenced perceived norms (measured as in Study 1) whereas assigned goals did not affect perceived norms. Furthermore, assigned goals did affect personal goals in Study 1, but assigned goals did not affect personal goals in Study 2. The direct effect of perceived norms to personal goals was not tested in their path analytic models. Although, the correlations between perceived norms and personal goals were $r = .73$ and $r = .71$ in Study 1 and Study 2, respectively, whereas the correlations between assigned goals and personal goals were $r = .59$ and $r = .29$ in Study 1 and Study 2, respectively. The correlation between manipulated performance norms and personal goals in Study 2 was $r = .42$. These relationships indicate the relationship between normative information and personal goals and how assigned goals are perceived normatively by participants.

Other results regarding perceived normative information indicate that manipulated normative information affects task performance when it is more proximal than assigned goals and that assigned goals affect task performance when it is more proximal variable than normative information (Earley & Erez, 1991). Garland (1983) manipulated assigned goals (i.e., easy, specific vs. difficult, specific) and normative information such that participants were told that 95%, 50%, or 5% of previously tested students were able to beat the assigned goals. The results indicated that the there was interaction between assigned goals and normative information that explained incremental variance to the main effects on personally set goals. The interaction indicated that participants in the easy, specific goal condition set increasingly higher personal goals as normative information indicated higher standards of goal attainment by other participants whereas

participants in the difficult, specific goal condition decreased their personal goals as normative information indicated higher standards of goal attainment by other participants.

The above studies (i.e., Garland, 1983; Meyer & Gellatly, 1988; Earley & Erez, 1991) manipulated the perception of normative information such that the normative information was manipulated around the assigned goal. That is, in all three studies participants were not told veridical information regarding the task performance of other people who have performed the tasks in the experiments. This study will include conditions where people will have access to veridical normative information regarding task performance.

Hypotheses

This section is divided into three parts. First, the hypotheses between the three independent variables (i.e., goal difficulty, goal specificity, and normative information) and task performance will be proposed as the focus of most goal setting studies has been on the relationship between assigned goals and task performance. Then, a second section will propose hypotheses between the independent variables and mediating variables of the relationship between the independent variables and task performance. This is followed by hypotheses regarding the effects of the process variables on task performance. Figure 1 presents a heuristic model of the hypotheses proposed in the present study. However, the main purpose of the present study was not to test this model as a whole via structural equations modeling, but rather more directly test how assigned goals affect task performance. Thus, Figure 1 should simply be used as a guide to understand how this process is carried out.

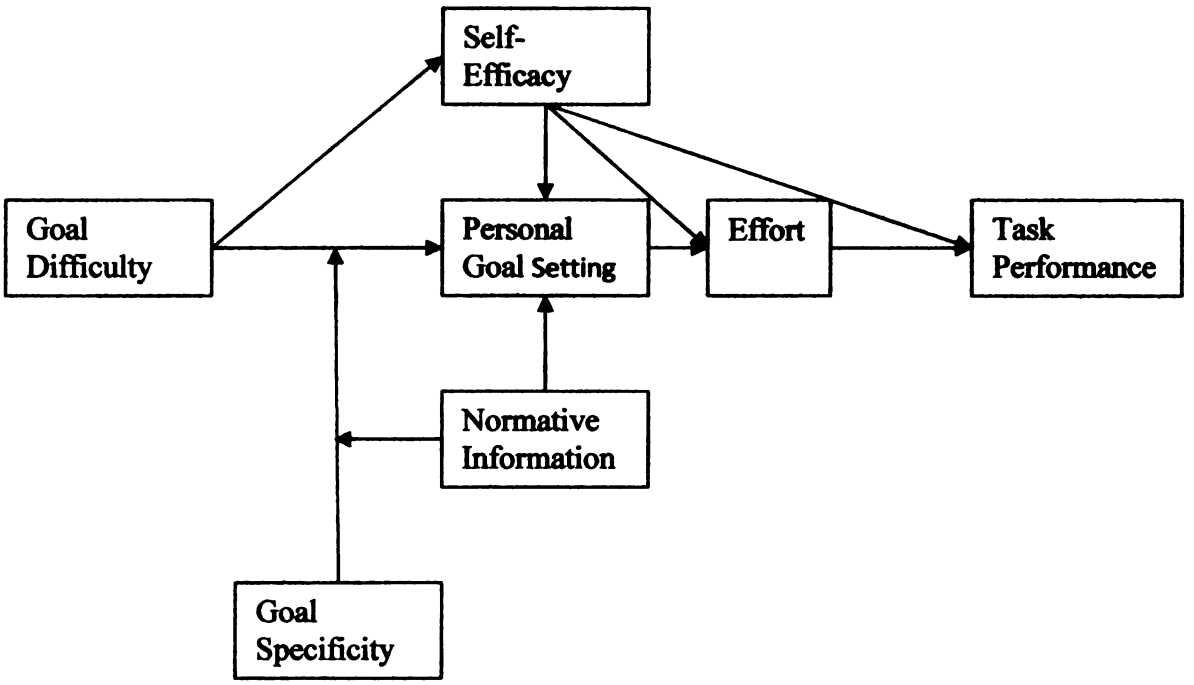

Figure 1. Heuristic model of the propositions of GST

The Effects of the Independent Variables on Task Performance

GST has argued and goal setting studies have consistently demonstrated that high goal difficulty leads to higher task performance than low goal difficulty (Locke et al., 1981; Garland, 1982; Garland, 1983; Locke & Latham, 2002). Locke and colleagues conducted several experiments to demonstrate that the relationship between goal difficulty and task performance was linear rather than curvilinear as it was proposed by other researchers (Locke, 1966; Locke & Bryan, 1968; Locke, 1982; see Steers & Porter, 1974 also).

Hypothesis 1: Goal difficulty affects task performance such that high goal difficulty leads to higher task performance.

The role of goal specificity independent of goal difficulty has been much less studied in goal setting studies. Locke et al. (1989) argued that goal specificity affects

variability of task performance and found statistical support for their assertion across two experiments. Wright and Kacmar (1994) provided additional empirical support that non-specific goals are associated with higher task performance variability than specific goals.

Hypothesis2: Goal specificity affects task performance variability such that high goal specificity reduces task performance variability.

Most studies in the goal setting literature have not separated the effects of goal specificity and goal difficulty on task performance. Rather, high goal specificity, high goal difficulty are often compared to low goal specificity, high goal difficulty (e.g., "do your best" goals). Notice that this is a comparison between two cells in a four cell orthogonal design. The statistically significant difference between high goal specificity, high goal difficulty and low goal specificity, high goal difficulty can be referred to as a simple effect (Keppel & Wickens, 2004). However, given the assumption in the goal setting literature that goal specificity does not affect task performance, the difference between the high goal specificity, low goal difficulty and low goal specificity, low goal difficulty should not be statistically significant as the driver of task performance should be goal difficulty and not goal specificity. The lack of a simple effect between the latter two cells indicates that an interaction exists between goal specificity and goal difficulty because the simple effects of one independent variable (i.e., goal specificity) is not the same at all levels of the other independent variable (i.e., goal difficulty; Keppel & Wickens, 2004). Thus, the prediction that high goal specificity, high goal difficulty leads to higher task performance as compared to low goal specificity, high goal difficulty is an interaction whereby goal specificity moderates the relationship between goal difficulty and task performance.

Hypothesis 3: Goal specificity will moderate the relationship between goal difficulty and task performance such that high goal specificity leads to higher task performance when goals are of high difficulty than when goals are of low difficulty more than when goals are of low specificity.

If the manipulations of most goal setting studies are examined closely, it can be seen that comparative groups do not only differ on the types of goals (i.e., specific, difficult vs. 'do your best') that they are given, but these goals also differ in the way that they are determined. Specific, difficult goals are set at the 90th percentile of task performance (e.g., Locke et al., 1989). Meyer and Gellatly (1988) argue that assigned goals can be used as normative reference standards. That is, the assigned goal will serve as a norm for evaluating the level of performance that is attainable. In fact, a specific, difficult goal is a normative reference point that refers to the fact that only 10 percent of people who perform on this task score higher than the assigned goal. On the other hand, a 'do your best' goal will be perceived by participants as a self-referential goal. That is, assigned goals in GST have not only been different in terms of specificity, but have also been different in terms of the referent standard. Giving 'do your best' participants normative information regarding task performance could serve to put the two goals on equal grounds. Social information processing theory would suggest that social comparisons are made when normative information is present (Festinger, 1954). Hence, when participants are given normative information they will tend to compare themselves to others.

Goal setting studies have assumed that 'do your best' is on the same level of goal difficulty as specific, difficult goals (Locke & Latham, 1990a). If that is the case, then

participants who are given normative information with a 'do your best' goal would be expected to select goals close to the 90th percentile of task performance. On the other hand, if normative information is combined with specific, difficult goals no significant increase in task performance should be observed because the assigned goal level is close to the highest that people can score on this task. Additionally, it is expected that task performance variability will be affected by normative information as the variability in the personal goals individuals choose will decrease in the presence of normative information which equates the specific, difficult goal group with the vague, difficult goal group.

Hypothesis 4: Normative information will moderate the relationship between goal difficulty, goal specificity, and task performance such that the goal difficulty by goal specificity interaction will only be present in the absence of normative information.

Hypothesis 5: Normative information will moderate the relationship between goal specificity and task performance variability such that goal specificity will only affect task performance variability in the absence of normative information.

To summarize, the hypotheses in this section demonstrate the established findings in GST, clarify the role of goal difficulty and specificity on task performance, and propose that a difference in the reference standard could explain the effects as well. That is, hypotheses 1 and 2 test the GST findings that goal difficulty has a linear effect on task performance and that goal specificity affects task performance variability. Hypothesis 3 clarifies the fact that GST, in fact, proposes that goal difficulty and goal specificity combine to affect task performance. Finally, hypotheses 4 and 5 suggest that the results could be due to differences in the referent standards of the assigned goals. That is, the

assigned goals calibrate individuals to different referent standards, and thus, the differential effects are observed. The next section will examine the process by which the effects of the independent variables are expected to manifest.

The Effects of the Independent Variables on Process Variables

GST and goal setting studies have posited and demonstrated that the effects of assigned goals on task performance are mediated by personal goal setting and performance expectancy or self-efficacy (Garland, 1983; Locke & Latham, 1990b; Locke & Latham, 2002; Meyer & Gellatly, 1988). That is, goals that are of high difficulty will lead to higher personal goals. Additionally, the correlation between personal goals and task performance has shown to be higher than the correlation between assigned goals and task performance (e.g., Meyer & Gellatly, 1988). Remember, though, that most goal setting studies do not measure the personal goals of the low goal specificity condition, which has generally been the 'do your best' goal group. However, since some goal setting studies (e.g., Locke & Bryan, 1968; Locke, Mento, & Katcher, 1978) have demonstrated that non-specific, difficult goal groups outperform non-specific, easy goal groups, then the expected mechanism should be the same as that for when goal difficulty is assessed with specific goals. That is, irrespective of goal specificity, goals that are of high difficulty will lead to higher personal goals being set. Since effort is the major mediator between personal goals and task performance, a similar effect should be found on effort as well.

Hypothesis 6: Goal difficulty affects personal goal setting such that high goal difficulty leads to higher personal goal setting than low goal difficulty.

Hypothesis 7: Goal difficulty affects effort such that high goal difficulty leads to higher effort than low goal difficulty.

Hollenbeck and Klein (1987) indicated that goal specificity could affect goal commitment such that more specific goals would lead to higher goal commitment. Wright and Kacmar (1994) provided empirical support for this assertion as specific goals led to higher goal commitment than non-specific goals. However, in the present study individuals in the low goal specificity conditions will receive feedback on their performance levels. Thus, it can be argued that individuals' goal commitment toward their low specificity goal (e.g., 'do your best') will be high as their goal will have been translated in terms of performance levels on the task at hand. On the other hand, individuals receiving a specific goal may have higher overall commitment to their goal than those receiving low specificity goals as the former have a constant standard to evaluate their performance whereas a 'do your best' goal changes depending on previous performance levels.

Hypothesis 8: Goal specificity affects goal commitment such that high goal specificity leads to higher goal commitment than low goal specificity.

Interestingly, using Meyer and Gellatly's (1988) studies, Locke and Latham (1990) argue assigned goals portray normative information that suggests the expected performance level for an individual. That is, in Meyer and Gellatly's (1988) Study 1, assigned goals affected perceived norms which affected self-efficacy. Thus, Locke and Latham (1990) argue that assigned goals have a positive effect on self-efficacy. Note, however, the computed positive correlation in Locke and Latham (1990) comes from

studies that only looked at goal difficulty, so it is unclear if goal specificity has any effect on self-efficacy.

Hypothesis 9: Goal difficulty affects self-efficacy such that high goal difficulty leads to higher self-efficacy than low goal difficulty.

The interaction of goal specificity and goal difficulty should also be present on personal goal setting and effort in the same way this interaction is described for task performance because personal goals and effort are the major mediators between assigned goals and task performance (Locke & Latham, 1990a). This is to say that the specific, difficult goal group will set the highest goals and display more effort as compared to the other goal groups. Note, however, that even though GST expects assigned goals to affect personal goals, whether this relationship exists is not known for low specificity goals. As generally, personal goals were not measured when individuals were given low specificity goals.

Hypothesis 10: Goal specificity will moderate the relationship between goal difficulty and personal goal setting such that high goal specificity leads to higher personal goal setting when goals are of high difficulty than when goals are of low difficulty more than when goals are of low specificity.

Hypothesis 11: Goal specificity will moderate the relationship between goal difficulty and effort such that high goal specificity leads to higher effort when goals are of high difficulty than when goals are of low difficulty more than when goals are of low specificity.

The presence of normative information has shown to affect levels of aspirations (i.e., personal goals; Frank, 1941). Perceived norm information and manipulated

perceived norm information has shown to affect performance expectancy (Meyer & Gellatly, 1988), self-efficacy, personal goals, and task performance (Erez & Earley, 1991). Bandura and Jourden (1991) showed that individuals that received a progressive mastery normative information manipulation reported the greatest gains in self-efficacy over three time assessments. Additionally, those individuals who were told that they consistently outperformed others reported gains in self-efficacy. Given that goal difficulty is expected to affect self-efficacy, then normative information may moderate this relationship as those given low goals will see that higher performance levels have been achieved by a majority of previous task performers. Thus, individuals given low goals will expect to achieve higher performance levels in the presence of normative information.

Hypothesis 12: Normative information will moderate the relationship between goal difficulty and self-efficacy such that goal difficulty will affect self-efficacy only in the absence of normative information.

As previously explained, Garland (1983) demonstrated that an interaction occurred between goal difficulty and normative information regarding those assigned goals. The interaction was such that those individuals who were given a goal of low difficulty set higher personal goals across each of the normative information conditions whereas those individuals who were given a goal of high difficulty set lower personal goals across each of the normative information conditions where the normative information increasingly indicated that fewer previous individuals had beaten that assigned goal. Locke and Latham (1990) offered an explanation for this interaction effect. They write that high normative information (i.e., 5% of other people beat the

assigned goal) could have been viewed as a challenge by individuals given a goal of low difficulty whereas individuals given a goal of high difficulty could have believed that their goal was too high, and thus, individuals with low assigned goals set higher personal goals whereas individuals with high assigned goals set lower personal goals. This crossover interaction (see Keppel & Wickens, 2004) is rather interesting. Lewin, Dembo, Festinger, and Sears (1944) also offer a similar explanation proposed by Locke and Latham (1990). Individuals who performed above the average of their group of comparison tended to decrease their personal goals whereas individuals who performed below the average of their group of comparison tended to increase their personal goals. Given that effort is the major mediator between personal goals and task performance, it is expected that the effects on effort would be similar.

Hypothesis 13: Normative task performance information will affect personal goal setting such that when normative task performance information is present individuals will set high personal goals.

Hypothesis 14: Normative task performance information will affect effort such that when normative task performance information is present individuals will display higher effort.

Hypothesis 15: Normative task performance information will moderate the relationship between goal difficulty, goal specificity, and personal goal setting such that the goal difficulty by goal specificity interaction will only be present in the absence of normative task performance information.

Hypothesis 16: Normative task performance information will moderate the relationship between goal difficulty, goal specificity, and effort such that the goal

difficulty by goal specificity interaction will only be present in the absence of normative task performance information.

Goal setting studies have typically averaged across performance trials when investigating the relationship between assigned goals and task performance (e.g., Locke et al., 1989). However, as Garland (1983) suggests, if individuals are aware that their assigned goal is too difficult, then they will tend to set lower personal goals. Similarly, if individuals are aware that their assigned goals are too easy, then they will tend to set higher personal goals. Thus, in the presence of normative information, it is expected that all individuals, whether they are given easy or difficult goals to begin with, will converge upon similar personal goals over time. This provides an explanation as to why normative information will negate the interaction of goal difficulty and specificity on personal goals, and thereby, on task performance as well. That is, normative information calibrates the goal difficulty by goal specificity conditions to the same referent standard. Once individuals are calibrated by normative informative they can better assess achievable performance levels.

Hypothesis 17: In the presence of normative information individuals from each of the goal difficulty by goal specificity conditions will converge to the same personal goals over time.

The Effects of the Process Variables on Task Performance

Self-efficacy has been proposed to affect personal goal setting and task performance in GST (Bandura & Jourden, 1991; Earley & Erez, 1991). Individuals that believe they have the capabilities to perform well on a given task will indicate so by setting high personal goals. Furthermore, individuals' belief that they can perform well

also relates directly to task performance (Bandura, 1986; Bandura, 1991). High self-efficacious individuals put forth the necessary effort to achieve high task performance. Personal goal setting has been the most investigated mediating variable between assigned goals and task performance in goal setting studies. Naturally, higher personal goals have led to higher task performance (Garland, 1982; Garland, 1983; Garland, 1984; Meyer & Gellatly, 1988). GST suggests this relationship will be carried out through effort (Locke & Latham, 1990a).

Hypothesis 18: Self-efficacy will affect personal goal setting such that higher self-efficacy leads to higher personal goal setting. Self-efficacy will affect effort setting such that higher self-efficacy leads to higher effort. Self-efficacy will affect task performance such that higher self-efficacy leads to higher task performance. Personal goal setting will affect effort such that higher personal goals will lead to higher effort. Personal goal setting will affect task performance such that higher personal goals will lead to higher task performance. Finally, effort will affect task performance such that higher effort leads to higher task performance.

METHOD

Design

The present study utilized a fully-crossed 2 x 2 x 2 factorial design with repeated measures. The first factor is goal difficulty, which includes two levels: high goal difficulty and low goal difficulty. The second factor is goal specificity, which includes two levels: high goal specificity and low goal specificity. Finally, the third factor is calibration, which includes two levels: normative task performance information is present and normative task performance information is not present.

Task

The task that was used in this study was a version of TANDEM (Dwyer, Hall, Volpe, Cannon-Bowers, & Salas, 1992), which is a computer-based radar tracking simulation. In the version of TANDEM that was used for this experiment participants monitored twenty-two contacts on the radar screen. Participants had to make four decisions in total for each contact. Each of the first three decisions had three answer choices, and the last decision had two answer choices. Correct decisions were based on selecting the correct answer choice based on the cue for that particular sub-decision. Thus, there were three cues to learn regarding the contacts. Participants received 100 points for correct decisions and lost 100 points for incorrect decisions.

Participants

There were 526 psychology undergraduates from a large Midwestern university in this study who completed the study for course credit. There were 317 females (60 %), and the average age of the sample was 19.50 years old.

Procedure

This study took about two hours to complete: thirty minutes of learning contact cues on the Web and 1.5 hours in the laboratory. Participants were randomly assigned to one of the eight conditions (see below) once they came to the laboratory. Given that skill acquisition is not of interest in this study, participants were trained to quickly remember the cue sets for each decision. Upon signing up for the study online and at the beginning of the laboratory session, participants were instructed on how to make correct decisions to process targets and how different cues relate to different answer choices.

The cycle of reviewing the task cues manual, performing TANDEM, and receiving feedback on one's performance was followed for each of the ten trials. The task cues manual was reviewed for up to 1.5 minutes for the first trial and thirty seconds for the nine trials that followed, each performance trial was 4 minutes, and performance feedback was reviewed after each trial. If participants were in the normative information conditions, then they also saw the normative performance information on their performance feedback screens after each trial. Following performance feedback, participants were reminded of their assigned goal. Goal commitment, personal goals, self-efficacy, and effort were then assessed.

Manipulations

Goal difficulty. The level of goals assigned to participants was based on pilot data that used the exact specifications of TANDEM described above. Goal setting studies have traditionally set the high goal difficulty level at the 90th percentile of task performance (Locke et al., 1989; Locke & Latham, 1990a). However, there has not been

a traditional percentile level defined for lower goal difficulties. Wright and Kacmar (1994) utilized the 10th percentile as an easy goal condition, and for the sake of symmetry the same criterion was employed. In this study, 1700 points was the 90th percentile of task performance and 800 points was the 10th percentile.

In terms of setting the difficulty level of non-specific goals, there is not much guidance in the goal setting literature as to how to assign such goals. Typically, these goals have been adjusted for the type of task that will be utilized (e.g., Locke et al., 1989; Wright & Kacmar, 1994). The expression "get a high score" was assigned to represent high goal difficulty since this was most appropriate for the task that was utilized in this study. Similarly, the expression "get a low score" was assigned to represent low goal difficulty. Wright and Kacmar (1994) used the similar expressions for their high and low non-specific goal conditions.

Goal specificity. The specificity of the goal was operationalized by giving participants either a quantitative goal or a qualitative goal. Participants in the high goal specificity conditions were told their goal is to obtain a numeric score set at the appropriate goal difficulty. On the other hand, participants in the low goal specificity conditions were told their goal in verbal form as described above. The exact phrases were as follows:

1a. Easy, specific goal: "Your assigned goal is to get a score of 800 points."

1b. Difficult, specific goal: "Your assigned goal is to get a score of 1700 points."

2a. Easy, non-specific goal: "Your assigned goal is to get a low score."

2b. Difficult, non-specific goal: "Your assigned goal is to get a high score."

Calibration. Calibration was specified by giving participants normative task performance information or not giving participants normative task performance information. Normative information was presented to individuals on the same screen as when they observed their feedback. The distribution of task performance was obtained from pilot data where individuals were operating under a "do your best" goal. The normative information was presented as displayed in Table 2.

Table 2. Presentation of normative task performance information.
You can use the table below to compare your score with how others have scored on this simulation.

Comparison	Bttm 10%	Bttm 20%	Bttm 30%	Bttm 40%	Avg	Top 40%	Top 30%	Top 20%	Top 10%	Top Score
Percentile	10	20	30	40	50	60	70	80	90	100
Score	800	1000	1100	1200	1300	1400	1500	1600	1700	2000+

Measures

The laboratory part of this study included nine measurement time points after each trial. The variables of interest were be goal commitment, self-efficacy, personal goals, effort, and task performance. Locke and Latham (1990a) recommend that all of these variables be measured when running a goal setting experiment.

Ability. Locke and Latham (1990a) recommend that participants' abilities be controlled for on the task. Hence, participant's ability was assessed by performance on the first performance trial. The first performance trial was considered to be an appropriate estimate of participants' natural ability on the task as none of them had previous experience with this task.

Goal commitment. The measure of goal commitment was based on items from Hollenbeck, Klein, O'Leary, and Wright (1989). This measure assesses a participant's commitment or valence to the assigned goal. An example item was, "I think my

ASSIGNED goal is a good goal to shoot for." The average Cronbach's alpha across trials was .70. Appendix B presents the complete measure used in the present study.

Self-efficacy. Self-efficacy was assessed by three items that have been previously used in research utilizing this task (e.g., DeShon, Kozlowski, Schmidt, Milner, & Weichmann, 2004). Self-efficacy could not be measured as suggested by Locke and Latham (1990) because this would give participants in all conditions information on the range of performance. This would confound one of the benefits of having normative information. An example item was, "I am certain that I can manage this simulation." The average Cronbach's alpha across trials was .91. Appendix B presents the complete measure used in the present study.

Personal goals. Participants were asked to type in the goal that they are striving for after being presented with feedback from the previous trial. Specifically, participants were asked: "What is your PERSONAL goal for the next trial?"

Effort. Effort was assessed by three items that have been previously used in research utilizing this task (e.g., DeShon, et al., 2004). An example item was, "I will put a great deal of effort into my performance on this simulation in the next trial." The average Cronbach's alpha across trials was .96. Appendix B presents the complete measure used in the present study.

Task performance. A participant's performance score was based on the number of correct and incorrect decisions that he or she made. One hundred points were received for correct decisions and one hundred points were lost for incorrect decisions.

RESULTS

The results will be presented in the order of the presentation of the hypotheses. The first set of hypotheses pertained to the effects of assigned goals and normative calibration on task performance. The second set of hypotheses pertained to how the effects of assigned goals and normative calibration may be carried out through process variables. And finally, process variables were linked to task performance. All measures (i.e., goal commitment, self-efficacy, personal goals, and task performance) were averaged across trials 5 through 10. These trials were chosen because the distribution of task performance remained the same starting with trial 5 across all conditions. Thus, the results of analyses on task performance were not a result of task learning. Participants were informed that negative scores do not count toward achieving their assigned goals. Thus, any participant that scored negative 300 or less in any of these trials was removed from all analyses as they did not follow instructions. A score of negative 300 was chosen because by trial 5 all participants had learned how to play the simulation, and thus, were purposely not following instructions if they processed three or more contacts incorrectly. This assertion is supported by the fact that 439 (84%) participants answered correctly all 13 questions of the knowledge test the last time they took it before trial 3 and another 52 (10%) participants answered 12 questions correctly. Thus, Table 3 describes the number of participants who were removed from each condition as a result of not following instructions. The final sample size was 480 people. Table 4 presents how these 480 people were distributed across conditions. All of the dependent variables were analyzed using a fully-crossed 2 (Goal Difficulty) x 2 (Goal Specificity) x 2 (Normative

Calibration) model with performance from the first trial as a covariate in the analyses on task performance.

Table 3. The number of participants who were removed from each condition as a result of not following instructions.

	No Norms		Norms	
Goals	Non-specific	Specific	Non-specific	Specific
High Difficulty	7	5	1	2
Low Difficulty	9	5	9	8

Table 4. The final number of participants in each condition.

	No Norms		Norms	
Goals	Non-specific	Specific	Non-specific	Specific
High Difficulty	58	68	67	64
Low Difficulty	50	60	56	57

The Effects of the Independent Variables on Task Performance

Hypothesis 1: The first hypothesis pertains to one of the central findings from GST and it stated that individuals given goals of higher difficulty would have higher task performance than individuals given goals of lower difficulty. The analysis found that high goal difficulty, (M = 1569.96, SE = 24.65), led to higher task performance, ($F(1,471) = 143.17, p < .001, \omega^2 = .23$), than low goal difficulty, (M = 1136.64, SE = 26.48). Thus, hypothesis 1 was supported.

Hypothesis 2: The second hypothesis stated that individuals given goals of higher specificity would have lower task performance variability than individuals given goals of lower specificity. Locke et al. (1989) utilized Scheffe's procedure to test for differences in variance (Winer, 1971). The analysis reported here replicates that same procedure as reported in Locke et al. (1989). Participants within each condition were randomly assigned to four groups. Then the variance of the averaged task performance scores was computed for each randomly assigned group. These variances were then converted to

logs. Thus, for this analysis, each condition had a sample size of 4. A one-way ANOVA found that high goal specificity, (M = 4.98, SE = 0.07), led to lower task performance variability, ($F(1,30) = 9.11, p < .001$), compared to low goal specificity, (M = 5.30, SE = 0.07).

The homogeneity test of variance is a second method of testing this hypothesis. For this analysis, the original averaged task performance scores were analyzed across the two goal specificity conditions, and it was found that the error variances of the two goal specificity conditions were not equal ($F(1,478) = 93.45, p < .001$) such that those who received goals of high specificity (SE = 32.88) had lower error variance compared to those who received goals of low specificity (SE = 34.14). Thus, hypothesis 2 was supported.

Hypothesis 3: The third hypothesis gives information on whether the goal difficulty effect is differential across goal specificity and it stated that goal specificity would moderate the relationship between goal difficulty and task performance such that high goal specificity would lead to higher task performance when goals are of high difficulty than when goals are of low difficulty more than when goals are of low specificity. The analysis found that goal specificity did moderate, ($F(1,471) = 108.41, p < .001, \omega^2 = .19$), the relationship between goal difficulty and task performance. However, the pattern of the interaction was not according to our expectations. Goal specificity moderated the relationship between goal difficulty and task performance such that only low goal specificity led to higher task performance when goals were of high difficulty than when goals were of low difficulty. This effect is shown in Figure 2. The

95% confidence intervals indicate that only the low difficulty, non-specific goal group was different from the other three goal groups.

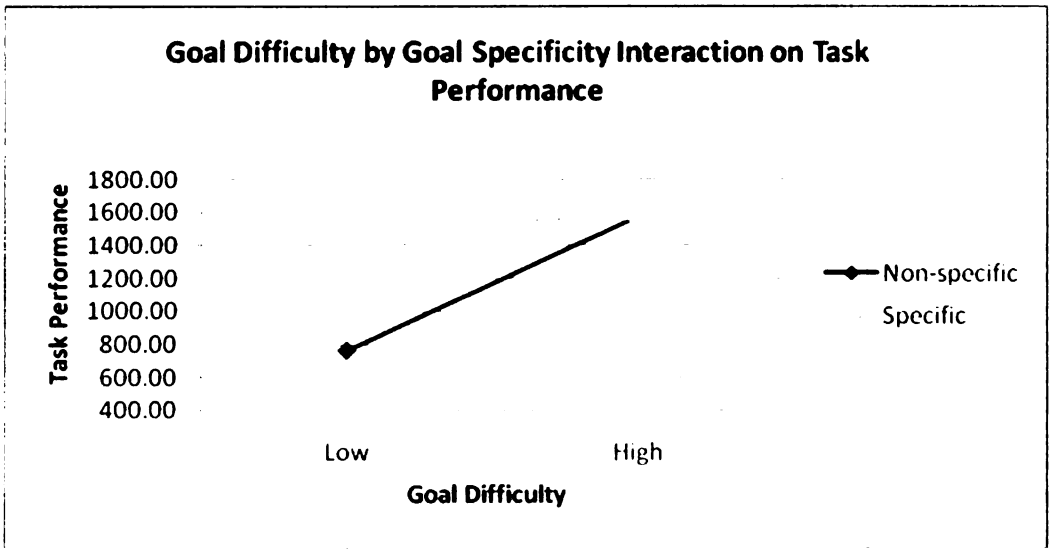

Figure 2. Goal difficulty by goal specificity interaction on task performance.

Hypothesis 4: The fourth hypothesis indicated that there would be a boundary condition on the goal difficulty by goal specificity interaction and it stated that normative information would moderate the relationship between goal difficulty, goal specificity, and task performance such that the goal difficulty by goal specificity interaction would only be present in the absence of normative information. The analysis found that normative information did moderate, ($F(1,471) = 3.32$, $p = .07$, $\omega^2 = .01$), the relationship between goal difficulty, goal specificity, and task performance. However, the pattern of the interaction was not according to our expectations. Instead, normative information simply increased task performance for each combination of goal difficulty and specificity. This effect is shown in Figures 3 and 4. The 95% confidence intervals indicate that in each normative information condition only the low difficulty, non-specific goal group was different from the other three goal groups.

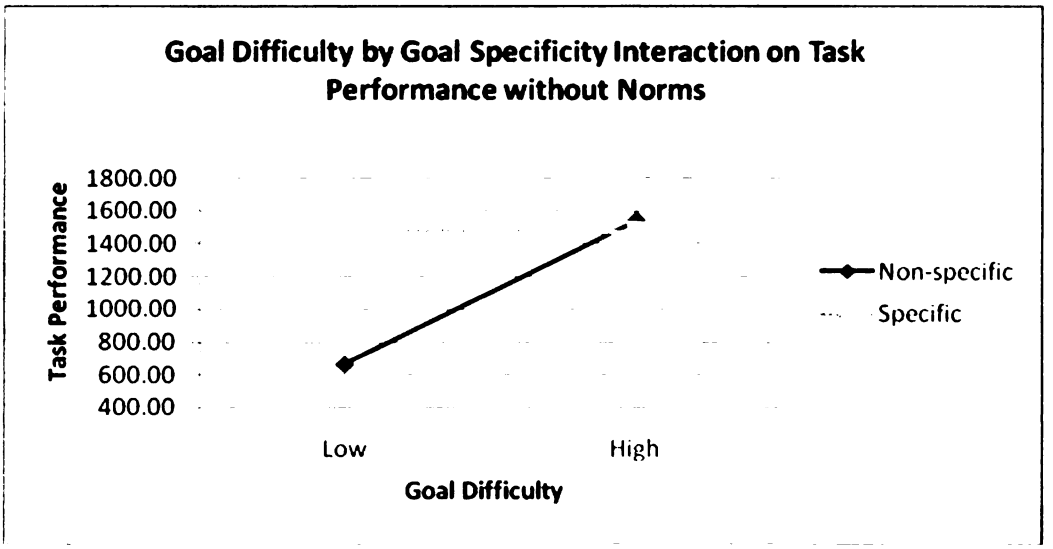

Figure 3. Goal difficulty by goal specificity interaction on task performance without norms.

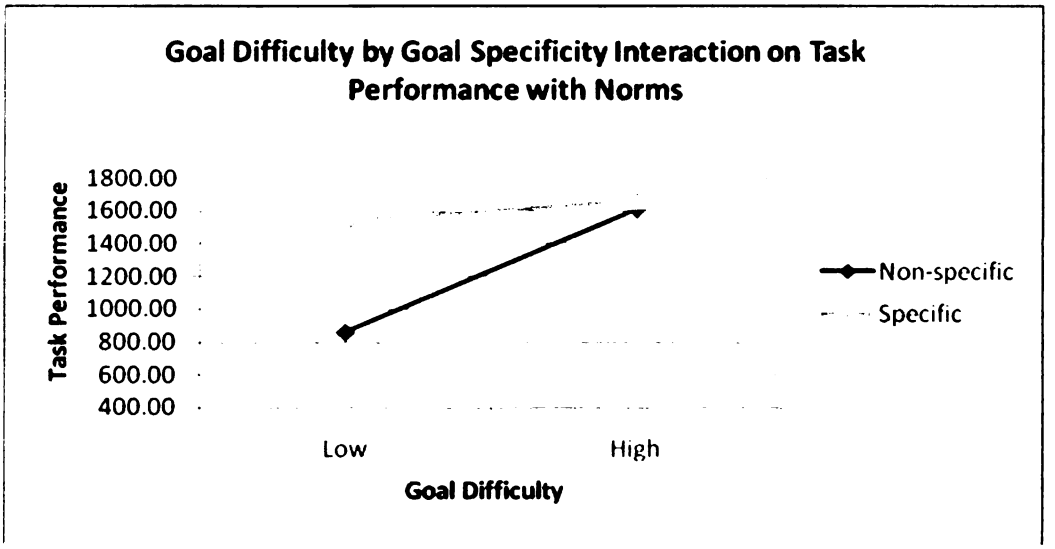

Figure 4. Goal difficulty by goal specificity interaction on task performance with norms.

Hypothesis 5: The fifth hypothesis stated that normative information would moderate the relationship between goal specificity and task performance variability such that goal specificity would only affect task performance variability in the absence of normative information. Following Locke et al. (1989), a two-way ANOVA found that normative information did not moderate, ($F(1,28) = 0.90$, $p = .35$), the relationship

between goal specificity and task performance variability. However, the homogeneity test of variance did find that the error variances of the conditions were not equal ($F(7,472) = 22.29, p < .001$). The pattern of the standard errors did follow the expectation, and it is shown in Figure 5.

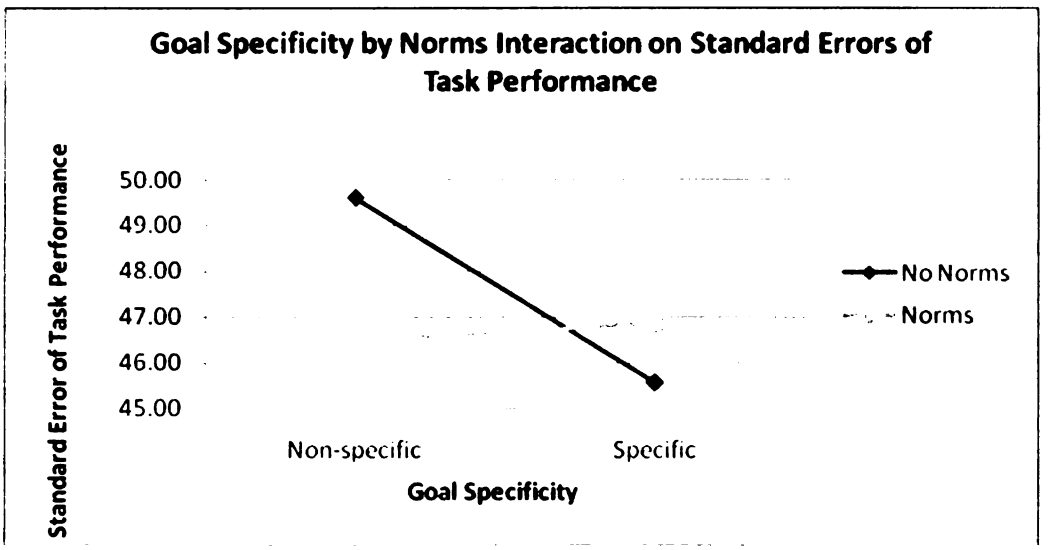

Figure 5. Goal specificity by norms interaction on standard errors of task performance.

The Effects of the Independent Variables on Process Variables

Hypothesis 6: The sixth hypothesis stated that goal difficulty would affect personal goal setting such that high goal difficulty would lead to higher personal goal setting than low goal difficulty. The analysis found that high goal difficulty, (M = 1696.27, SE = 28.26), led to higher personal goal setting, ($F(1,467) = 196.11, p < .001, \omega^2 = .30$), compared to low goal difficulty, (M = 1115.23, SE = 30.38). Thus, hypothesis 6 was supported.

Hypothesis 7: The seventh hypothesis stated that goal difficulty would affect effort such that high goal difficulty would lead to higher effort than low goal difficulty. The analysis found that high goal difficulty, (M = 3.86, SE = 0.05), led to higher effort,

($F(1,472)= 5.66, p <.05, \omega^2 = .01$), compared to low goal difficulty, (M = 3.68, SE = 0.06). Thus, hypothesis 7 was supported.

Hypothesis 8: The eighth hypothesis stated that goal specificity would affect goal commitment such that high goal specificity would lead to higher goal commitment than low goal specificity. The analysis did not find that high goal specificity, (M = 3.45, SE = 0.05), led to higher goal commitment, ($F(1,472) = 1.61, p = .20, \omega^2 = .00$), compared to low goal specificity, (M = 3.35, SE = 0.06). Thus, hypothesis 8 was not supported.

Hypothesis 9: The ninth hypothesis stated that goal difficulty would affect self-efficacy such that high goal difficulty would lead to higher self-efficacy than low goal difficulty. The analysis did not find that high goal difficulty, (M = 4.19, SE = 0.04), led to higher self-efficacy, ($F(1,472) = 0.10, p = .75, \omega^2 = .00$), compared low goal difficulty, (M = 4.20, SE = 0.04). Thus, hypothesis 9 was not supported.

Hypothesis 10: The tenth hypothesis stated that goal specificity would moderate the relationship between goal difficulty and personal goal setting such that high goal specificity would lead to higher personal goal setting when goals are of high difficulty than when goals are of low difficulty more than when goals are of low specificity. The analysis found that goal specificity did moderate, ($F(1,467) = 96.57, p <.001, \omega^2 = .17$), the relationship between goal difficulty and personal goal setting. However, the pattern of the interaction was not according to our expectations. Goal specificity moderated the relationship between goal difficulty and personal goal setting such that only low goal specificity led to higher personal goal setting when goals were of high difficulty than when goals were of low difficulty. This effect is shown in Figure 6. The 95% confidence intervals indicate that the low difficulty, non-specific goal group was different

from the other three goal groups, and the low difficulty, specific goal group was different from the high difficulty, specific goal group.

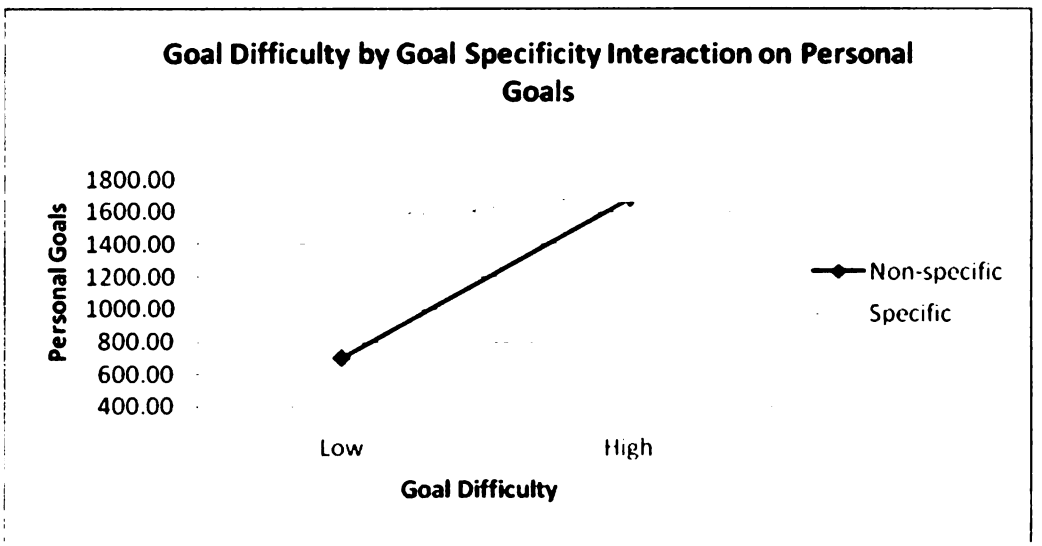

Figure 6. Goal difficulty by goal specificity interaction on personal goals.

Hypothesis 11: The eleventh hypothesis stated that goal specificity would moderate the relationship between goal difficulty and effort such that high goal specificity would lead to higher effort when goals are of high difficulty than when goals are of low difficulty more than when goals are of low specificity. The analysis found that goal specificity did moderate, ($F(1,472) = 3.91, p < .05, \omega^2 = .01$), the relationship between goal difficulty and effort. However, the pattern of the interaction was not according to our expectations. Goal specificity moderated the relationship between goal difficulty and effort such that only low goal specificity led to higher effort when goals were of high difficulty than when goals were of low difficulty. This effect is shown in Figure 7. The 95% confidence intervals indicate that the low difficulty, non-specific goal group was different from the high difficulty goal groups.

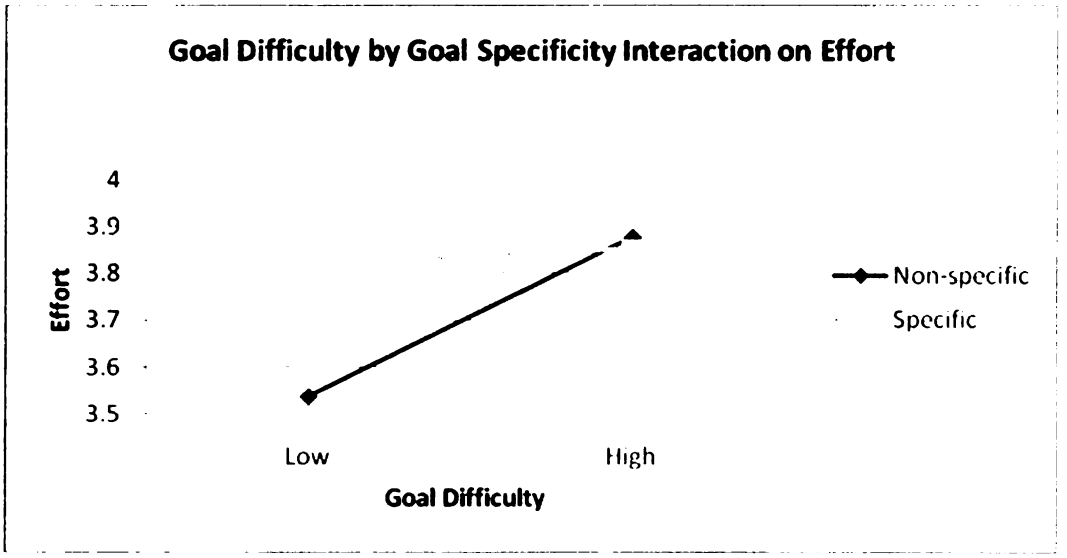

Figure 7. Goal difficulty by goal specificity interaction on effort.

Hypothesis 12: The twelfth hypothesis stated that normative information would moderate the relationship between goal difficulty and self-efficacy such that goal difficulty would affect self-efficacy only in the absence of normative information. The analysis found that normative information did marginally moderate, ($F(1,472) = 3.43$, $p = .07$, $\omega^2 = .01$), the relationship between goal difficulty and self-efficacy. This effect is shown in Figure 8.

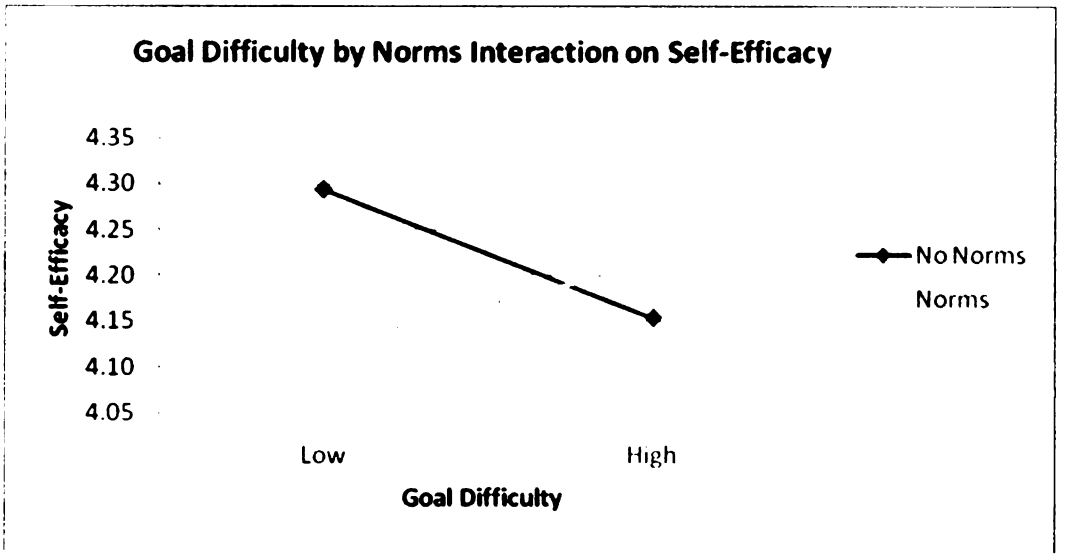

Figure 8. Goal difficulty by norms interaction on self-efficacy.

Hypothesis 13: The thirteenth hypothesis stated that normative information would affect personal goal setting such that when normative information is present individuals would set higher personal goals. The analysis found that normative information, (M = 1490.17, SE = 28.95), led to higher personal goal setting, (F(1,467) = 16.56, p = .001, ω^2 = .03), compared to no normative information, (M = 1321.32, SE = 29.72). Thus, hypothesis 13 was supported.

Hypothesis 14: The fourteenth hypothesis stated that normative information would affect effort such that when normative information was present individuals would display higher effort. The analysis found that normative information, (M = 3.77, SE = 0.05), did not lead to higher effort, (F(1,472) = 0.00, p = .98, ω^2 = .00), compared to no normative information, (M = 3.77, SE = 0.06). Thus, hypothesis 14 was not supported.

Hypothesis 15: The fifteenth hypothesis stated that normative information would moderate the relationship between goal difficulty, goal specificity, and personal goal setting such that the goal difficulty by goal specificity interaction would only be present in the absence of normative information. The analysis found that normative information did not moderate, (F(1,467) = 2.24, p =.14), the relationship between goal difficulty, goal specificity, and personal goal setting. However, the pattern of the interaction was similar to the three-way interaction found on task performance. This pattern is shown in Figures 9 and 10.

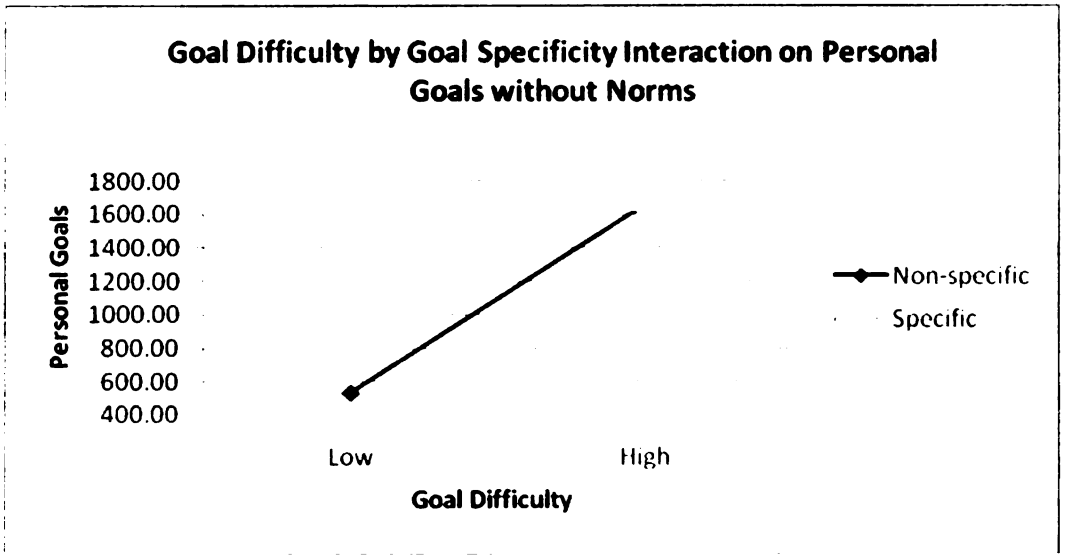

Figure 9. Goal difficulty by goal specificity interaction on personal goals without norms.

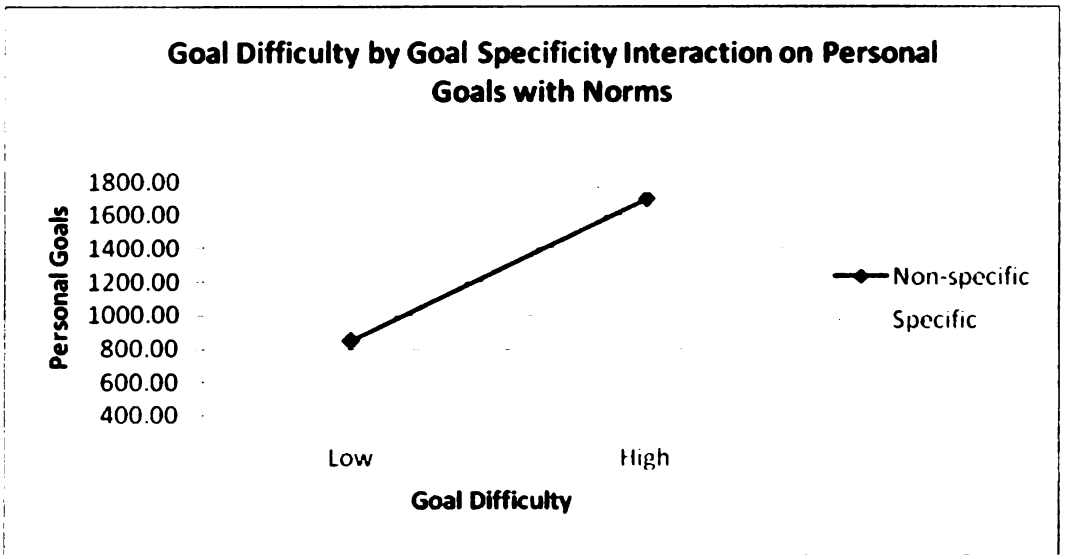

Figure 10. Goal difficulty by goal specificity interaction on personal goals with norms.

Hypothesis 16: The sixteenth hypothesis stated that normative information would moderate the relationship between goal difficulty, goal specificity, and effort such that the goal difficulty by goal specificity interaction would only be present in the absence of normative information. The analysis found that normative information did not moderate,

($F(1,472) = 0.76, p = .39$), the relationship between goal difficulty, goal specificity, and effort. Thus, hypothesis 16 was not supported.

Hypothesis 17: This hypothesis stated that in the presence of normative information individuals from each of the goal difficulty by goal specificity conditions would set similar personal goals over time. A one-way repeated-measures ANOVA indicated that the time by condition interaction, ($F(15,1160) = 0.39, p = .98$), was not significant. Thus, hypothesis 17 was not supported. Figure 11 clearly displays a lack of convergence between the different conditions.

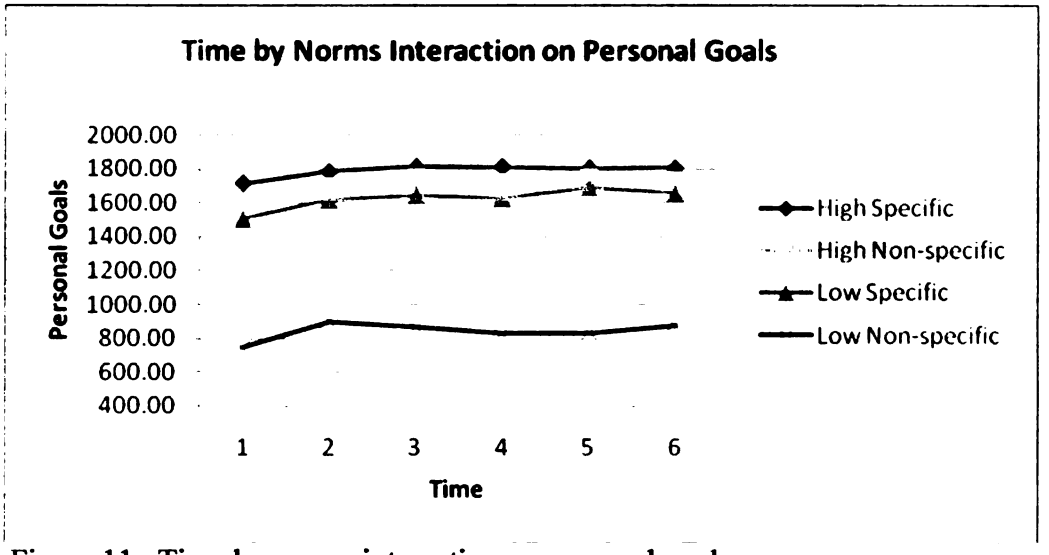

Figure 11. Time by norms interaction on personal goals.

The Effects of the Process Variables on Task Performance

Hypothesis 18: This hypothesis stated that self-efficacy would be positively related to personal goals, effort, and task performance; personal goals would be positively related to effort and task performance; and effort would be positively related to task performance. The correlations in Table 5 indicate that self-efficacy was positively related to personal goals ($r = .24, p < .001$), effort ($r = .43, p < .001$), and task performance ($r = .23, p < .001$), and personal goals was positively related to effort (r =

.33, $p < .001$), and task performance (r = .89, $p < .001$). Finally, effort was positively related to task performance (r = .27, $p < .001$).

Table 5. Means, standard deviations, correlations, and reliabilities of all variables.

	M	SD	1	2	3	4	5	6	7	8
1.Goal Difficulty	0.54	0.50	-							
2.Goal Specificity	0.52	0.50	-.01	-						
3.Norms	0.51	0.50	.00	-.05	-					
4.Goal Commitment	3.42	0.89	.23*	.05	-.01	.95				
5.Self-efficacy	4.19	0.64	-.02	.10*	-.04	.32*	.94			
6.Personal Goals	1436	608	.46*	.33*	.12*	.15*	.24*	.97		
7.Effort	3.78	0.86	.10*	.07	.00	.56*	.43*	.33*	.95	
8.Task Performance	1378	546	.39*	.32*	.11*	.11*	.23*	.89*	.27*	.96

Note. *$p < .05$. N = 480; except for personal goals where N = 475. 1 = High goal difficulty, specific goals, and norms; 0 = Low goal difficulty, non-specific goals, and no norms. The reliabilities on the diagonal are test-retest reliabilities across trials 5 through 10.

DISCUSSION

This study was interested in testing goal setting theory from a broader self-regulatory perspective (Karoly, 1993). More specifically, this study was interested in understanding the relationship between goal difficulty, goal specificity, and task performance. Goal setting theory stipulates that goal difficulty positively affects task performance, while specific goals lead to lower task performance variability than non-specific goals. However, there have only been a few studies (e.g., Locke et al., 1989; Wright & Kacmar, 1994) that have separately examined the effects of goal difficulty and specificity. One of the major questions raised in this study was if these effects are clearly understood because many goal setting studies had several limitations (e.g., differential feedback across assigned goal conditions) in their research design. This study attempted to investigate goal setting effects without these limitations. Hypotheses were derived from GST, but some of the results did not follow expectations. Thus, the results in this study serve to point out that goal setting effects are not clearly understood, and therefore, more research is needed. The results of this study can serve to inform future research.

Goal Difficulty and Goal Specificity

One set of hypotheses described effects of goal difficulty and specificity on task performance, task performance variability, goal commitment, self-efficacy, personal goals, and effort. Given that most of goal setting research has investigated the effects of goals on task performance, this will be discussed first, which will then be followed by a discussion of the results on process variables.

Effects on Task Performance and Task Performance Variability

The results confirmed expectations of a main effect of goal difficulty on task performance such that goals of higher difficulty led to higher task performance than goals of lower difficulty. However, this first result was averaged over goal specificity conditions. The goal setting literature indicates that there will be positive effects of goals on task performance whether or not these goals are specific or non-specific (Locke & Latham, 1990a). However, GST also suggests that specific, difficult goals will lead to higher task performance than non-specific, difficult goals. Thus, these propositions suggest that investigating the interaction between goal difficulty and specificity is useful in order to understand these effects.

In this study, goal specificity was found to be a moderator of the relationship between goal difficulty and task performance. However, the pattern of the interaction was not according to our expectations which again were derived from GST. As demonstrated in Figure 2, when goals were non-specific it was the case that goal difficulty positively affected task performance. However, when goals were specific, then low and high goal difficulty affected task performance similarly. The first thing to note from this pattern of interaction is that the specific, difficult goal group did not differ in task performance from the non-specific, difficult (i.e., "do your best") goal group. As mentioned previously, most goal setting studies only gave feedback to the specific, difficult goal group (e.g., Locke et al., 1981). In the present study, both goal groups received feedback. Thus, when individuals are given the opportunity to self-regulate by noting their feedback, then the results of the present study suggest that these two goal

groups will not differ. This implies that feedback may account for this effect. The second thing to note about this interaction is that the positive effect of goal difficulty on task performance only occurs when goals are non-specific, otherwise the effects are similar. Given the rarity of organizations wanting individuals to get a low score (i.e., non-specific, low difficulty goal manipulation), it might be concluded that in contexts that allow people to self-regulate, people will tend to perform similarly no matter what their initial assigned goal (e.g., specific, low difficulty goal manipulation).

Locke et al. (1989) did not find an interaction between goal difficulty and specificity on task performance in Study 1, but they did find one in Study 2. Study 1 had a small sample size (N = 16) in each condition, and thus any interaction pattern would have been difficult to detect statistically. The interaction pattern in Study 2 indicated a stronger slope from low to high goal difficulty in the specific goal condition as compared to the non-specific goal condition. Thus, the interaction pattern was different than from the one found in this study as there was only a positive slope from low to high goal difficulty on task performance when goals were non-specific. Locke et al. (1989) indicate that the listing task they utilized in Study 2 may not have been the best task to investigate the goal to task performance relationship as it may have limited task performance variability. Additionally, the instructions given to participants in Locke et al. (1989) specific goal conditions asked participants to list "exactly 2 ways, 3 ways, or 4 ways" (p. 280), while in this study we asked participants "to get a score" of 800 or 1700 points. The differences in the slopes from low to high goal difficulty when goals are specific may be explained by participants interpreting these sets of instructions differentially. The individuals in Study 2 of Locke et al. (1989) may have interpreted

their instructions strictly. That is, they achieved their assigned goal and did no more. On the other hand, the individuals in the present study may have viewed their assigned goals as a marker to surpass and achieve higher scores. This would also suggest that the positive slopes from low to high goal difficulty when goals are non-specific, observed in both studies, may be a result of individuals interpreting their assigned goals strictly. Since these goals are non-specific individuals would have to pick some referent point as their goal.

Task performance variability was investigated using the method specified by Locke et al. (1989). It was found that high goal specificity led to lower task performance variability compared to low goal specificity. Post-hoc analyses indicated that goal difficulty also affected task performance variability such that high goal difficulty led to lower between-person task performance variability compared to low goal difficulty. These results replicate findings from previous research (Locke et al., 1989; Wright & Kacmar, 1994). Additionally, post-hoc analyses indicated that the two-way interaction between goal difficulty and goal specificity was significant such that there was a strong negative slope from non-specific to specific goals when goal difficulty was low, but no slope when goal difficulty was high. Just like task performance, the significant interaction on task performance variability comes from the low difficulty, non-specific goal condition as compared to the other three conditions. If these results are coupled with the explanations provided for the interaction effect on task performance, then these results suggest that people in the low difficulty, non-specific goal group did not converge to the same degree as the other groups on their referent points. That is, the greater between-person variance for the low difficulty, non-specific goal group is probably a

result of those with norms performing around a score of 800 points, while those without norms performing around a score of 600 points. The performance of the three goal groups did not change as much (see Figures 3 and 4).

Effects on Goal Commitment, Self-efficacy, Personal Goals, and Effort

The effects of assigned goals on task performance are considered to be explained by goal commitment, self-efficacy, personal goals, and effort (Locke & Latham, 1990a). Thus, a second set of hypotheses predicted relationships between assigned goals and these variables. It was not found that goal specificity affected commitment to the assigned goal. However, post-hoc analyses indicated that goal difficulty did affect goal commitment such that high goal difficulty led to higher commitment to the assigned goal than low goal difficulty. Additionally, an interaction between goal difficulty and goal specificity was found such that the positive slope was steeper from low to high goal difficulty when goals were non-specific as opposed to specific goals. Given that this measure captures a valence component of the assigned goals, the goal difficulty main effect result indicates goals of lower difficulty were less valued than goals of higher difficulty. The interaction result indicates that the difference in how much assigned goals were valued was greater when there were non-specific goals as opposed to specific goals.

It was not found that goal difficulty affected self-efficacy. However, post-hoc analyses indicated that goal specificity did affect self-efficacy such that self-efficacy was higher when goals were specific as opposed to non-specific. The interaction between goal specificity and difficulty on self-efficacy indicated that when goals were of low difficulty there was a steep positive slope from non-specific to specific goals, while the slope was flat when goals were of high difficulty. Thus, the effect of goal specificity

occurs when goals are of low goal difficulty. Given knowledge of their task performance, these results may be interpreted as indicating that the low difficulty, specific goal group was confident in that they could do well in the simulation as they had exceeded their original assigned goal, while the low difficulty, non-specific goal group never exceeded their assigned goal, and thus, were less confident in their performance. This additionally implies that the high difficulty goal groups did not differ in their self-efficacy because they were not exceeding their high expectations.

It was found that goal difficulty affected personal goal setting and effort such that high goal difficulty led to higher personal goal setting and effort compared to low goal difficulty. The interaction between goal difficulty and specificity on personal goal setting and effort followed the same pattern as that found on task performance. As demonstrated in Figures 6 and 7, when goals were non-specific it was the case that goal difficulty positively affected personal goal setting and effort. However, when goals were specific, then low and high goal difficulty affected personal goal setting and effort similarly. Thus, these results suggest that the interaction effect found on task performance is carried through personal goals and effort.

Normative Calibration

The interaction effects of goal difficulty and specificity were expected to be only present in the absence of normative information as it was proposed that normative information would make participants behave similarly across the goal difficulty by specificity conditions. The results with respect to task performance and task performance variability will be discussed first, followed by the effects on process variables.

Effects on Task Performance and Task Performance Variability

Normative information did moderate the relationship between goal difficulty, goal specificity, and task performance. However, the pattern of the interaction was not according to expectations. As demonstrated in Figures 3 and 4, the pattern of the goal difficulty by goal specificity interaction on task performance does not change across normative information conditions. Instead, the means of each of the goal difficulty by goal specificity conditions increases, especially the low difficulty non-specific goal group. Interestingly, the mean of this group in the presence of norms was around the assigned low specific goal (i.e., 800 points). Additionally, these results are interesting as the low difficulty non-specific goal group did not increase their performance to the levels of the other groups even though they understood that their performance levels were at the 10^{th} percentile level. Thus, they are restraining their performance levels, while the low difficulty specific goal group is not as this group achieves performance levels comparable to the remaining two groups. This again may be explained by participants in different goal conditions interpreting their instructions differently where the low difficulty, non-specific goal group is interpreting as a strict benchmark. In the presence of norms they may have interpreted the lowest percentile score (i.e., 800 points) as their benchmark, and thus, the difference in this goal group across normative information conditions.

The analysis on task performance variability did not find that normative information moderated the relationship between goal specificity and task performance variability. However, the homogeneity test of variance indicated that the error variances of these conditions were not equal. Figure 5 indicates that the pattern of the standard errors in these conditions was according to expectations. That is, standard errors were

similar across the goal specificity conditions when norms were presented, but the standard error for the specific goal group was lower than the standard error of the non-specific goal groups when norms were not presented. This suits the previous discussion on task performance variability. When norms were present the non-specific individuals were better able to converge to striving for the same score.

Effects on Self-efficacy, Personal Goals, and Effort

Another set of hypotheses predicted how normative information affects the mediators of the relationship between assigned goals and task performance. It was found that norms marginally moderated the relationship between goal difficulty and self-efficacy. That is, when norms were not presented the slope from low to high goal difficulty was negative, but when norms were presented the slope was positive. Thus, when norms were not present, the people in the low goal difficulty group believed they could do well on the simulation as compared to people in the high goal difficulty group probably because they were exceeding their assigned goal, but when norms were present the self-efficacy of the low goal difficulty group was lower as compared to the high goal difficulty group as norms gave each of these groups material for interpreting their assigned goals.

It was found that normative information affected personal goal setting such that those presented norms set higher personal goals compared to those not presented with norms. Additionally, it was expected that normative information would moderate the relationship between goal difficulty, goal specificity, and personal goal setting. This three-way interaction was not significant. However, the pattern of the interaction followed the pattern of this interaction on task performance. That is, those individuals

who were presented norms tended to set higher personal goals across all four goal difficulty by specificity conditions. This suggests that the pattern of the three-way interaction may be explained by the personal goals that people in the different conditions are setting. Finally, it was hypothesized that individuals would set similar personal goals over time across the normative information conditions. However, as demonstrated in Figure 10, the low difficulty, non-specific goal group never raised their personal goals to match the personal goals set by the other three groups. Again, this provides an explanation as to why this group performed the worst and that they may have set a referent for each achieving their goal and not doing anything beyond it.

The analysis on effort did not find that norms positively affected effort or the three-way interaction. Thus, this suggests that the effect of normative information on task performance is only operating through personal goal setting.

Relationship between Goal Commitment, Self-efficacy, Personal Goals, Effort, and Task Performance

The final set of hypotheses pertained to the relationships between the process variables and task performance. As indicated in Table 5, all of the correlations between these variables were positive. This suggests that the effects of goal difficulty, goal specificity, and norms on task performance are mediated by these process variables giving support to the heuristic model presented in Figure 1.

Synthesis of Results

The results of the present study did not always follow expectations. GST states that goal difficulty positively affects task performance, while goal specificity restricts task performance variability (Locke & Latham, 1990). This study, though, found that

goal specificity also positively affected task performance. The interaction of goal difficulty and specificity indicated that goal difficulty has differential effects on task performance when goals are non-specific, while goal difficulty does not have differential effects on task performance when goals are specific. In fact, only the mean of the low difficulty, non-specific goal group is different from the means of the other three groups. This same pattern is seen on personal goal setting and effort, which are the two main mediators of the relationship between assigned goals and task performance. Thus, the pattern of the interaction on task performance may be explained by the similar patterns of the interaction exhibited on personal goal setting and effort. Normative information did not account for this interaction as expected. The most important effect of normative information was to adjust the self-efficacy expectations of the different goal groups.

The results found in the present study do not correspond to findings in other goal setting research (Locke & Latham, 1990a). For one, there was not a difference between the specific, difficult goal group and the non-specific, difficult goal group. This difference may potentially be explained by feedback. That is, most goal setting studies only provide feedback to the specific, difficult goal group. However, in the present study both goal groups were provided feedback, and thus, both goal groups were able to self-regulate. The interaction pattern of goal difficulty and specificity on task performance and mediating variables differed from that found in previous research. Locke et al., (1989) found that the goal difficulty effect was stronger when goals were specific. However, the present study found that the goal difficulty effect exists only when goals were non-specific. An explanation for this difference may be the way participants interpreted their assigned goals. In the present study, individuals receiving a non-specific

goal may have been interpreting their goals as standards to achieve, while individuals receiving specific goals may have been interpreting their goals as standards to surpass. This explanation requires that the non-specific goal group had to set their standard in some way. When there were no norms, individuals were solely basing their standards on their own performance, and when there were norms, individuals could base their standards on the norms. This explanation is supported by the results found in this study. That is, when there were norms, individuals in the low difficulty, non-specific goal group adjusted their goals and task performance to the lowest percentile score in the norms. Examining this goal group's goals over time showed that they never raised their personal goals to those of the other assigned goal groups. That is, they chose a standard and did not vary from it.

Limitations and Future Research

In the present study, it is clear in terms of task performance, the low difficulty, non-specific goal group behaved differently from the other three goal groups. The present study told participants that negative scores did not count toward achieving their assigned goal. This was done as a result of initial data collection where participants in the low difficulty, non-specific goal group were achieving high negative scores when participants were not told anything about interpreting their assigned goal. The adjustment in instructions was made because other goal setting studies have used tasks where the scale of task performance only included positive scores (e.g., Locke et al., 1989). This is something that needs to be explored further as the instructions of negative scores not counting toward achieving one's assigned goal were most useful for the non-specific, low difficulty goal group in interpreting their assigned goal. However, it would

be expected that the goal difficulty by specificity interaction would be even more dramatic as the non-specific, low difficulty goal group would perform on the negative side of task performance. All of this points again to the idea that the assigned goal groups are interpreting their goals differentially. That is, one possible explanation for the pattern of the results in the present study may be a result of how individuals in different goal conditions are interpreting their assigned goals as either standards to achieve or standards to surpass.

One way to examine this explanation may be done by the following manipulation: the goal instructions utilized in the present study may be used versus instructions that inform participants to get their assigned goal (e.g., "get a low score") or higher. Given the present results, any effect would only be expected on the low difficulty side of non-specific goals. That is, in the group that would receive the instructions utilized in the present study, it is expected that the goal difficulty by specificity interaction would like the interaction displayed in Figure 2. However, in the group that would receive the other instructions, it is expected that the goal difficulty by specificity interaction would not be present as all four groups would achieve similar task performance. This finding would add credence to the idea that individuals in the non-specific goal conditions view their assigned goals as standards to achieve versus standards to surpass.

Another way to examine this explanation may be done by investigating a similar effect on specific goals only by the following manipulation: the goal instructions utilized in the present study versus instructions that indicate to achieve exactly the specified score (e.g., "get exactly a score of 800 points"). Naturally, it would be expected that the specific, high difficulty goal group will perform similarly across the two sets of

instructions. However, if the specific, low difficulty goal group performs as instructed, then they would perform worse than in the present study. That is, they would get exactly a score of 800 points and achieve no more compared to the 1600 points they achieved in the present study. Thus, this finding would additionally indicate that the present results may be explained by whether participants interpret their goals as performance standards to achieve versus standards to surpass.

The discussion of present findings indicates another area of future research. One of the key variables not manipulated in the present study was feedback. That is, individuals in all conditions were presented with feedback as it was argued that previous research had prevented self-regulation in non-specific goal conditions by not giving individuals in those conditions feedback. However, knowledge of results has been presented as one of the explanations for differences between present findings and previous research (e.g., Locke et al., 1989). Although previous research has examined the effects of assigned goals and the presence or absence of feedback (e.g., Becker, 1978), there have been no studies that have examined the effects of goal difficulty and specificity separated from each other and the presence or absence of feedback. In the present study, individuals that were presented with norms had the choice of choosing their personal goals based on one's own performance or based on the normative information. A study designed to separate calibration based on one's own performance versus based on norms may also provide insight to the present findings. Therefore, a follow-up study may utilize the conditions of the present study where feedback is not presented to any condition. GST indicates that assigned goals will not have an impact on task performance beyond initial effects when there is no feedback (Locke & Latham,

1990a). Given this, it might be expected that task performance would decrease for all assigned goal conditions, but even more so for the specific, low difficulty goal group as it would not be expected for this group to perform beyond the initial effect of this goal (presumably around 800 points). Thus, the goal difficulty by specificity interaction would disappear when there is no feedback if individuals in the other goal conditions decrease their task performance by smaller margins. Additionally, it would be expected that if one were to compare the non-specific, difficult goal group without feedback to the specific, difficult goal group with feedback (i.e., the specific, difficult goal group from the present study), then the methodology of most goal setting studies would be replicated and one should find an effect. These results would suggest that feedback plays an important role in explaining the effects of assigned goals on task performance.

Conclusion

The present study was interested in taking a closer look at the effects of assigned goals on task performance and the explanations provided for these effects. Perhaps the most definitive conclusion of the present study is that our understanding of how different goal attributes differentially affect task performance is not entirely clear, and thus, more research is required as the pattern of findings in the present study did not follow predictions derived from GST. However, testable explanations have been proposed to continue further work in this area. This work, in turn, will surely lead to a more complete understanding of how different types of goals affect task performance than is currently known.

APPENDICES

APPENDIX A

Consent and Debriefing Forms

Informed Consent

Project Title: Decision Making Training

Investigators' Names: Goran Kuljanin & Dr. Steve Kozlowski

Description and Explanation of Procedure:

This research study contains two parts: an online questionnaire and an experiment in a laboratory. You have by now completed the online questionnaire. In this part of the research study you will be re-introduced to the simulation, perform the simulation, and complete measures that are related to the simulation. This study is about computer-based training, learning, and performance. You will learn how to assess the attributes of radar contacts and to decide what action should be taken.

Those not interested in this research can seek other alternatives and research studies for subject pool credit by consulting their instructor or the Department of Psychology subject pool web site.

Estimated time required: 30 minutes for the online questions [1 Psychology subject pool credit]. 120 minutes for completing the experiment [4 Psychology subject pool credits].

Risks and discomforts: None anticipated

Benefits: You gain experience with simulation-based training, which is increasingly used in organizations, and you will learn about the process of conducting psychological research.

Agreement to Participate:

Participation in this research study is completely voluntary. You also give permission to the experimenters to assess or verify your ACT/SAT score from University Register. You have been fully informed of the above-described procedure with its possible benefits and risks. You are free to withdraw this consent and discontinue participation in this project at any time without penalty. For those participants who are receiving course credit for participation, if you choose to withdraw from the study prior to its completion, you will receive credit for the time you have spent in the study (1 credit per 30 minutes).

The investigator will be available to answer any questions you may have. If, at any time, you feel your questions have not been adequately answered or you want to discuss the research, please contact the investigators (Goran Kuljanin, 432-7069; Steve Kozlowski, 353-8924). If you have questions or concerns regarding your rights as a study

participant, or are dissatisfied at any time with any aspect of this study, you may contact—anonymously, if you wish— Peter Vasilenko, Ph.D., Director of Human Research Protections, (517)355-2180, fax (517)432-4503, e-mail irb@msu.edu, mail 202 Olds Hall, Michigan State University, East Lansing, MI 48824-1047.

You must 18 years of age to participate in this research study. If you agree to participate, please enter the information requested at the bottom of this form. The reason you are asked for your name and PID is to ensure that you receive credit for participating in the study. Participants' identity data will be kept on a secure server belonging to Steve Kozlowski until the end of data collection (approximately 3 months) and only the investigators will have access to the data. Your identity will not be associated with your responses for any data analyses. Your confidentiality will be protected to the maximum extent allowable by law.

If you do not consent, then tell the experimenter that you will not be participating in this research study.

Debriefing Form

Thank you for your participation in this investigation. The study in which you just participated was designed to examine how individuals self-regulate in training-based simulations. If you are interested in obtaining more information, please contact Goran Kuljanin at his e-mail address: kuljanin@msu.edu.

The questions you answered have no right or wrong answers and have no significance other than to help us understand how assigned goals affect task performance. We will de-identify the data at end of data collection (i.e., end of Fall semester 2007), and we will keep the data confidential at all times. All of the information we collected will be used to understand how individuals self-regulate in training-based simulations. Your help will be invaluable in this regard.

If you have any questions about this study or would like to receive a copy of the results when they are complete, please notify the investigator now. We have tried to make your experience in this study as interesting for you as possible and are open to suggestions for improvements. If you have any additional questions about the study or your involvement in it, contact one of the Principal Investigators listed below. If you have any questions or concerns regarding your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact - anonymously, if you wish - Peter Vasilenko, Ph.D., Director of the Human Subject Protection Programs at Michigan State University, by phone: (517) 355-2180, fax: (517) 432-4503, email: irb@msu.edu, or regular mail: 202 Olds Hall, East Lansing, MI 48824.

APPENDIX B

Measures

Demographics:

1]. What is your gender?
-Female
-Male
2]. What is your age?

Declarative Knowledge

The following is a knowledge test about what you have just learned.

1].If a Response is Given, what is the Intent of the contact?
-Military
-Hostile
-Civilian
-Peaceful
2].A submarine may have which of the following characteristics?
-Speed 30 knots
-Speed 40 knots
-Speed 20 knots
-Speed 60 knots
3].If a contact's Intelligence is Private, what Class does this suggest for the contact?
-Air
-Civilian
-Military
-Peaceful
4].If a contact's Speed is 40 knots, what Type is this contact?
-Air
-Surface
-Civilian
-Military
5].If a contact's Intelligence is Platform, what Class does this suggest for the contact?
-Sub
-Civilian
-Military
-Hostile
6].If a Response is No Response, what is the Intent of the contact?
-Surface
-Hostile
-Civilian
-Peaceful

7]. If a contact's Speed is 27 knots, what Type is this contact?
-Surface
-Military
-Sub
-Peaceful
8]. If the Intent of a contact is Peaceful, what is the Final Engagement decision?
-Shoot
-Clear
9]. If the Intent of a contact is Hostile, what is the Final Engagement decision?
-Shoot
-Clear
10]. What is the correct order of decisions for each contact?
-Type, Class, Intent, Final Engage
-Class, Type, Intent, Final Engage
-Intent, Class, Type, Final Engage
-Class, Intent, Final Engage, Type
11]. What is the zoom function used for?
-To locate contacts that are not in the current viewing range
-The zoom function is not used
12]. How is your score computed for each contact?
-Gain 100 points for making each of the four decisions correctly, and lose 100 points for making each of the four decisions incorrectly
-Gain 200 points for making each of the four decisions correctly, and lose 200 points for making all four decisions incorrectly
-Gain 100 points for making all four decisions correctly, and lose 100 points for making any one of the four decisions incorrectly
-Gain 200 points for making all four decisions correctly, and lose 200 points for making any one of the four decisions incorrectly
13]. Do scores below zero count toward achieving your goal?
-No
-Yes

Goal Commitment

This set of questions asks you to rate your commitment to the ASSIGNED goal you just saw. Thinking about your ASSIGNED goal, please use the scale to make your ratings for these questions.

1]. Quite frankly, I don't care if I achieve my ASSIGNED goal or not.
2]. I am strongly committed to pursuing my ASSIGNED goal.
3]. I think my ASSIGNED goal is a good goal to shoot for.

Self-efficacy

This set of questions asks you to describe how you feel about your capabilities for performing the simulation.

1]. I am confident I can meet the challenges of this simulation.

2]. I am confident in my understanding of how information cues are related to decisions.

3]. I am certain that I can manage this simulation.

Personal Goal

This question asks you to set a PERSONAL goal for the next trial.

1]. What is your PERSONAL goal for the next trial?

Effort

This set of questions asks you about how much effort you will put into the simulation during the next trial.

1]. I will put a great deal of effort into my performance on this simulation in the next trial.

2]. I will try very hard to perform well on this simulation in the next trial.

3]. I will work very intensely on this simulation in the next trial.

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