THE EFFECTS OF ASSIGNED GOALS ON GOAL ORIENTATION, LEARNING, AND PERFORMANCE IN A NEW AND COMPLEX TASK

by

CHIA, HO-BENG

B.B.A., The University of Singapore, 1979
B.B.A. (Hons)., The University of Singapore, 1980

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FACULTY OF COMMERCE AND BUSINESS ADMINISTRATION
INDUSTRIAL RELATIONS MANAGEMENT DIVISION

~~Department of~~ ______________________

The University of British Columbia
Vancouver, Canada

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ABSTRACT

Contrary to the usual goal setting effect, researchers are finding that in new and complex tasks, specific and difficult (SD) goals may be worse than "do your best" (DYB) goals.

Dweck and colleagues' research and ideas on goal orientation provide some insight into the possible causes of these observations. Dweck (1986, 1990) suggests that the goal orientation (proving vs. learning) which the person adopts affects learning and performance. She suggested that when both (1) the perceived task ability (self-efficacy) of participants is low, and (2) performance set-backs occur, participants with proving orientations often show deficits in learning and performance, while those with a learning orientation do not. This dissertation argues that in the initial trials of complex tasks, participants are more likely to encounter the two conditions of low self-efficacy and set-backs. If SD goals lead to a proving orientation, then learning and performance may be impaired.

This dissertation re-framed Dweck and colleagues' work within goal setting theory to test whether: (1) different assigned goals (learning, proving, SD, and DYB goals) affect goal orientation, learning, and performance; (2) goal setting affects new and familiar tasks differently; and (3) SD goals lead to a proving orientation.

The results showed that learning and no goals led to better performance than the proving goals especially when the task was unfamiliar. However, SD and DYB goals had no differential effects on proving orientation, learning, and performance. Dweck's hypothesized processes were also not supported: although assigned goals affected learning orientation, learning orientation did not affect either learning or performance. Exploratory analyses found that learning and performance were also unaffected by two important mediators in motivational processes - self-efficacy and personal goal levels.

Thus, the performance difference between learning and proving goals could not be accounted by the motivational processes of both goal setting and self-efficacy theory. An alternative script base explanation that is consistent with the findings is discussed.

The results demonstrated the limitation of motivational processes in accounting for goal effects. Furthermore, they showed that traditional goals (SD and DYB goals) had little effect on performance whereas learning and proving goals did.

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I. INTRODUCTION

Goal Setting Theory

In a review of motivation theories, Pinder (1984) observed that "goal setting theory has demonstrated more scientific validity to date than any other theory or approaches on work motivation." Miner (1984), in reviewing emerging theories in organizational sciences, rated goal setting theory high on both validity and usefulness. Lee and Earley (1988) arrived at a similar conclusion after surveying 127 leading scholars in organizational behavior and industrial psychology.

The major finding of goal setting research is that specific difficult goals (SD goals), given acceptable levels of commitment, lead to better performance than easy goals, "do your best" goals (DYB goals), or no-goals (Latham & Yukl, 1975; Locke & Latham, 1990; Locke, Shaw, Saari, & Latham, 1981). The positive effects of goal setting appear in both laboratory and field settings (Katzell & Guzzo, 1983). Furthermore, goal setting is the essence of management techniques and systems such as management by objectives (Carroll & Tosi, 1973), performance appraisal (Latham & Wexley, 1993), and quality control circles (Wood, Hull, & Azumi, 1983).

Criticisms of Goal Setting Research

The strength of the empirical findings is the result of systematic research along two goal attributes - goal difficulty and goal specificity. This concentration on the two goal attributes has sometimes drawn criticisms about the theory's breadth. Austin and Bobko (1985) pointed out that goal setting research "originates from a relatively narrow and unidimensional world view" and research should extend its boundaries. They suggest exploring different goals, goal attributes, and dependent measures.

Wood and Bailey (1985) criticized goal setting research for focusing excessively on simple tasks while neglecting complex ones. Other prominent researchers (Campbell, 1984, 1988, 1991; Campbell & Gingrich, 1986; Earley, Connolly & Lee, 1989; Locke et al., 1981; Wood, Mento, & Locke, 1987) argued that in complex tasks, performance was less contingent upon the goal effects of attention, direction, effort, and persistence than upon developing an appropriate strategy. They therefore argued that strategy development was an important process mediating the relationship between goals and performance.

Evidence supports the contention that goal setting effects in complex tasks may differ from those in simple tasks. The meta-analytical review by Wood et al. (1987) found that goal setting effects were strongest for simple tasks and weakest for complex tasks. They found that task strategy development mediated the goal effects in complex tasks.

Wood et al. (1987) also found that few studies employed complex tasks. Among those studies, however, several found results contrary to goal setting theory's core findings. They found that SD goals resulted in no better (Bandura & Wood, 1989; Kanfer & Ackerman, 1989; Wood, Bandura & Bailey, 1990), or poorer performance than DYB goals (Earley, Connolly & Ekegren, 1989; Kanfer & Ackerman, 1989).

A closer look at these studies suggests that the contrary findings tended to occur when the task was complex and the participants were inexperienced (Locke Latham, 1990). Once the participants gained experience, those with SD goals tended to do better than those with DYB goals. This observation suggests that learning affects the goal - performance relationship.

Wood and Bailey (1985) argue that the critical element in the goal - strategy - performance linkage is the quality of the task strategy which "will depend upon the level of task relevant knowledge which, in turn, is a function of learning." Earley, Lee, and Hanson (1990) found some support for this contention in a correlational field study. Winters and Latham (in press) found that goals on the number of task strategies to be generated (which they called learning goals) resulted in the improved performance on a complex task. Unfortunately, exactly how goals affect the learning of complex tasks is still unknown. Thus these researchers called for more research into the learning processes associated with goal setting.

Dweck's Goal Orientation

One potentially informative area of research that relates goal attributes to learning and performance is that of Dweck and her colleagues (Dweck, 1986, 1990; Dweck & Leggett, 1988; Elliott & Dweck, 1988). Their research focuses on how motivation affects the acquisition and use of skills in children. Their social cognitive perspective is compatible with goal setting theory and links motivation, learning, and performance. This dissertation, therefore, aims to integrate their findings into goal setting theory.

Dweck and Leggett (1988) suggest that in achievement situations, the personal goals that children pursue can be classified as either having a proving orientation or a learning orientation. (Note that they used the term "performance goal orientation" instead of "proving orientation." The term "performance goals" has a different meaning in the goal setting literature, so this paper uses "proving goals" instead.) Although the two orientations can be pursued simultaneously, emphasis may be put on one or the other. Those who focus on a proving orientation seek to "maintain positive judgments of their ability and avoid negative judgments by seeking to prove, validate, or document their ability and not to discredit it." Those who focus on a learning orientation, however, seek to "increase their ability or mastery at the new task" (Dweck, 1986).

Dweck and Leggett (1988) reported that children with an emphasis on a proving orientation showed more performance variance than those with a learning orientation. When children focused on a proving orientation, those with low perceived task ability exhibited maladaptive behaviors following setbacks. These maladaptive behaviors included the repetition of ineffective strategies, the development of fewer new strategies, and the failure to use known and more effective strategies. Those who focused on a learning orientation, however, exhibited self-instruction and self-monitoring, more analysis and development of strategies, more use of appropriate task strategies, and more transfer of learning to new situations.

Some Theoretical Concerns

Dweck's research links the attributes of goals, the development and use of strategies, and the transfer of learning. It will, therefore, be interesting to goal setting theorists at a time when the research focus is on strategy development in complex tasks. However, an important theoretical concern is whether Dweck's findings with children can be generalized to an adult population in the work-place.

Intuitively, the idea that people pursue proving orientations has considerable face validity in organizational life. Organizations commonly use job performance as an important indicator of ability (Beehr, Taber, & Walsh, 1980; London & Stumpf, 1983; Taylor, 1975). Proving one's ability is important in securing promotions (London & Stumpf, 1983) and in gaining the cooperation of peers and subordinates. People also take difficult assignments to see if they are ready for a more senior position. Thus, many aspects of the work environment cue people to prove their ability through job performance.

People also pursue a learning orientation in the work-place. Often, we take jobs or assignments because they provide an opportunity to gain experience in various aspects of work. These learning experiences, we believe, will improve our chances for promotion and employment. Management practices such as job enlargement, job rotation, and job design rely on the premise that people wish to learn and that organizations benefit from this learning. It therefore appears that important aspects of work-life do cue the pursuit of both proving and learning orientations.

Unfortunately, other than the research done by Dweck and her colleagues, we know little about the effects of goal orientation on performance. We know even less about the mediating variables that govern their potential relationship. Thus, studies on goal orientation can contribute to confirming this theoretical issue.

Some Practical Possibilities

Assuming that Dweck and colleagues' findings are replicable in an adult working population and that goal orientation can be influenced with assigned goals, then there may be several practical possibilities. Staw, Sandelands, and Dutton (1981) argue that people contribute to organizational decline when they fail to learn new and appropriate responses to changes in the business environment. They argue that environmental changes represent threatening situations that can induce people to use well learned but ineffective strategies instead of developing new ones. Their description of maladaptive behaviors echo Dweck's findings. These findings also imply that environmental changes may lead employees to experience setbacks and low self-efficacy.

Elliott and Dweck's (1988) findings, however, suggest some hope: employees may still maintain their persistence, motivation, and performance if they adopt a learning orientation. Furthermore, if learning orientation can be induced through assigned goals, then goal setting can be used as an intervention technique for countering dysfunctional behaviors such as those described by Staw, et. al. (1981).

Currently, many interventions aimed at correcting dysfunctional behaviors after failure are based on studies in causal attributions, learned helplessness, and self-efficacy. The interventions focus on modifying each individual's perception (e.g., causal attribution of failure, perceptions of controllability, and perceptions of self-efficacy). Goals on the other hand can be set for entire work groups; the intervention is thus easier to administer. Moreover, in most organizations, goal setting is already implicitly incorporated into many of the performance targeting systems (e.g., budgeting and performance appraisal systems). If learning goals do induce or maintain adaptive behaviors, these goals can easily be included into existing processes. Performance targeting and appraisal systems can therefore be made more effective and less harmful to the individual.

Purpose of this Study

Dweck and her colleagues' work on the goals, learning, and task performance of children may offer some insight into causes for the equivocal results found with SD and DYB goal in new and complex tasks. Their work suggests that the goal orientation that people adopt may affect learning and the use of skills and knowledge and thus the performance of the task.

This study examines whether goal orientation is a useful variable within the framework of goal setting theory. It also investigates whether externally assigned learning and proving goals can affect goal orientation, learning, and performance. The study attempts to better understand the process with which assigned goals affect the learning of new tasks.

The study crosses traditional goals (SD and DYB goals) with learning and proving goals. This enable us (1) to compare the relative effects of all the goal conditions; and (2) to detect any interactions between learning and proving goals, and the traditional goals. Furthermore, the study investigates if the effectiveness of different goals is contingent upon task familiarity.

II. LITERATURE REVIEW

Goal Setting Theory

Many models of human behavior suggest that people are purposive, and that goals direct their actions. Goals are, therefore, viewed as immediate precursors and regulators of many human actions. Based on this underlying assumption, goal setting theory has evolved as a body of empirical findings about the relationship between goals and task performance. It is commonly seen as a theory of work motivation.

Core Findings

Most goal setting research has focused on the effects of goal difficulty and goal specificity. Goal difficulty is the level of difficulty associated with achieving a certain level of performance for a given task. Typically, difficult goals are performance levels that only 10% of the population can attain. Theorists distinguish goal difficulty from task difficulty. Task difficulty is a characteristic of the task whereas goal difficulty is an objective characteristic of the goal itself.

Locke (1968) used the data of twelve studies and empirically derived a linear relationship between goal difficulty and performance. Four other meta-analytical reviews (Chidester & Grigsby, 1984; Mento, Steel, & Karren, 1987; Tubbs, 1986; and Wood et al., 1987) found similar relationships.

Locke and Latham (1990) reviewed 192 studies on goal difficulty. They reported that 140 (72.9%) studies showed a positive association between goal difficulty and performance, 35 (18.2%) studies showed a positive association for one sub-group or condition, and 17 (8.8%) studies showed no significant effects or effects in the opposite direction. The meta-analytical review by Wood et al., (1987) covered 72 studies. They found a conservative effect size of 0.58 for the goal difficulty-performance relationship. Tubbs' (1986) less conservative meta-analytical review of 56 studies, which included within participant designs, found a larger effect size of 0.82.

Goal specificity refers to how specifically a goal is stipulated. For instance, a specific goal would be to produce 10 units per hour, and a less specific goal would be to produce as many as possible. The research on goal specificity has focused mainly on comparing specific difficult goals (SD goals) with either "do your best" goals (DYB goals) or no assigned goal (no-goal) conditions. Meta-analyses of the effects of SD goals versus either DYB goals or no-goal conditions on performance found effect sizes of 0.43 (53 studies, Wood et al., 1987) and 0.50 (48 studies, Tubbs, 1986).

At first sight, the comparison between SD goals and DYB goals or no-goals appears odd. But Locke and Latham (1990) argue that DYB goals imply a high level of difficulty. They are therefore non-specific difficult goals. These theorists also argue that no-goal conditions do not mean that people will not have any goals at all. Often the no-goal condition is an implicit DYB condition, especially when people are exposed to the demand conditions of laboratory settings (Orne, 1962). According to this argument, it appears that most research studies have looked only at the effects of specificity under the difficult goal condition. Part of the reason for the lack of interest in easy vague goals is that they imply low motivation and productivity, and thus have little appeal to researchers on work motivation.

Only two studies have directly examined the effects of goal specificity. In the first, Wofford (1982) found that more specific goals led to better performance. Locke and Latham (1990), however, suggested that Wofford's study was flawed. In that study, participants constructed moon tents. There were three conditions: specific goal (20 units), moderately specific goal (18 to 22 units), and low specific goal (15 to 25 units). Locke and Latham (1990) argued that the goal of 20 units was very difficult to achieve. Thus, participants that were given a performance range as a goal would likely have adopted a personal goal that was close to the lower limit. Accordingly, those with a less specific goal would have chosen a lower goal, thus confounding goal specificity with goal difficulty.

Locke, Chah, Harrison, and Lustgarten (1989) corrected for the possible flaw in Wofford's study. They used the norms obtained from the results of the vague goal manipulation to set goals for the moderately specific and the specific treatments. Thus the level of difficulty was held constant. They conducted two experiments with different tasks. Each experiment varied both goal specificity and difficulty. In both studies, they found a main effect on performance for goal difficulty but not for goal specificity. They also did not find significant interaction effects between goal difficulty and goal specificity. They, however, found a main effect on the variability of performance for goal specificity. These findings suggest that vague goals offer a greater latitude for interpreting what is to be achieved. Thus, vague goals tend to lead to greater performance variability.

The goal setting literature identified two variables that moderate the relationship between goals and performance. The first is ability. Given similar levels of motivation, those with higher ability will do better than those with lower ability especially when the goals are difficult (Locke, 1982; see Locke & Latham, 1990 for a review of existing studies). Thus, in goal setting studies, it is usual to control for the effects of ability.

The second is goal commitment. Goal commitment refers to "one's attachment to or determination to reach a goal" (Locke & Latham, 1990). Goal commitment is equally applicable to assigned goals and personal (or self-set) goals. Erez and Zidon (1984) found that goal setting effects can be severely dampened by a lack of goal commitment. Locke and Latham (1990), however, offered a comforting fact. They noted that in most studies, sufficient goal commitment had been attained for the goal-performance relationship to be studied.

In summary, the key established finding in goal setting research is that given adequate ability and commitment, SD goals lead to better performance and less variability than DYB goals. Theorists explain that behavior is goal oriented. Thus when people commit to more difficult goals, they also bring forth an increase in effort and persistence in the attempt to achieve those goals. The specificity of SD goals clarifies the performance criteria from which self-satisfaction can be contingently derived (Bandura, 1990; Latham & Locke, 1991). With DYB goals or no-goal conditions, however, the performance criteria are open to a wide range of interpretations including those that are below the person's best efforts (Locke and Latham, 1990).

Mechanisms Governing Goals and Performance

The first 13 years of goal setting research focused on establishing the empirical relationship between goals and performance. It was only recently that Locke et al., (1981) advanced a theoretical explanation for the findings (Naylor & Ilgen, 1984; Wood & Bailey, 1985).

Locke et al. (1981) suggest that goals operate through motivational mechanisms. These are direction, intensity of effort, persistence, and strategy development. The first three are considered to be almost automatic motivational mechanisms involving minimal cognitive activity, whereas strategy development involves greater deliberateness and cognitive effort. Locke and Latham (1990) present an excellent and detailed review of the empirical evidence. Below is a summary of the highlights.

Direction. Evidence that goals direct attention, action, and cognitive processing, comes from other fields such as learning. Participants with specific learning objectives learned more about goal relevant material than those with general or no objectives (e.g., Kaplan & Rothkopf, 1974; Rothkopf & Billington, 1979; Rothkopf & Kaplan, 1972). There were more frequent and longer eye fixations on goal relevant text (Rothkopf & Billington, 1975). Wyer, Srull, Gordon and Hartwick (1982) found that giving specific prereading goals (as opposed to general goals) aided the learning of goal related material and inhibited the learning of goal unrelated material. These findings support the hypothesis that goals direct attention.

Locke and Bryan (1969) provided evidence that goals directed action. Participants received feedback on five dimensions of driving performance after having driven around a standard course. They were then assigned goals to improve the score on a single dimension. Driving scores improved only on the dimension for which the goal was assigned. Similar results were found in behavioral change programs (Kolb & Boyatzis, 1970; Nemeroff & Cosentino, 1979).

Goals also affect cognitive processing patterns. For instance, Cohen and Ebbesen (1979) asked participants to view actors on video tape. They told participants to either form an impression of the personality of the actor or identify the task of the actor. They found that the participants not only learned more information relevant to their goals, but also searched for information differently. For example, participants viewed larger chunks of video segments when asked to form personality impressions than when asked to identify the task the actor was performing.

In another study, Hoffman, Mischel and Mazze (1981) found that different purposes affected the classification of materials read. They found that participants whose purpose was to recall the material organized the material primarily in terms of the character's goals. In contrast, those with the purpose of forming a personality impression organized the material in terms of the character's traits.

Intensity of effort. Theorists suggest that effort expended is in proportion to task requirements. Thus, more effort is expended on hard goals. Support for this proposition comes from many studies using different ways of measuring effort. These include measuring direct physical effort (e.g., Bandura & Cervone, 1983, 1986); measuring rate of work in simple tasks where the strategy effects are precluded (e.g., Bandura & Schunk, 1981; Bryan & Locke, 1967; Garland, 1982); and using self-reported measures of effort (e.g., Earley, Wojnaroski, & Prest, 1987).

Persistence. Theorists make a distinction between intensity of effort and persistence. Persistence is effort maintained over time, that is, the duration of effort. Intensity and persistence are alternative but not mutually exclusive ways of exerting effort. Again there is ample evidence in the literature to suggest that difficult goals lead to persistence (e.g., Bavelas & Lee, 1978; Huber, 1985; Kaplan & Rothkopf, 1974).

Task strategies. Evidence that goals stimulate strategy development can be found in many studies across varied contexts. Logging truck drivers made modification to vehicles (Latham & Baldes, 1975) and coordinated with radios (Latham & Saari, 1982); computer programmers sought more information from supervisors (Campbell and Gingrich, 1986); and salespersons gave supervisors stock information (Kim, 1984). The current research focus is on the effects of goals on the development of new task strategies in complex tasks. The findings have been equivocal, and there are still too few studies to allow a clear understanding of the phenomenon. Details of these studies will be discussed later.

Self-Efficacy - An Important Mediator

Self-efficacy is the central construct in Bandura's (1986; 1990; 1991) social cognitive theory. Self-efficacy is a good predictor of performance in a variety of settings (Feltz, 1988; Gist & Mitchell, 1992; Locke & Latham, 1990; Multon, Brown & Lent, 1991).

Self-efficacy encompasses people's beliefs about their personal capability to mobilize the motivation, cognitive resources, and courses of action needed to exercise control over events, and to accomplish desired goals (Wood and Bandura, 1989). The construct is similar to but not identical to expectancy in Vroom's (1964) valence-instrumentality-expectancy theory. Expectancy refers to the probability of performing at a given level of a task with a given level of effort; it is a probability associated with the effort-performance relationship. Self-efficacy on the other hand, is broader in scope. It is an expectancy of success resulting from a belief about how various personal elements (such as ability, skill, knowledge, and experience) will affect task performance (Locke & Latham, 1990; Wood & Locke, 1987).

Self-efficacy is also often confused with self-esteem. Self-esteem is a trait reflecting a person's affective evaluation of self. In contrast, self-efficacy is neither a trait nor an affective evaluation. It reflects judgments about task specific capability (Gist & Mitchell, 1992). Thus, people can have very high self-esteem and yet have very low self-efficacy in performing tasks where they have little aptitude or expertise.

According to Bandura (1982, 1986, 1990), skills and ability are necessary but insufficient to predict performance. This is because self-efficacy beliefs can impair or enhance motivation and problem solving efforts and thus affect task performance. Self-efficacy influence the tasks and goals people choose to undertake, and the amount of effort they put forth. It also influences the amount of persistence people show in the face of difficulties. Those with stronger self-efficacy are more likely to persist in the face of failure. In contrast, those with weaker self-efficacy are more likely to adjust their goals downwards, slacken efforts, or give up altogether. Finally, self-efficacy also partly determines the degree of stress and despondency people experience when they fail to achieve their goals.

Evidence of the effects of self-efficacy on performance and persistence comes from a meta-analytical review of 39 published and unpublished studies between 1977 and 1988 (Multon, Brown & Lent, 1991). The meta-analysis of self-efficacy on performance found an effect size of 0.38 (which accounted for 14 percent of the variance in academic performance). The meta-analysis of self-efficacy on persistence used 18 of the 39 studies. It also found an effect size of 0.34 (accounting for 12 percent of the variance).

Locke, Frederick, Bobko, and Lee (1984) provided evidence of the relationships among self-efficacy, goals, and performance. They used a model for path analysis that was consistent with social cognitive theory. The study examined the effects of ability, goals, self-efficacy, and task strategy training on performance across repeated trials. They found that ability, strategy training, strategy used, and post training performance affected self-efficacy either directly or indirectly. Self-efficacy, in turn, affected performance directly. It also affected performance indirectly through personal goals (self-set goals). Self-efficacy was the sole influence on personal goals which in turn affected performance.

More recently, Latham, Winters, and Locke (1994) found that the effects of participation on task performance was mediated by both task strategies and self-efficacy. So powerful was self-efficacy that it accounted significantly for variances in performance even when it was the last variable to be entered in the regression analysis. Self-efficacy was also correlated with strategy development and strategy use. However, the direction of causality could not be inferred from the data.

These studies demonstrate the centrality of self-efficacy. Thus, they support the claim of social cognitive theorists that self-efficacy is the key variable in determining task performance.

Assigned Goals, Personal Goals, Self-Efficacy, and Performance

Figure 1 represents Locke and Latham's (1990) model of the relationship among assigned goals, personal goals, self-efficacy, and performance. Assigned goals affect both the personal goals and the self-efficacy of the person. Self-efficacy, in turn, influences the formulation of personal goals. Finally, self-efficacy and personal goals both affect task performance. The mean correlations in Figure 1 have been derived from studies detailed in Table 1.

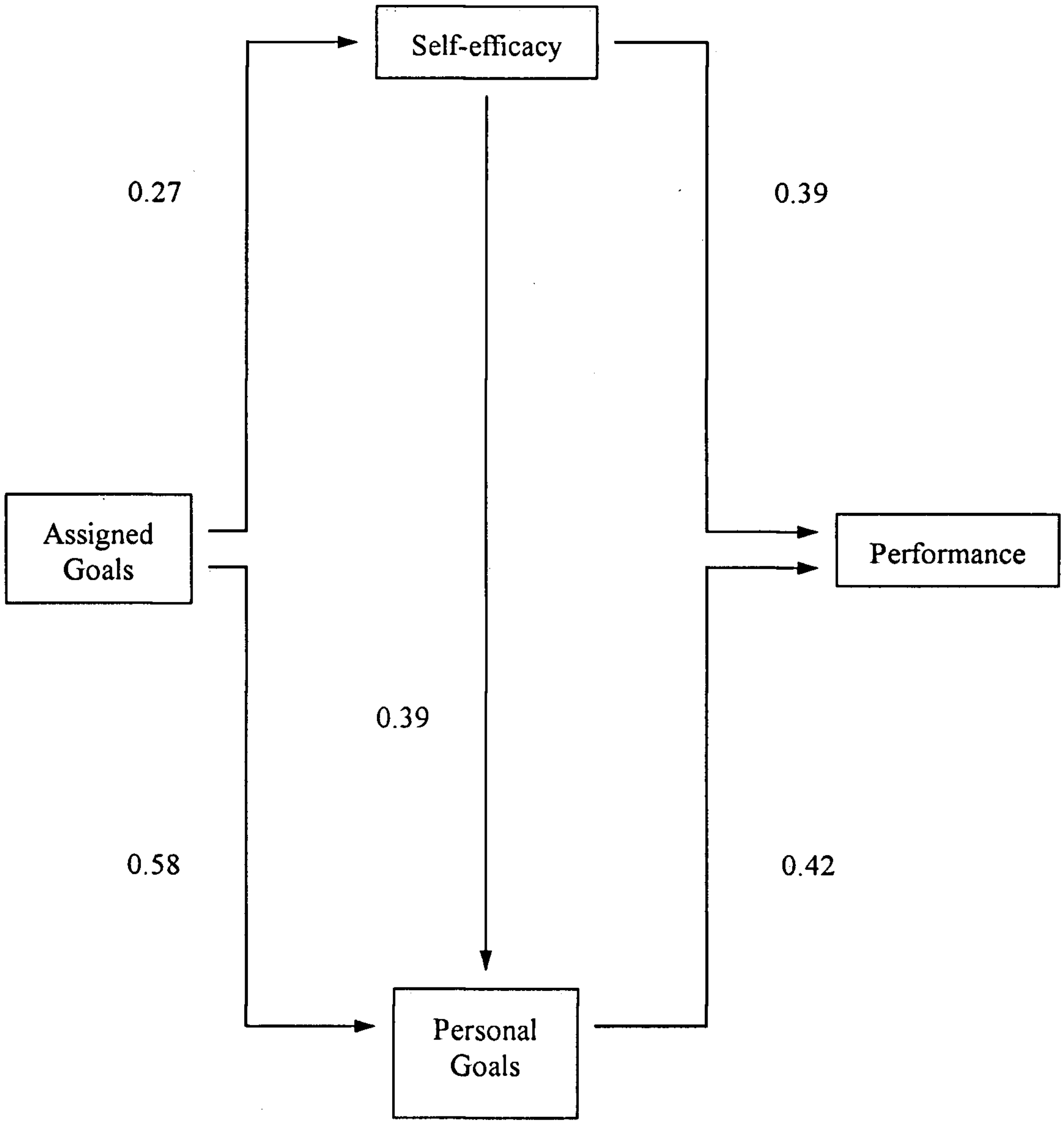
Locke and Latham (1990) provided the most comprehensive summary of studies on correlational evidence linking the four variables. They reviewed 13 studies that examined at least 3 of the five possible relationships shown in Figure 1.

They then derived the mean correlation coefficient weighted by the number of participants in each study. Table 1 is a summary of the correlation coefficients for each of the relationships in the model.

Earley and Lituchy (1991) provided further support for the model. They conducted a series of three studies and tested three models (by Eden, 1988; Garland, 1985; and Locke and Latham, 1990) relating assigned goals, personal goals, self-efficacy, and performance.

The first two studies had college students performing mathematical problems (simple task) and a simulation game (complex task) respectively. The third study was with undergraduates within a course setting (field setting). Using hierarchical path modeling (LISREL IV), the study concluded that there was varying support for each of the models. But Locke and Latham's (1990) model generally was the most parsimonious description of the three sets of data.

Figure 1. Relationship between assigned goals, self-efficacy, and performance



Note: From "A Theory of Goals Setting and Task Performance" by E.A. Locke and G.P. Latham, 1990, p.72.

Table 1. Correlations between assigned goals, personal goals, self-efficacy, and performance

Authors	N	AG-PG	AG-SE	SE-PG	SE-P	PG-P	Notes
Bandura & Cervone (1986)	88			.43[a]	.50[a]	.69[a]	[a] average of 4 discrepancy conditions
Dachler & Mobley (1973) -1 -2	184 412			.31[b,c] .30[b,c]	.30[c] .12[c,d]	.42[b] .16[b]	[b] average of current and future goals [c] SE=maximum expected utility; [d] all jobs
Garland (1985)	176	.54[e]	.25[e]	.58	.74	.55	[e] not in article; personal communication
Garland & Adkinson (1987)	127	.70	.20	.39	.62	.45	
Hollenbeck & Brief (1987)	102		.29[f,g]	.49[g,h]	.47[f,g]	.31[f]	[f] all Ss [g] SE=task-specific ability [h] PG=self-set Ss only
Locke, et. al. (1984)	181			.54[i]	.61[i]	.57[i]	[i] combined SE measures, trials 5 & 6
Meyer & Gellatly (1988) -1 -2	56 60	.59 .29	.33 .13	.62 .48	.73 .71	.83 .62	
Meyer et al. (1988)	69	.67	.48	.60[j]	.54	.56[j]	[j] desired performance used as goal measure
Podsakof & Farh (1989)	90			.69	.63	.73	
Taylor et al. (1984)	223[k]			.20	.38	.25	[k] average of high and low N of Ss
Wood & Locke (1987)	517			.32[l]	.22[l]	.42[l]	[l] average of 3 samples and both SE measures
Total	2285						
Weighted	$\bar{r}$	.58	.27	.39	.39	.42	

AG = Assigned goals; PG = Personal goals; SE = Self-efficacy; P = Performance

Note: From "A Theory of Goals Setting and Task Performance" by E.A. Locke and G.P. Latham, 1990, p.71.

Current Issues in Goal Setting Theory

Task Complexity, Familiarity, and Learning

The findings in goal setting suggest that better performance and greater consistency should result if we set goals that are specific and difficult. But a recent meta-analysis of goal setting studies by Wood, Mento & Locke (1987) found that goal setting effects were strongest for simple tasks and weakest for complex tasks. This finding suggests that goal setting effects may be different for simple and complex tasks (also Campbell, 1984; Campbell & Gingrich, 1986; Earley et al., 1987; Locke et al, 1981).

In Wood et al. (1987), two of the authors independently rated the 125 studies on task complexity based on Wood's (1986) conception of task complexity. According to Wood (1986), task complexity involves three aspects: (1) component complexity - the number of acts and information cues involved; (2) coordinative complexity - the type and number of relationships among acts and information cues; and (3) dynamic complexity - the degree of changes in the acts, the cues, and the cause-effect relationships among acts and cues. Despite the multidimensional conception of complexity, the study employed a 10-point general scale of complexity (1 for the least complex and 10 for the most complex task). Inter-rater reliability coefficient was, however, good at 0.92. The researchers then used regression analysis and found that task complexity was a significant moderator in the relationships between goal difficulty and performance and between SD goals and performance.

Several theorists presented explanations for the difference in goal setting effects between simple and complex tasks. They (Campbell, 1988, 1991; Campbell & Gingrich, 1986; Earley, Connolly, & Lee, 1989; Locke et al., 1981; Wood Locke, 1990) argued that in simple tasks, the goal mechanisms of direction, effort, and persistence had a direct and substantial effect on performance. But in complex tasks, the direction, effort, and persistence resulting from SD goals were insufficient to ensure superior performance because performance was highly contingent upon developing an appropriate strategy.

Locke and Latham (1990) suggested that in simple tasks, the appropriate task strategies were part of the person's repertoire. Thus, applying an appropriate task strategy was almost automatic. As the task became more complex, appropriate task strategies to be used had to be more complicated, more task specific. Previously - learned task strategies were often inappropriate or inadequate. Thus, people had to develop new and effective task strategies to achieve superior performance.

Unfortunately only a few empirical studies investigated complex tasks. For instance, Wood et al. (1987) found that of the 125 studies they reviewed, none of the tasks studied scored 8 or above on a 10-point complexity scale (see Figure 2 for representative tasks for various complexity levels; and Figure 3 for the frequency distribution of goal setting task by complexity). The few studies that investigated complex tasks found mixed results.

Earley, Connolly, and Ekegren (1989) conducted 3 studies on a task to predict stock prices for 100 fictitious companies using three pieces of information. In their first and third studies, they found that people with DYB goals did better than those with SD goals. Those with DYB goals were using weighting strategies that were closer to the task rule. In addition, those in the SD goal condition shifted weighting strategies more often; especially in block 1 trials (20 trials per trial-block).

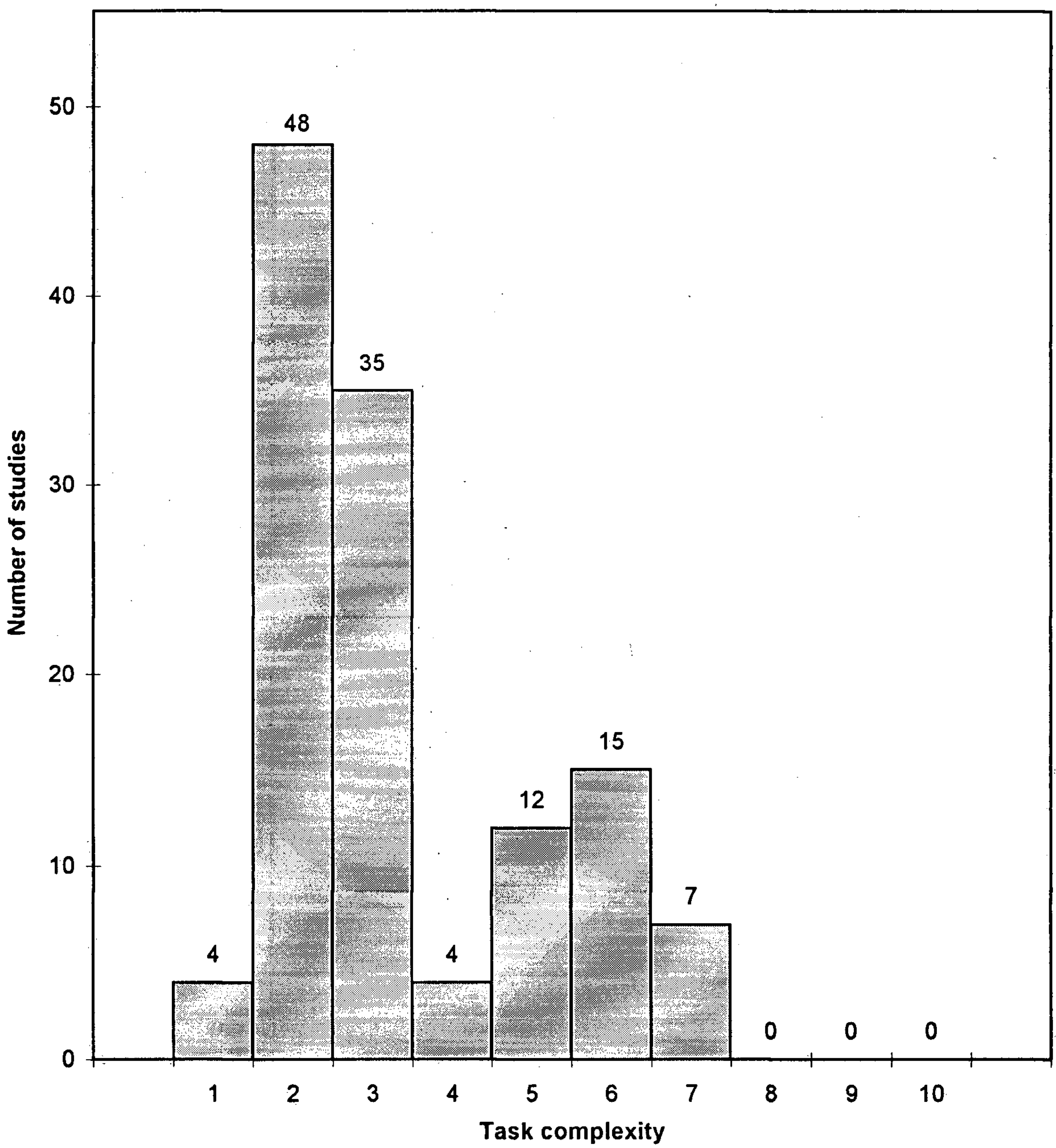
In the second study, they investigated 2 easier but specific goal conditions together with an SD goal that became more difficult as the trials progressed. A significant goal by trial-block interaction indicated that the DYB goal condition resulted in superior performance over the SD goal condition only in the first 2 trial-blocks,

Figure 2. Representative tasks for various complexity levels

1	2	3	4	5	6	7	8 to 10
Reaction Time	Brain-storming	Toy assembly	Sewing machine work	School or college course work	Supervision	Science and engineer-ing	None
	Simple arithmetic	Anagrams	Production work		Middle manage-ment		
	Perceptual speed	Typing	Floor plan analysis		Technician work		

Note: From "Task complexity as a moderator of goal effects: A meta-analysis" by R.E. Wood, A.J. Mento, and E.A. Locke, 1987, p. 418.

Figure 3. Frequency distribution of goal setting studies by task complexity



Note: From "Task complexity as a moderator of goal effects: A meta-analysis" by R.E. Wood, A.J. Mento, and E.A. Locke, 1987, p. 419.

and was superior over the 2 easier specific goals only in trial-block 1. From trial-block 3 onwards, performance in all goal conditions were not significantly different. The study also found that participants in the SD goal condition shifted strategy significantly more often than those in DYB goal condition only in trial-blocks 1 and 2.

These researchers suggested that the excessive searches stimulated by SD goals impaired performance when (a) success was strategy sensitive, (b) there were many available strategies to choose from, and (c) the optimal strategy was not obvious. Another reason offered to explain the harmful effects in the initial trials was that SD goals might have interfered with meta-cognitive learning (i.e., learning about how to approach a task).

Earley, Connolly, and Lee (1989) used the same stock prediction task but introduced search training and search restrictions as treatments. In the control group, where participants were neither given training nor search restrictions, those with DYB goals did better than those with SD goals in the earlier trials. But when participants were either given search training or search restrictions before the trials, those with SD goals did better than those with DYB goals. This supported Earley, Connolly and Ekegren's (1989) hypothesis on excessive search.

Kanfer and Ackerman (1989) used an air traffic controller task with air force personnel as participants. In the first experiment, they found that participants with DYB and SD goals did not differ in their performance in the earlier trials (the first 7 of the 10 trials). But in later trials, participants classified as having higher ability performed better with SD goals than those with DYB goals.

Kanfer and Ackerman (1989) hypothesized that various cognitive activities would compete for limited cognitive resources. They suggested that SD goals motivated by stimulating self-regulatory activities. These self-regulatory activities required cognitive resources to operate. In new and complex (NC) tasks, however, learning and not motivation was the key determinant to task performance. Learning of a complex task, however, required substantial cognitive resources. Thus when SD goals were assigned in NC tasks, they shifted limited cognitive resources away from learning, resulting in poorer learning and performance.

To test their hypotheses, they conducted two other experiments. The second experiment introduced the SD goals only in the fifth trial, that is, after participants had had some experience with the task. They found that participants with SD goals performed better regardless of ability. The third experiment tested the competing cognitive demands hypothesis by introducing two training conditions. The first was procedural training aimed at teaching the motor sequences necessary for the task. The second was declarative knowledge training aimed at reducing the cognitive learning demands during task performance. They found that in the procedural training group, participants with SD goals did better than those with DYB goals, while in the declarative knowledge training group, the reverse was true. Based on the findings of their 3 experiments, Kanfer and Ackerman concluded that SD goals were effective only after learning had taken place; and that SD goals might have interfered with learning, especially in low ability groups.

Kanfer and Ackerman's (1989) data, however, did not consistently support their explanation. For instance, they found measures of self-regulatory activities to be minimal even with SD goals. Moreover, in experiment 2, where participants were assigned the SD goal in the fifth trial, participants reported significantly less spontaneous goal setting. Low ability participants, however, did report significantly more spontaneous goal setting activities than high ability participants. Since Kanfer and Ackerman did not measure the intervening variables such as personal goals or self-efficacy across trials, we were unable to tell for certain which process was responsible for the observations. It was possible that the explanation lay within the self-regulatory process rather than with the competing cognitive resources. For example, low ability participants might have low self-efficacy and tended to adjust their personal goals downward resulting in poorer performance. Plausible self-regulatory explanations could always be formulated to explain what was observed in the other two studies.

The final set of studies on complex tasks was from Wood and his colleagues. They studied the goal-performance relationship with a complex work assignment and motivation game. Wood et al., (1990) found no significant difference in performance between participants with SD and DYB goals. Cervone, Jiwani, & Wood (1991), on the other hand, found that in the initial trials, moderate and difficult goals resulted in superior performance to no-goals, but in later trials, they found no difference among the three goal conditions.

In summary, research on strategy development in complex tasks suggests that the presence of SD goals could interfere with performance when the task is new and complex. The findings, however, have not been consistent, and the causes and mechanisms are not well understood. Part of the reason is that most goal setting studies examined the effects of goals on performance but few examined the processes involved. Take the series of studies reviewed as an example. Only Wood and his colleagues measured self-efficacy and personal goals across trials. Without more process research, we will not be able to map out the reasons for the equivocal findings in complex tasks.

Although several researchers have suggested that SD goals may somehow interfere with learning, resulting in inferior performance, little research has been done on the relationship between goals and learning. Wood and Bailey (1985) have called for more research on this issue arguing that "as tasks become more complex, the quality of action plans will depend upon the level of task relevant knowledge which, in turn, is a function of learning."

The over - concentration on traditional (e.g., SD and DYB) goals also hindered research into the goal effects of learning because these goals focused participants' attention primarily on performance and not learning. These two goals were appropriate for investigating task situations where participants had adequate task knowledge and performance was mainly contingent upon motivation, but might not be adequate or appropriate in the investigation of learning effects. Thus, if we intend to extend goal setting theory to include goal effects on learning and performance, we have to expand the scope of goal attributes beyond specificity and difficulty. We should also look beyond the boundaries of the goal setting program for useful insights. Integrating useful ideas when we find them may have synergistic results and expand our knowledge exponentially.

The similarities in some of the findings of Kanfer and Ackerman (1989) and those of Dweck and Leggett (1988) suggest that there may be a link between the two areas of research. Both sets of studies found that low ability participants tended to be more concerned with their own performance rather than those of others. They also engaged in more negative self-reactive thoughts.

Dweck and Leggett's main thesis is that the goal orientation (either a learning or proving orientation) that a person focuses on can affect his or her learning, strategy development and usage, and performance on a task. Goal orientation may be viewed as a qualitative attribute of personal goals and could prove to be a useful construct to goal setting theory. The next section will review the main ideas and findings of Dweck and her colleagues.

Goals Orientation, Task Strategies, and Learning

Most research on learning and performance focused on the acquisition of the task relevant skills necessary for success. Two reviews in educational psychology (Dweck 1986; Dweck & Leggett, 1988) focused on the motivational process instead.

According to these researchers, the goals that people pursue create a framework for interpreting events and reacting to them.

Dweck and Leggett (Dweck, 1986, 1990; Dweck & Leggett, 1988) suggested that a person's goal orientation influenced the framework for interpreting performance feedback and the judgments about personal competence. They suggested that two classes of goal orientation (learning and proving orientation) accounted for different patterns of behavior associated with skill acquisition and skill usage among children. For instance, a learning goal orientation induced more constructive self-instructions and self-monitoring during problem solving. A proving goal orientation, in contrast, resulted in the repeated use of ineffective problem solving strategies.

These researchers suggest that both learning and proving orientations are naturally occurring and universal. Both orientations can exist simultaneously. However, the relative emphasis given to one or the other can induce very different patterns of cognition and behavior. They suggest that in the face of difficulties, an emphasis on proving induces "helpless" responses whereas an emphasis on learning induces "mastery-oriented" responses.

They explain that the emphasis on proving orientation focuses attention on gaining confirmation about one's competence and ability. People with proving orientations seek to establish the adequacy of their abilities and avoid evidence of their inadequacy. They view achievement situations as tests or measures of competence (Dweck & Leggett, 1988). This orientation also cues the interpretation of negative outcomes as a reflection of ability. Thus setbacks tend to be more harmful to self-esteem and self-efficacy. As a result, when they are faced with challenging tasks, they are therefore more likely to exhibit self-esteem protective strategies and behaviors. Bandura's self-efficacy perspective also suggests that a decline in self-efficacy will lead to the lowering of personal goal levels which, in turn, reduces performance (Wood & Bandura, 1989).

In contrast, those with a learning orientation focus on gaining competence, skills, and improvements, and are more likely to accept challenges, show persistence, and create useful task strategies (Dweck, 1986; 1990; Dweck & Leggett, 1988). Learning goals also cue the interpretation of setbacks as deficiencies outside oneself. For instance, causes of poor performance are attributed to insufficient effort or inappropriate task strategies. Thus, children generally respond to setbacks by increasing effort, and developing better strategies. Furthermore, by attributing the cause of setbacks to improvable factors, self-esteem and self-efficacy are less likely to deteriorate, which in turn, helps maintain performance.

Elliott and Dweck (1988) provided the evidence for Dweck and Leggett's view. They manipulated children's goal orientation by highlighting the value of either proving or learning. In the proving condition, they told the children that their performance was being filmed and evaluated. In the learning condition, no filming or evaluation was mentioned. Instead, they told the children that learning to do the task well could help them in their school work.

The researchers also manipulated the children's perception of ability (high vs. low ability) via false feedback on a pretest task that was said to measure their task ability. They then presented each participant with pattern discrimination problems. Four training problems were presented followed by three test problems. During the first test problem, they gave the participants prearranged feedback indicating failure. The children's problem solving strategies and verbal protocols were recorded. The strategies were analyzed according to effectiveness and the verbal protocols were content analyzed.

The study found that children who received the proving orientation and perceived low ability manipulations showed a significant tendency to deteriorate in their use of problem solving strategies after they were given failure feedback. Analysis of the verbal protocols found that these children made significantly more attributions of failure and negative affect than those in the perceived high ability condition. These results showed an interaction effect between perceived task ability and goal orientation on performance and behavioral responses. When participant's perceived task ability was low, performance was sensitive to the goal orientation manipulations.

Elliott and Dweck (1988) also reported anecdotal evidence that children with a proving orientation passed up opportunities to learn and increase their skill on a task that entailed public mistakes. In contrast, those in the learning orientation condition did not. This was consistent with the findings of M. Bandura and Dweck (1985). In that study, they measured goal orientation instead of manipulating it. They found that children with a learning orientation were more likely to choose a more difficult version of a task than those with a proving orientation. Sub-group analysis suggested that goal orientation had a more marked effect on task choice when participants had low confidence in accomplishing the task.

Farrell and Dweck (1985; an unpublished study cited in Dweck & Leggett, 1988) also found evidence that goal orientation could affect learning. They taught eighth-grade students one of three scientific principles. Subsequently, they tested the students on their ability to generalize this learning to tasks involving two conceptually related principles. They found that children with a learning orientation when compared with those with a proving orientation, (1) had much higher transfer scores; (2) produced 50% more work; and (3) produced more rule related answers on the test.

A summary of Dweck and colleagues' work is shown in Figure 4. Their work provides some evidence that goal orientation may affect learning, motivation, strategy usage, and performance when children perceive their task ability to be low at the time when setbacks occur. From a goal setting perspective, goal orientation can be conceived as a qualitative attribute of personal goals, and perceived task ability as an indicator of self-efficacy. Although the findings have interesting implications for goal setting research, they must be viewed tentatively. Elliott and Dweck's (1988) study was not conducted within the framework of goal setting. As a result, some important variables were not measured while others were measured with instruments that are different from those used in the goal setting literature. To integrate these findings, theoretical ideas will have to be re-framed within the goal setting theory and empirically tested. This will be an objective of this study.

Another issue is the question of generalizability. Dweck and colleagues' research pertains to children and may not be generalizable to an adult population. Again this issue can only be settled empirically.

There are however, reasons to believe that the findings are applicable to adults. Firstly, learning and proving orientations seem intuitively universal. We often undertake tasks (e.g., hobbies, sports, and job assignments) to learn or improve ourselves. Similarly we also undertake tasks to prove to ourselves and others that we have certain abilities. For instance, we may undertake a difficult job assignment to prove to our superiors and peers that we deserve a promotion.

Secondly, there are some similarities between the findings described by Dweck and colleagues and those of social facilitation which uses adult participants. Research in social facilitation (Sanna, 1992; Zajonc, 1965) has found that task performance is often impaired in complex or not well learned tasks when others are present. The explanations offered in the literature are, however, varied and controversial.

Figure 4. Goal orientation, self-efficacy, and behavior

Goal Orientation	**Self-efficacy**	**Behavior**
Proving Orientation (focuses on gaining positive but avoiding negative judgments of competence)	if **high**	**Mastery-oriented** Seek challenges High persistence
	if **low**	**Helpless** Low persistence Avoid challenges
Learning Orientation (focuses on gaining competence)	**high** or **low**	**Mastery oriented** Seek challenges High persistence

Note: Adapted from "Motivational processes affecting learning" by C.S. Dweck, 1986, **American Psychologist, 41**, p. 1041.

There is one explanation that is compatible with Dweck's position. It suggests that the performers attempt to gain social approval and avoid disapproval (Bond, 1982; Carver & Scheier, 1981) in the presence of evaluators. This motive is compatible with a proving orientation. Thus, on complex and not well learned tasks where expectancy of success is low, performers may experience evaluation anxiety, resulting in poorer performance.

There is also ample evidence that evaluation anxiety can lead to self-deprecatory thoughts, preoccupation with and anticipation of failure and avoidance behaviors (Geen, 1987; Morris, Davis, & Hutchings, 1981; Sarason, 1984; Wine, 1982). These observations are similar to those observed by Dweck and colleagues. The difference is that the observations are from adult participants. This gives us reason to believe that Dweck and her colleague's findings may be generalizable to adults.

Although some of the findings and explanations are similar, the research interest in the two areas of inquiry differs. Social facilitation research focuses on the presence of another person as a stimulus for eliciting dysfunctional behavior whereas Dweck and colleagues suggest that goal orientation cues such behavior. Although a proving orientation is similar to the motives hypothesized by advocates of the evaluation anxiety explanation, it is not influenced solely by the presence of an evaluator. A proving orientation can be cued by instructions (Elliott & Dweck, 1985) and by participants' implicit theories about their own ability (M. Bandura & Dweck, 1985).

Another difference is that within Dweck and Leggett's (1988) theoretical framework, the presence of others need not always result in a performance deficit. Elliott and Dweck's (1988) study showed that a learning orientation could help prevent dysfunctional behavior. Finally, Dweck and colleagues' research framework focused on a cognition-behavior linkage whereas the predominant approach in social facilitation focused around an external stimulus, namely, cognitive response linkage (e.g., drive theory of Zajonc, 1965 or of Cottrell, 1972). It is only in recent years that theorists are offering models that focus on deliberate rather than automatic cognitive processes - for instance, expectancy explanations (Sanna, 1992; Sanna & Shotland, 1990) and attentional overload (Baron, 1986; Geen, 1989).

The final issue concerns the possibility of an alternative explanation for Elliott and Dweck's (1988) findings. The manipulations in the study to induce the different proving orientations may induce different beliefs about the locus of control of reinforcements for the particular task. Locus of control (Rotter, 1966) refers to the degree to which a person expects that reinforcement is contingent on the person's own behavior versus the degree to which the person expects that reinforcement is a function of chance, luck, fate, or is under the control of powerful others (Rotter, 1990).

Although Rotter's locus of control is a generalized expectancy, it may be possible to induce task specific and temporal expectancies for internal versus external control of reinforcements. When participants are told that their performance is being filmed and evaluated, they may reasonably expect external reinforcements to be forthcoming. These reinforcements may take the form of rewards, social reinforcement, punishment, or even self-satisfaction, which are internally generated, but contingent upon external evaluation.

In contrast, no filming or evaluation was mentioned in the learning orientation manipulation. The experimenters told the children that doing the task well could help them with their school work. This manipulation instruction puts evaluation and the administration of reinforcements solely within the purview of the participant. Such an instruction was likely to induce an internal locus of control.

There are similarities between Dweck's findings and those on locus of control. For instance, participants with internal locus of control are better performers, are more persistent, and are willing to delay rewards to maximize them later (Findley & Cooper, 1983). But there are also aspects that differ. For instance, when Elliott and Dweck (1988) gave participants failure feedback. They found that participants who were externally evaluated showed strong negative affect while those in the learning condition did not. Locus of control theorists would predict the opposite. Participants with induced external locus of control would exhibit less emotional intensity whereas participants with induced internal locus of control would feel shame (Findley & Cooper, 1983).

Nonetheless, locus of control has an important influence on academic achievement (Findley & Cooper, 1983). Unfortunately, Elliott and Dweck did not measure the construct in their experiment. Thus, we cannot rule out the possibility that the locus of control variable partially contributed to Elliott and Dweck's (1988) findings.

Although the relative contribution of locus of control to Elliott and Dweck's study warrants further investigation, such a research project is beyond the scope of this dissertation. This dissertation adopts a limited agenda of replicating and integrating Dweck and colleagues' findings within a goal setting framework. Nonetheless, the possible effects of the locus of control variable should be accounted for in the research design. This study will therefore administer Rotter's (1966) internal-external locus of control scale. This will allow us to partial out the effects of locus of control should the need arise.

III. THE CONCEPTUAL FRAMEWORK AND HYPOTHESES

Rationale

The robust findings that specific, difficult (SD) goals lead to better performance than "do your best" (DYB) goals and no goal conditions seem limited to tasks in which the individual has experience. In complex tasks where a long period is needed to gain expertise, SD goals may hurt performance in the initial learning phase. The reasons for this are, however, not clearly understood and therefore deserve more research attention.

Two factors argue for further research into how goals affect learning and performance when tasks are new and complex. The first factor is that many tasks are complex and require a considerable amount of time to master. Thus, the enhancement of learning and acquisition of expertise can translate into greater productivity. Secondly, today's technological, cultural, and business environments are rapidly changing (Morton, 1991; Naisbitt, 1982; Toffler, 1980). People today, unlike their parents, can expect to embark on several careers or professions in a lifetime. Even if the person has the good fortune of remaining in one career or profession throughout his or her life, the nature of the task is likely to change. With new complex tasks, learning plays an important role in effectiveness. Thus, as the environment changes more rapidly, the effects of goal setting on learning and performance become more relevant and crucial. Goals that help people learn and adapt rapidly to changes in complex situations can help make organizations more effective.

Recent work by Dweck and colleagues on goal orientation may shed some light on how goals affect learning and performance. They suggest that qualitative aspects of personal goals may affect learning and performance effectiveness. A person with a proving orientation appears vulnerable to learning and performance deficits when setbacks occur at the time when self-efficacy is low. On the other hand, a learning orientation may insulate the person against learning and performance deficits regardless of the level of self-efficacy. These findings suggest that goal orientation interacts with self-efficacy to affect performance.

Dweck and colleagues' findings may also provide an explanation for the observation that SD goals sometimes impair performance. It is possible SD goal manipulations or the SD goals themselves induce a proving orientation which, in turn, results in a learning and performance deficit. Thus, it may be useful to explore Dweck's ideas within the theoretical framework of goal setting.

To understand the effects and role of goal orientation within the context of goal setting, we first have to conceptualize and test Dweck and colleague's ideas within the framework of goal setting theory. Unless we achieve some theoretical integration and experimental compatibility, research findings in the two areas will not be comparable. Any findings in one area can only offer tentative evidence for the other.

For goal orientation to be a useful concept, two relationships must be established. First, goal orientation must affect performance in new and complex (NC) tasks in the way that Dweck and colleagues suggest (i.e., a learning orientation leads to better learning, performance, and strategy development and usage).

Then, assigned learning and proving goals must induce learning and proving orientations, respectively. Hence, for practical interest, this study also explored whether the assignment of learning and proving goals led people to adopt learning and proving orientations, respectively. This study was also interested in how learning and proving goals would compare with traditional SD and DYB goals in eliciting learning and performance. According to the MCPL paradigm, learning and performance are conceptually different and can be differentiated mathematically with the use of MCPL tasks (see appendix 1). Overall performance is the accuracy of the predictions. Learning is the closeness of fit between the person's prediction policy and the task rule; and the consistency of use of that policy (please see measures in the "Method" chapter for more details).

Based on the literature reviewed so far, we will now integrate Dweck's ideas into a goal setting framework and offer some hypotheses to be tested.

Theoretical Synthesis

A model showing the relationship between goal orientation and the various goal setting variables is presented in Figure 5. The model represents goal setting in the context of new and complex tasks. The following section will explain the linkages and their rationale.

Effects of Assigned Goals on Learning, and Performance

A primary focus of goal setting research has been on how externally assigned goals influence outcome variables such as performance. The research has shown that assigned goals can have a powerful influence on internal processes which in turn affect performance. Thus, one of the aims of this study is to see if assigned learning and proving goals can affect the outcome variables of learning and performance.

Given Dweck and her colleagues' finding that children with proving orientations exhibited deficits in learning and performance, while those with learning orientations did not, it was hypothesized that assigned learning goals should lead to better learning and performance than assigned proving goals.

H1a : Participants with assigned learning goals learn better than those with assigned proving goals.

H1b : Participants with assigned learning goals perform better than those with assigned proving goals.

Boundary Conditions

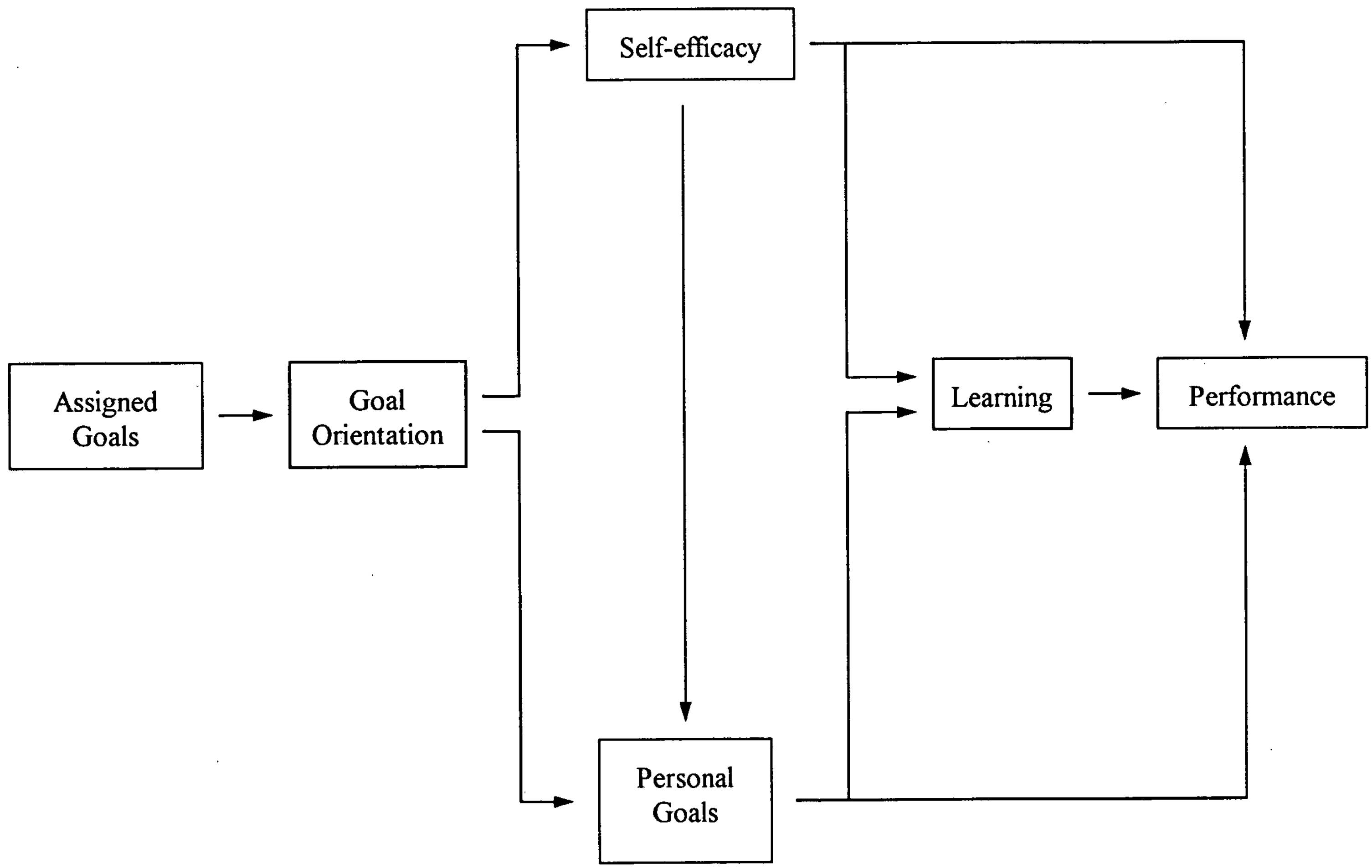
However, Dweck and her colleagues' findings were limited by certain boundaries. They found that goal orientation influenced performance and learning effectiveness when the following two conditions occurred simultaneously: (1) when the self-perceived task ability of participants was low; and (2) when performance setbacks occurred.

This study reconceptualizes perceived task ability as self-efficacy. There are two reasons to do so. Firstly, perceived task ability is a major component of self-efficacy beliefs. Secondly, self-efficacy is a powerful mediating variable in the goal-performance relationship.

The boundary conditions can be interpreted using a self-efficacy perspective. Dweck's findings suggest that when self-efficacy is low, dysfunctional behaviors can result from inappropriate goal orientations.

For example, when we do not do well in a task, initially we may attribute the cause to chance or inexperience; our self - efficacy may diminish slightly or remain unchanged. But if we continue to perform poorly, our self-efficacy may fall more substantially as our confidence in our task competence is reduced. At this point, our goal orientation may affect how we might behave. If we believe that the task is related to our general ability and we had initially pursued the task to demonstrate our ability, we may adopt esteem protection strategies, for example, we may avoid the task or deliberately do poorly. However, if we believe that the task is a learning opportunity that will help us improve our skills and knowledge and that performance on the task is secondary or unimportant, we may persist in our efforts. The teaching of martial arts

Figure 5. Goal orientation within a goal setting framework in new and complex tasks



provide a good illustration. The student is often told that practice will lead to mastery of a technique. Furthermore, stagnation in skill improvement is expected. To move towards the next level of finesse, he or she needs to learn and practice the movements continually and diligently. Here the teacher divests the student of the proving goal and replaces it with a focus on learning, practice, and the process of self improvement.

Goal orientation seems especially applicable in explaining goal setting effects in new and complex tasks. New and complex tasks are more likely than simple tasks to induce the two boundary conditions set forth above. When performing an unfamiliar and complex task, the participants' self-efficacy is likely to be lower than when they perform a simple or familiar task. Not only are setbacks more likely to occur, but they also occur for more trials. These conditions increase the chance of lowering self-efficacy to a point where learning and proving orientation may have an effect on learning and performance.

H1c : The effects of assigned learning and proving goals on learning and performance are larger when the task is unfamiliar than when the task is familiar.

Assigned Goals and Goal Orientation

The goal setting perspective differentiates assigned goals from goal orientation. Assigned goals are externally imposed goals whereas goal orientation is a dimension of internal personal goals. Thus, assigned goals are not assumed to automatically result in congruent personal goals. The degree of congruence is mediated by the acceptance of the assigned goals.

Also, goal orientation is more than the acceptance of a learning or proving goal. It is a cognitive framework for interpreting performance feedbacks. For instance, Dweck (1986), and Dweck and Leggett (1988) suggest that goal orientation may affect the interpretation of performance setbacks and causal attributions of successful and unsuccessful performances.

The model suggests that assigned goals can make either a proving or a learning orientation more salient, and there are reasons to believe this. Elliott and Dweck (1988) experimentally manipulated goal orientation through instructions. Also, researchers in education often induce intentional learning (Locke & Latham, 1990; Ryan, 1970).

Whether SD and DYB goals affect goal orientation is unknown. Locke (in a personal conversation) suggests that the goal attributes of specificity and difficulty are objective and neutral and do not influence goal orientation. Thus, it may be useful to look at assigned goals as not only having attributes of specificity and difficulty, but also having attributes of proving or learning.

Proving goals would therefore be qualitative goals that instruct participants that the main aim for performing the task is to prove to themselves and others of their task ability. Learning goals, on the other hand, would be goals that instruct participants that the main aim of the task is to develop their knowledge, skills and ability. Proving and learning goals are not mutually exclusive and can be assigned simultaneously. Thus, interaction effects may be possible. This study is, however, exploratory. Its limited goal is to investigate if the assignment of proving and learning goals will result in differences in learning and performance. The question of how learning and provin goals relate to one another is left to future studies.

The model suggests that assigned learning and proving goals can influence the person's internal goal orientation.

H2a : Assigned learning goals induce a learning orientation.

H2b : Assigned proving goals induce a proving orientation.

Goal Orientation, Self-efficacy, Learning and Performance

The model incorporates Elliott and Dweck's (1988) findings that a proving orientation leads to learning and performance deficits whereas a learning orientation does not. Thus, participants with a learning orientation should do better than those with a proving orientation. As with H1c, we should also expect the effects of goal orientation to be larger when the task is unfamiliar.

H3a : Participants with a learning orientation learn better than those with a proving orientation.

H3b : Participants with a learning orientation perform better than those with a proving orientation.

H3c : The effects of learning and proving orientation on performance are larger when the task is unfamiliar than when the task is familiar.

According to researchers such as Brehmer (1979), and Tolman and Brunswik (1935), the inference process is the essence of learning and knowledge. Through the inference process people learn about the environment and adapt accordingly. Brehmer (1979) suggests that knowledge refers to a relationship between the knower and some state in the environment. The person is said to be knowledgeable when the person's cognitive map matches the corresponding state in the environment. Thus, learning is a process of changing one's cognitive map based on experience. As learning occurs, the cognitive map of the person approaches congruence with the state of the environment.

A technique developed for investigating the relationship between the state of the environment and the person's cognitive map is the multiple cue probability learning (MCPL) task (Brehmer, 1979). The task is to make predictions on a criterion variable using a set of cues. The task, therefore, requires participants to learn the functional rule relating the set of cues to the criterion variable. In arriving at a prediction, the person must use a model of reality. Researchers then estimate this cognitive map with regression analysis. The MCPL technique thus allows researchers to describe cognitive systems in statistical terms. The person's cognitive map is described in terms of the estimated cue weights, function forms, combination rules, and consistency of use. The MCPL paradigm also decomposes performance in into orthogonal components of learning and achievement (for details see appendix 1).

This study uses the MCPL task format (for details see the chapter on Method and in appendix 1). Since the MCPL task is cognitive, it precludes much of the motivational effects of effort and persistence, except for those that pertain to learning. As each participant makes predictions over repeated trials, learning is inferred when the participant's prediction rule approaches the task rule. Another indicator of learning is the consistent use of the appropriate prediction rule. Finally, the consistent application of a prediction rule that is more congruent with the task rule will result in better performance.

Dweck (1986) suggests that different goal orientations create different frameworks for interpreting events. When people adopt a proving orientation, which focuses on ability affirmation, they interpret setbacks as evidence of inability (e.g., lack of intelligence, memory, or problem solving ability). People with a learning orientation interpret setbacks as a natural part of learning. They attribute the cause of setbacks to external causes such as effort. If the experimental task is both new and cognitive, participants should attribute setbacks to insufficient learning rather than to effort.

H4a : When participants do not attain their personal goals, those with a proving orientation attribute the cause to a lack of ability.

H4b : When participants do not attain their personal goals, those with a learning orientation attribute the cause to insufficient learning.

When people see setbacks as part of learning, their perception of their own task ability is less like to deteriorate. In contrast, when people see setbacks as a reflection of inability, perceived task ability islikely to deteriorate. Since perceived ability is an important component of self-efficacy, we can, therefore, expect self-efficacy to change as well. Since self-efficacy influences performance through personal goal, we can also expect participants with a proving goal orientation to lower both their personal goal and performance levels after experiencing setbacks.

H5a : When participants do not attain their personal goals, the self-efficacy of participants with a proving orientation is more likely to decline than the self-efficacy of participants with a learning orientation.

H5b : When participants do not attain their personal goals, the personal goal level of participants with a proving orientation is more likely to decline than the personal goal level of participants with a learning orientation.

H5c : When participants do not attain their personal goals, the performance of participants with a proving orientation is more likely to decline than the performance of participants with a learning orientation.

SD Goals in New and Complex Tasks

Effects of SD and DYB goals on Goal Orientation

Goal setting theorists (and others) would be interested to know whether SD goals tend to cue a proving orientation, resulting in the findings that SD goals sometimes impair performance.

It is possible that SD goals may induce a proving orientation whereas DYB goals may not. Although proving goals and SD goals may be conceptually distinct, in practice confounding them may be difficult to avoid.

SD goal manipulations typically include a statement that the goals are difficult but achievable. This procedure is a common device used to gain goal acceptance. But by doing so, it may also unwittingly provide normative information about what constitutes "elite performance". It tells participants the exact level of performance they must achieve to qualify as an elite performer. This may implicitly induce a proving orientation: participants accept the difficult goal to prove that they are top performers.

Even if the SD manipulations are not confounded and all normative information is eliminated, participants can still gauge that the goal is difficult. They base their estimates on their life experiences and background knowledge. This is consistent with the anticipatory mechanisms postulated by social cognitive theory. Even if the estimation of difficulty can be precluded, for instance, in an artificial and foreign task, participants will have sufficient information for an estimate after the first few trials.

In contrast, with DYB or no-goal conditions, people are not able or at least less likely to adopt a proving orientation. Normative information about elite performance is absent. It is difficult to prove that one has ability through performance achievement if we are uncertain about what is good performance. In addition, little information is gained about one's ability in accomplishing easy or ill defined goals.

H6 : Participants in the SD goal conditions are more likely to infer that they are trying to attain a level of elite performance than those in the DYB condition.

H7 : SD goals are more likely to cue a proving orientation than DYB goals.

If SD goals do tend to induce a proving orientation, then learning and performance effectiveness may be hampered whenever the two conditions of low self-efficacy and performance setback are both present. In a complex and new task, both of these conditions have a high probability of occurring, especially in the initial trials. Thus, we are more likely to observe SD goals producing more performance deficits than in other task situations (see H1c).

Effects of SD and DYB goals on Self-Efficacy and Perceived Success

SD goals may also affect self-efficacy directly to induce a performance deficit when the task is new and complex. In complex tasks, expertise is not readily acquired (Anderson, 1993; Hayes, 1985, VanLehn, 1989). Thus, when participants are given an SD goal, they are unlikely to achieve the goal quickly. Thus, the SD goal becomes, temporarily, an impossible goal. With impossible goals, self-efficacy may decline, resulting in poorer performances in the initial trials.

Furthermore, with a specific goal, the performance standard is clearly defined. When performance falls short of the standard, the deficit is also unambiguous. An absolute standard also implicitly suggests that the goal level is the only criterion for acceptable performance. Shortfalls are therefore onerous and difficult to ignore or rationalize. As a result, substandard performance is likely to elicit the inference of failure, which may in turn, decrease self-efficacy and performance.

In contrast, DYB goals and no-goal conditions do not have an absolute standard of performance specified and participants have a greater latitude for interpreting their performance. Without an external and unwavering standard, any performance level may be interpreted as acceptable. The phrase "do your best" also suggests that the criterion for acceptable performance may not necessarily be performance output. Thus, participants are free to adopt levels of effort or persistence as criteria for interpreting success or failure. All the above conditions tend to favor the interpretation of performance as successful rather than as unsuccessful. Thus, their self-efficacy is more likely to be maintained if not enhanced.

H8a : With a new and complex task, participants in SD goal condition are more likely to view their performance as failures.

H8b : With a new and complex task, participants in the DYB condition are more likely to view their performance as successes.

H9 : With a new and complex task, the self-efficacy of participants in the SD condition is more likely to decline than the self-efficacy of participants in the DYB condition.

In summary, it was argued that SD goals may have contradictory effects on performance. SD goals enhance performance by stretching the effort and capability of the individual and by reducing the variance in performance with specific information. At the same time, SD goals may hurt performance by inducing a proving orientation. By conveying information about elite performance and providing specific standards for proving one's ability, SD goals provide ready opportunities for adopting proving orientations that DYB goals do not. With a proving orientation, both self-efficacy and performance are vulnerable to setbacks.

Moreover, SD goals set up a situation where failure to achieve goals is highly likely in the initial trials of new and complex tasks. The specificity of SD goals clearly defines the criteria for success or failure whereas DYB goals do not. Thus, people with SD goals are more likely to interpret substandard performance as failures, resulting in lowered self-efficacy and the further decline of performance.

IV. METHOD

Participants

A total of 125 graduate and undergraduate students participated in the study; 63 were males, 61 were females, and 1 did not disclose his/her sex. Their ages ranged from 17 to 47 with a mean age of 22.1 (s.d. = 4.1). Approximately 80% of the participants were commerce majors while the rest were psychology majors and education students.

The students were recruited through classroom presentations and notices posted on bulletin boards. For participating in the study, students were given a seminar on personal effectiveness and a chance to win cash prizes in a raffle.

Task

The experimental task was a multiple cue probability learning (MCPL) task used by Earley, Connolly, and Ekegren (1989) and Earley, Connolly, and Lee (1989). The task consisted of predicting stock prices of 100 fictitious companies based on three cues. The cues were the performance ratings of marketing (X_1), research and development (X_2), and production divisions (X_3). Participants were told that a 0% rating for a particular function meant that it was "completely ineffective", and that a 100% rating meant "completely effective".

The actual stock price, Y_e, was generated with the formula:

$$Y_e = 0X_1 + 0.33X_2 + 0.67X_3 + \text{error}.$$

The stock prices (Y_e) were normally distributed with a mean of \$50 and a range of \$2 and \$96.

The values of the three cues were randomly generated from a uniform distribution with a mean of 80% and a range of 10% to 150%. The error term was drawn from a uniform distribution with a mean of $0 and a range of -$10 to +$10.

The random generation of cue values and error term, however, could not ensure that the distribution of the cues and errors were similar among the 5 trial blocks. Neither could it ensure that the task rule inferred from the cues and prices resembled the actual task rule used. This was the result of sampling error.

To correct for these problems, the following procedure was used. The purpose was to produce uniform trial blocks. First, numerous samples of 20 trials were generated. Those blocks with near normal distributions were selected for the experiment. Then the task rule was used to compute the actual price. Thereafter, the cues were regressed against the actual price to arrive at the best possible estimate of the task rule. The random error terms were then reassigned within each trial block of 20 until all trial blocks produced similar estimates of the task rule. These procedures ensured that the 5 trial blocks were equivalent. They also ensured that students did not experience the prediction task as unusual, abnormal, or unpredictable.

The above procedure was not reported in the studies conducted by Earley and his colleagues. Other than for the above procedure and number of trials, the procedure was almost identical to that of Earley et al. (1989).

MCPL tasks were used to study how people learned rules and made inferences. The main reason for using a MCPL task was that self-reports provided less than perfect descriptions of cognitive processes (Brehmer, 1979). Participants might interpret and rationalize what they had done. They could also have less than perfect insight into their own cognitive processes. MCPL tasks allowed researchers to describe cognitive systems in terms of statistical estimates. The task, with its associated statistical procedures, gave information about cue weights, function forms, combination rules, and predictability (Brehmer, 1979).

MCPL tasks required people to learn to use a set of cues to make inferences about a criterion variable. Participants had to learn the functional rule relating the set of cues to the criterion variable. Since the rule was not given, participants had to learn by a hypothesis testing process. According to Brehmer (1979), the purpose of MCPL experiments was to study how the cognitive system came to terms with the task system. Research in this area had focused mainly on how the properties of the task (as reflected by the cue weights, function forms, combination rules, and predictability) affected the learning and cognitive mapping of the task. In other words, researchers focused on how well people mirrored the different aspects of the functional rule. Brehmer's (1979) discussion of the statistical parameters used for measuring the extent to which the cognitive system matched the task system is reproduced in Appendix 1.

Earley, Connolly, and colleagues used the MCPL task to explore how the cognitive process of strategy development affected performance under different assigned goals. Firstly, the task allowed them to describe statistically the content (in terms of cue weights used) and the consistency of the strategies used by participants.

Secondly, the MCPL task was a cognitive task. This allowed Earley and colleagues to focus on the relationships among assigned goals, strategy development, and performance.

Thirdly, theorists using MCPL tasks conceived of the inference process as a learning process. According to Brehmer (1979) the inference process involved cognitive activities directed at "finding the best possible set of cues, and learning to use them adequately." Thus, the MCPL task could be used to investigate learning.

Fourthly, by using Earley, Connolly, and colleagues' task, the results of this study would be comparable with theirs. This was important because it was their series of experiments that provided the strongest evidence that SD goals might be less beneficial than DYB goals. Using the identical task also allowed an understanding of the dynamics of Earley, Connolly, and colleagues' experiments.

Finally, the stock prediction task qualified as a moderately complex task (with a rating of 6-7 on Wood et al.'s 10 point scale). The task had three information cues that must be attended to, processed, and integrated to make a prediction; and the task was probabilistic. Thus, the task had all the dimensions of complexity defined by Wood (1986), that is, component, coordinative, and dynamic complexity.

In Earley, Connolly, and colleagues' experiments, the MCPL task proved difficult to master even after 100 trials. This suggested that the task was indeed complex. Furthermore, Earley and colleagues' MCPL task had been accepted by Locke and Latham (1990) as a complex task.

Treatment Factors

The study consisted of 2 assigned goal factors and 1 repeated measure factor. The first factor, the LPN factor, consisted of the assigned learning/proving goal treatments: (1) learning goal, (2) proving goal, and (3) no goal (no(LPN). The second factor, the DSN factor, consisted of the traditional "do your best"/specific difficult goal treatments: (1) "do your best" goal, (2) specific difficult goal, and (3) no goal (no(DSN)). The between factors, LPN and DSN factors were crossed resulting in 9 treatment cells. The crossing of the two assigned goal factors enabled us to detect interactions between the two assigned goal factors. The repeated measure factor consisted of 6 trial-blocks of 20 trials each. To compare the effects when the task was unfamiliar and when it was familiar, data from the two extreme trial blocks (i.e., trial block 1 versus trial block 6) were compared. Although data in trial blocks 2 through 5 had been "wasted", the procedure was still appropriate. Participants gained familiarity over time and at different rates. Thus, trial blocks 2 through 4 were likely be more heterogeneous with respect to task familiarity. Using only the extreme two trial blocks improved the validity of the classification.

Treatment Manipulations

Treatment manipulations were embedded in the task instructions that participants read before the commencement of the task. In addition, manipulation instructions appeared before each trial block. These took the form of "some useful hints" for performing the task. For an example of the questionnaire booklet and details of the manipulations see appendices 3 through 6. Booklets containing these treatment manipulations were assigned randomly to participants.

Below are the main treatment manipulations:

Learning goals. Participants in the learning goal condition were told that the purpose of the task was to enable them to learn about predicting stock prices.

Proving goals. Participants in the proving goal condition were told that the purpose of the task was to allow them to prove their ability at predicting stock prices.

SD goal. Participants in the SD goal condition were told that their goal was to make stocks predictions that were within $10 of the actual price for each of the trials. This goal level was identical with that used in Earley, Connolly, and Ekegren (1989). According to these researchers, this was a difficult goal: only 15% of their participants were able to attain that level of performance at the end of the 100 trials.

DYB goal. Participants in the DAB goal condition were told that they should do their best at predicting the stock prices.

No goal. In the no goal condition, the manipulation statements corresponding to the treatment factor were not included.

Procedure

The study was conducted in classrooms and in small group laboratories. Participants signed up for prearranged time slots or made individual arrangements to participate. Participants were seated sufficiently apart so that they could not see one another's material. They were then given 2 booklets. The first contained the manipulation instructions and questionnaires, and the second, the price prediction record sheet. The separate worksheet allowed them to review their predictions easily.

Participants completed a questionnaire before each block of 20 trials. They then proceeded with the predictions. For each trial, the experimenter presented the cues with the overhead projector and read them aloud. After 13 seconds, the correct stock price was shown for 7 seconds, as the experimenter read it aloud. Thus, each trial totalled 20 seconds.

The participants were required to write the correct stock price next to their predictions to ensure that they noted the feedback. Response times were short to prevent participants from trying more than one strategy for each set of cues. Each response and data point represented one strategy move. This ensured that the cognitive system was mapped accurately. After completing all the trials, the participants completed a final questionnaire before they were debriefed.

Measures

Learning. In developing an MPCL task the experimenter first starts with a task rule. In this study it was

$$Y = 0X_1 + 0.33X_2 + 0.67X_3.$$

An algorithm is used to generate the actual price from a set of cues. The algorithm is based on the task rule with an error term added. In this study it was

$$Y_e = 0X_1 + 0.33X_2 + 0.67X_3 + \text{error}.$$

With each trial, the participant uses cues presented ($X_1..X_n$) to arrive at a price prediction (Y_s). Thus, with a sufficient number of predictions we can deduce the participant's prediction model. This can be done by regressing the participant's prediction (Y_s) as a dependent variable and the respective cues as independent variables:

$$\hat{Y}_s = \sum_{i=1}^{n} \beta_{si} X_i + \beta_{so}$$

The estimate of the participant's prediction model will take the form of a regression equation. With this regression equation, we will be able to measure the effectiveness of learning by seeing how well it matches the best estimate of the task rule:

$$\hat{Y}_e = \sum_{i=1}^{n} \beta_{ei} X_i + \beta_{eo}$$

This study used the following procedures for measurement. First I generated a prediction price ($\hat{Y}_s$) from each set of cues by using the regression equation which represented the participant's prediction model. This procedure gave us a price that the participant would have predicted if there were no random extraneous variables influencing the price estimate. In other words, it was a price prediction based solely on the value of the cues and the participant's prediction model.

Earley, Connolly and their colleagues compared subjects' $\hat{Y}_s$ with Y_e. However, since the algorithm contained a random error term the best linear estimate of the task rule (using the cue and feedback information received up to the point of the prediction) need not be identical to the task rule. The best learners would have made use of all the information presented to estimate the task rule, and then made predictions with that. Thus, it would be incorrect to evaluate the participant's learning against the algorithm. Instead, the evaluation should be made against the best linear estimate of the task rule, given all the information that had been presented.

To derive the best linear estimate of the stock price at trial t, we regressed the cues against the actual stock price for all the trials prior to trial t. The cues for trial t were then entered into the derived linear regression equation to arrive at the best linear estimate of each stock price $(\hat{Y}_e)$.

According to the MCPL paradigm, learning would be shown by the degree of congruence between the participant's model and the best linear estimate of task rule. This was given by the matching index (r_m) which was the correlation between $\hat{Y}_e$ and $\hat{Y}_s$.

For effective learning and superior performance, participants must not only determine the correct prediction rule, they must also apply the rule consistently. In the inference literature, the extent to which people adhered to their prediction rule was measured by the consistency index (r_s). This index was the correlation between $\hat{Y}_s$ and Y_s.

Brehmer (1979) suggested that when the participant's task prediction rule matched closely with the task rule (i.e., r_m approaches 1), the index of consistency r_s, provided an additional measure of congruence between the participant's cognitive map and the task rule. Thus, the consistency index was used more as a fine grained measure of learning when the matching index failed to detect differences.

Excerpts of discussions by Brehmer (1979) and Sniezek (1986) on the statistical technique associated with MCPL tasks are reproduced in Appendix 1.

Performance. Earley, Connolly, and Ekegren (1989) used two indices for performance, namely, the mean absolute error (MAE) and the correlation between the predicted price (Y_s) and the correct prices (Y_e). The MAE index was the mean difference between the participant's predictions and the actual stock prices. Both indices evaluated performance against the actual stock price instead of the best estimate of the stock price. Thus, these indices did not recognize the limits to predictability. As stated in the previous section, the actual stock price contained a random error term. To evaluate participants against the actual stock price might unduly reward or penalize participants. Although it could be argued that the error term is random and should cancel out over time, sampling error could still cloud the results. This study, therefore, used the mean error from the best estimate (MEBE) as the performance index. MEBE was the mean difference between each participant's prediction (Y_s) and the best linear estimate of the stock price ($\hat{Y}_e$).

Goal orientation. Two types of measures were used. The first type consisted of items measuring intention. Two items consistent with a learning orientation made up the learning orientation intention scale or LOIS. And two items consistent with a proving orientation made up the proving orientation intention scale or POIS.

Learning items:

1. Learn something from this task.
2. Gain some insight into how I think and/or how I do things.

Proving items:

1. See how good I am at this task.
2. Try not to humiliate myself.

The second type consisted of retrospective measures. They were self-reports about the participant's focus during the prior trial block. Two items that were consistent with a learning orientation made up the learning orientation retrospective scale or LORS. And 3 items that were consistent with a proving orientation made up the proving orientation retrospective scale or PORS.

Learning items:

1. While performing the task, I focused on how and what I learned rather than on how well I did.
2. I believe that performance on this task depends on the amount of effort and learning rather than on ability.
3. I believe that performance on this task is unimportant; it is learning new skills that is important.

Proving items:

1. While performing this task, I was concerned about how well my performance will compare with others.
2. I was anxious to do well on this task because a poor performance score will reflect badly on me.

For both the intention and retrospective measures, participants were asked to rate on a 7-point scale the degree to which they agreed with each of the statements.

Self-efficacy. Self-efficacy measures were based on Bandura's dimensions of strength. For each level of performance, participants were asked how certain they were that they would achieve the particular level of performance (see Appendix 6 page 153). Self-efficacy strength is the sum of the degree of certainty scores. This measure has been used in many goal setting and self-efficacy studies (e.g., Pandora & Cervone, 1986; Pandora & Wood, 1989; Locke et al., 1984; Wood & Locke, 1987).

Personal goals. Before each block of trials, participants recorded their personal targeted performance level for the coming trials.

Goal commitment. Goal commitment for all the assigned goals and personal goals was measured on a 7-point scale (1 = definitely will not try at all to 7 = definitely will try my hardest).

Attributions of success or failure. Participants were asked whether their performance exceeded, met or fell short of their personal goal. They also stated the degree of success or failure they felt about their performance during the previous trial block. The 7-point scale ranged from "have completely failed" to "am very successful".

Causal attributions. Participants were asked to identify the causes of their better or worse than expected performance. The five causes provided were "personal ability", "effort", "sufficient or insufficient learning time", "chance or luck", and "task difficulty or ease". Participants were asked to rate on a 7-point scale the contribution each cause made to the performance during the previous trial block.

Striving for elite performance. Striving for an elite level of performance was measured with two questions with 7-point scales at the end of the task. The first asked if they were striving for an elite performance while the second asked how much they wanted to be among the top 10 percent of their peers.

Manipulation Checks

Instead of testing participants' awareness of the manipulation instructions, the manipulation checks tried to see if the focus of the participant was consistent with the manipulations. The rationale was that manipulation checks should be more than a memory or awareness testing, instead it should confirm whether the manipulation was assimilated. Please see page 62 for the items and results.

Extraneous Variables

To control for extraneous variables, participants were randomly assigned across treatments. In addition, data on the initial level of self-efficacy and locus of control were collected and used as covariates in analyses when these variables might affect the results. Details of the analyses will be presented later.

Initial level of self-efficacy. Self-efficacy has been shown to influence learning and performance. Thus, to control for its effects, initial self-efficacy was measured prior to the first block trial and used as a covariate in analyzing performance and learning.

Locus of control. Predisposed locus of control could affect attribution. People with an internal locus of control could have a tendency to attribute performance to ability and effort whereas those with an external locus of control might be more likely to attribute performance to chance. Thus, Rotter's (1966) internal-external locus of control scale was used as a covariate in analyzing causal attributions.

Goal commitment. Goal setting theory assumed an adequate level of goal commitment. In most experiments, the demand conditions of the laboratory setting were sufficient to ensure an adequate level of goal commitment. But, because of its potentially large moderating effects, goal commitment was usually measured as a manipulation check and for possible inclusion as a control variable (Locke & Latham, 1990).

Data Analysis

ANCOVA procedures were used to partial out the effects of extraneous variables. Apriori contrasts were then used to test specific hypotheses. Exploratory contrasts were also employed to further explore and interpret the data. Details of the specific statistical techniques are reported together with the results.

In all the analyses, data were examined for outliers. Outliers were defined as data points lying outside three standard deviations from the treatment mean. Each outlier was verified against the participants' booklets to eliminate coding errors. The values of the outliers were then adjusted to one unit more extreme than the data point which fell inside the three standard deviation boundary. This practice preserved the extreme value of the data but reduced the distortion effect it had to the sampling distribution (Tabachnick and Fidell, 1989).

The statistical package used in this study was the biomedical statistical program BMDP. The ANCOVA modules used were BMDP1V, BMDP2V, and BMDP4V. It was necessary to use the three modules because each provided certain unique statistical information.

V RESULTS

The first part of this chapter will present the results of the manipulation checks and discuss some of the psychometric properties of the scales used in this study. The significance level used for analyses in the first part will be at the 5 percent level (i.e., $\alpha = .05$).

In the second part of this chapter, the findings of each hypothesis together with the statistical techniques used will be discussed. Exploratory analyses that shed light on the results are also discussed. Because of the numerous hypotheses tested, the level of significance adopted for the analyses is 1 percent (i.e., $\alpha = .01$). This conservative level of significance will reduce the experimental-wise type-I error rate. But to report only the results that meet this stringent hurdle rate would provide too little information to future researchers. Thus, to guide their decision on the choice of possible follow-up studies, findings that have a significance level of less than 5 percent will also be presented.

PART I

Manipulation Checks

Checks were made on: (1) the DSN manipulation; (2) the LPN manipulation; (3) novelty of the task; and goal commitment. Except for goal commitment measures, all other the check items were administered after the entire 100 trials.

DSN Manipulations

The DYB-SD manipulation was assessed with two of the following statements:

(1) "I wanted to do my best"; and

(2) "I tried to get my predictions within $6 of the actual price."

Participants were asked to rate on a 7-point scale the degree to which they agreed with each of the statements (1 = definitely disagree to 7 = definitely agree). Separate analyses were performed on each item using a 3x3 ANOVAs (with DSN and LPN factors). The analyses of item 1 showed that all participants were trying to do their best and that there was no difference among treatment groups (mean = 6.34, s.d. = .87). The analyses of item 2 found a significant main effect for the DSN factor, $F(2, 116) = 3.49$, $p = .03$. Pairwise comparisons showed that the DYB group had significantly lower ratings than either the SD or the no-goal group on item 2 (DYB vs. SD: $F(1, 116) = 6.02$, $p = .02$; DYB vs. None: $F(1, 116) = 4.28$, $p = .04$). These results suggest that participants in different treatment groups were putting equal effort, but those in the SD group were more likely to try for the specific target of $6. The unexpected result was that the no-goal group was more similar to the SD groups than the DYB group.

Table 2. Manipulation checks items for learning and proving treatments

Learning	1. Learning was an important objective for me. 2. I tried to use this task to improve myself. 3. I wanted to learn how to succeed in this task.
Proving	1. Proving to myself and/or others is an important objective for me. 2. I wanted to do better than other people on this task. 3. I wanted to do well on this task.

LPN Manipulations

To assess the learning and proving manipulations, three questionnaire items were used for each manipulation (see Table 2). Multivariate ANOVA was used with the statistical program BMDP4V. Checks of the learning and proving manipulations failed to find significant results among the treatment groups. However, this failure to confirm that the manipulations succeeded is not fatal as both learning and proving orientations were measured at the end of each trial block and were used as primary data for analyses (e.g., H2 through H5).

Novelty of the Task

Novelty of the task was assessed using a single item. Participants were asked to rate the task on a 7-point scale (where 1 = familiar and 7 = novel). Participants found the task to be novel (mean = 5.75, s.d. = 1.3). The 3 (LPN) x 3 (DSN) ANOVA found no significant differences among the treatment groups.

Goal Commitment

Goal commitment measures for learning and proving goals were administered before each trial block. Those in the learning condition were administered only the learning goal commitment measure and those in the proving goal condition were administered only the proving goal commitment measure. This was to prevent possible contamination. For instance, if a proving goal commitment measure was to be administered to those in the learning condition, the measure might cue a proving orientation and thus contaminate the treatment. The two measures used are as follows:

(1) "How committed are you to the goal of "learning as much as you can" from this task?"

(2) "How keen are you to test and find out your stock price prediction ability?"

Participants in both the learning and the proving conditions were highly committed to their goals. For the learning condition, the mean score was 6.4 on a 7-point scale with a standard deviation on 0.6. For the proving condition, the mean score was 6.3 with a standard deviation of 0.8.

Commitment to SD goals was similarly measured for SD goals. The item used was:

> "How committed are you to the assigned goal of attaining a prediction error of less than 6 dollars?"

The mean score was 6 with a standard deviation of 1. Commitment to do your best was not measured as it was a not quantified performance target.

In addition, commitment to personal goals was measured. A 3 (LPN) x 3 (DSN) x 5 repeated measure ANOVA showed that commitment to personal goals was high in all conditions (cell means range from 6.1 to 6.9). There was a significant main effect for the LPN factor, $F(2, 114) = 3.9$, $p = .023$. The means for the learning, proving, and no-goal conditions were 6.7, 6.4, and 6.7 respectively. Although the difference was very small, comparison between the proving goal condition with the other two conditions was significant , $F(1, 114) = 7.71$, $p = .006$.

Given that commitment levels were high, were certain groups highly committed to different goal levels? A 3 (LPN) x 3 (DSN) x 5 repeated measure ANOVA with personal goals as the dependent variable showed a main effect for the DSN factor, $F(2, 115) = 5.23$, $p = .007$. The means (goal levels in terms of prediction error) for the DYB, SD, and no-goal conditions were 12.2, 9.5, and 11.6 respectively. Pairwise multiple comparisons using the Dunn-Bonferroni procedure (i.e., $\alpha_{Bon} = \alpha_{ind} / m = .05/3$) showed that those in the SD condition set significantly lower levels of prediction error as their goals than those in the DYB condition, $F(1, 115) = 9.64$, $p = .0024$.

The Goal Orientation Scale

The key variables of interest in this study are learning and proving goal orientations. However, scales for these constructs have yet to be developed. The scales used in this study represent a first attempt to operationalize the two constructs. However, please bear in mind that the purpose of this study was not to develop a psychometrically sound scale but to see if learning and proving orientations are useful concepts to pursue within a goal setting and social cognitive framework.

Learning and proving orientations were measured separately. For each orientation, 2 scales were used - the intention scale and the retrospective scale. By using two scales instead of one, we can derive some information about the convergent validity of the two instruments.

The intention scale consisted of 2 items each for learning and proving orientations. The items were phrased to capture the intent of the participant before each block of 20 predictions. The retrospective scale consisted of 3 items for the learning orientation and 2 items for the proving orientation. The items either stated that an aspect of a learning orientation was more important than an aspect of a proving orientation or vice versa. Participants were asked to rate the extent to which they agreed with the statements.

The items were constructed based on the various concepts found in Dweck's work. Multiple items were included in each scale to capture the entire domain of the goal orientation constructs rather than to improve the reliability of the instruments. Thus, it was not expected that intra-scale correlations would be high.

For the analyses, the learning, proving, and no-goal treatment groups were analyzed as separate sub-populations. Each response was then standardized using the group means and standard deviation. The standardized scores were then consolidated for further analyses.

Table 3. Inter-item correlations

	L1	L2	P1	P2	RL1	RL2	RL3	RP1	RP2
L1	1.000								
L2	.595	1.000							
P1	.365	.196	1.000						
P2	-.080	-.096	.124	1.000					
RL1	.549	.371	.243	.115	1.000				
RL2	.391	.327	.169	.167	.336	1.000			
RL3	.508	.338	.150	.046	.486	.306	1.000		
RP1	-.110	-.136	.029	.560	-.038	.081	-.084	1.000	
RP2	-.113	-.075	.095	.562	-.001	.071	-.033	.461	1.000

The Intention Scale

The intention scale asked participants to indicate how much emphasis they would be giving to each of the four qualitative goals as described by the scale items. The scale was administered before each of the 5 blocks of 20 predictions.

Learning items:

L1. Learn something from this task.

L2. Gain some insight into how I think and/or how I do things.

Proving items:

P1. See how good I am at this task.

P2. Try not to humiliate myself.

The 2 learning orientation items correlated at 0.60. Internal consistency index, Cronbach's α, was 0.75. The reliability is acceptable for a 2 item scale. Moreover, the items were meant to tap different aspects of learning orientation as described by Dweck. These 2 items were summed to form the learning orientation intention scale (LOIS).

The 2 proving orientation items correlated poorly at 0.12. Item 1 had a positive correlation with the learning orientation items (0.36 and 0.20). Thus, this item was ambiguous in goal orientation and was dropped. The remaining proving orientation item was acceptable with a slightly negative correlation with the learning items (-0.08; -0.10) and with the LOIS scale (-0.10). This provides evidence that P2 of the proving scale was measuring a different construct from the learning items. Item P2 was the only item used (POIS).

The Retrospective Scale

The retrospective scale was administered after each of the trial blocks. Participants were asked to rate the extent to which they agreed with the following statements.

Learning items:

RL1. While performing the task, I focused on how and what I learned rather than on how well I did.

RL2. I believe that performance on this task depends on the amount of effort and learning rather than on ability.

RL3. I believe that performance on this task is unimportant; it is learning new skills that is important.

Proving items:

RP1. While performing this task, I was concerned about how well my performance will compare with others.

RP2. I was anxious to do well on this task because a poor performance score will reflect badly on me.

The correlation coefficients for the 3 learning orientation items were 0.31, 0.34, and 0.49. Internal consistency index, Cronbach's α was 0.64 (Carmines & Zeller, 1979). The proving orientation items correlated at 0.46. The correlations between the learning and proving orientation items were near zero, ranging from -0.08 to 0.08. This provides evidence that the learning and proving items measure different constructs. The individual items were summed to form their respective scales - the learning orientation retrospective scale (LORS) and the proving orientation retrospective scale (PORS).

Interscale Correlations

Correlations between scales measuring the same goal orientation had moderate positive correlations (see Table 4). The 2 learning scales (LOIS and LORS) correlated at 0.60 and the 2 proving scales (POIS and PORS) correlated at 0.66. Scales measuring different goal orientation had either low positive correlations, or had near zero correlations. These ranged from -0.14 to 0.14.

Table 4. Inter-scale correlations

Scales	LOIS	LORS	POIS	PORS
LOIS	1.00			
LORS	0.61	1.00		
POIS	-0.10	0.14	1.00	
PORS	-0.14	-0.00	0.66	1.00

Summary

In summary, the items in the two scales were theoretically derived. Multiple items for each scale were included in an attempt to capture the domain of the goal orientation constructs and not for improving the reliability of the instruments. Thus, a high intra-scale correlations typically found in scale construction studies was not expected. The moderate correlations between items within the scales, and those between the scales of the same construct (i.e., either the learning or the proving orientation) provide evidence of convergent validity. The near zero to low negative correlations found between the scales measuring different constructs (i.e., learning vs. proving) provide evidence of discriminant validity. They also show that learning and proving orientations are orthogonal dimensions. Thus, the proving and learning orientations were analyzed separately. The intention and retrospective measures were also analyzed separately as each type of measure was likely to have different psychometric properties. Furthermore, such separate analysis would also provide information on the relative usefulness of each measurement. This would help in future research on goal orientations.

PART II

Effects of Assigned Learning and Proving Goals on Performance and Learning (H1)

H1a : Participants with assigned learning goals learn better than those with assigned proving goals.

H1b : Participants with assigned learning goals perform better than those with assigned proving goals.

H1c : The effects of assigned learning and proving goals on learning and performance are larger when the task is unfamiliar than when the task is familiar.

Hypotheses 1a and 1b compared assigned learning and proving goals on learning and performance, while hypothesis 1c compared the difference in effects between the two types of assigned goals at trial blocks 1 and 5.

A set of 3x3x5 ANCOVAs with repeated measures tested these hypotheses. The LPN factor consisted of learning, proving and no(LPN) goal treatments. This factor was crossed with traditional goal setting goals (i.e., the DSN factor consisting of DYB, SD and no(DSN) goal treatments). Although a simpler single factor design (i.e., with only the LPN factor) would have been sufficient to test the hypotheses, this cross factor design allowed for a comparison of the learning and proving goals with the traditional goals and for controlling any confound between them. This design had several advantages. First, it addressed the concerns of both goal setting theorists and Dweck together with her colleagues. Second, it allowed for the detection of any interactions that might have existed and thus could comment on how simultaneous goals might affect learning and performance. Finally, the repeated design allowed for the comparison of learning and performance across trial blocks. Thus, the design not only tested the hypotheses, it allowed for exploratory research.

In many studies, self-efficacy had been a good predictor of learning and performance. Thus, the undue influence of a participant's initial self-efficacy needed to be controlled. This was done by using the self-efficacy score collected before the trials as a covariate in the analyses.

All the treatment cells had 14 participants except one cell which had 13. Unweighted means analysis was therefore used with BMDP2V. This approach is appropriate for experimental designs and is conservative (Tabachnick and Fidell, 1989; Winer, Brown, and Michels, 1991).

Besides the omnibus ANCOVA above, apriori contrasts tested each specific hypothesis. The comparisons were made using the appropriate error terms that were derived from the omnibus ANCOVA using the statistical program BMDP4V. This approach provided improved statistical power over simple two-group comparisons. The error terms derived from the omnibus ANCOVA were smaller as the systematic variances of the specified factors had been accounted for. To control for family-wise type-I error, the Dunn-Bonferroni procedure was used.

Learning

Hypothesis 1a compared assigned learning goals and proving goals on the dependent variable learning. The two measures of learning were the matching index (r_m) and the consistency index (r_s); both have been used extensively in multiple cue probability learning experiments. For further details of the indices, please see page 54 and Appendix 1.

Separate but identical analyses were performed using each of the indices. Both indices are correlation coefficients. They typically have skewed distributions. It was therefore necessary to normalize the distribution with Fisher's Z formula before analysis. The Fisher's Z transformation has been customarily used in studies using multiple cue probability learning tasks. For more details on the Fisher's Z transformation, please see Appendix 2.

The following section presents the findings for hypothesis 1a with each index as the dependent variable.

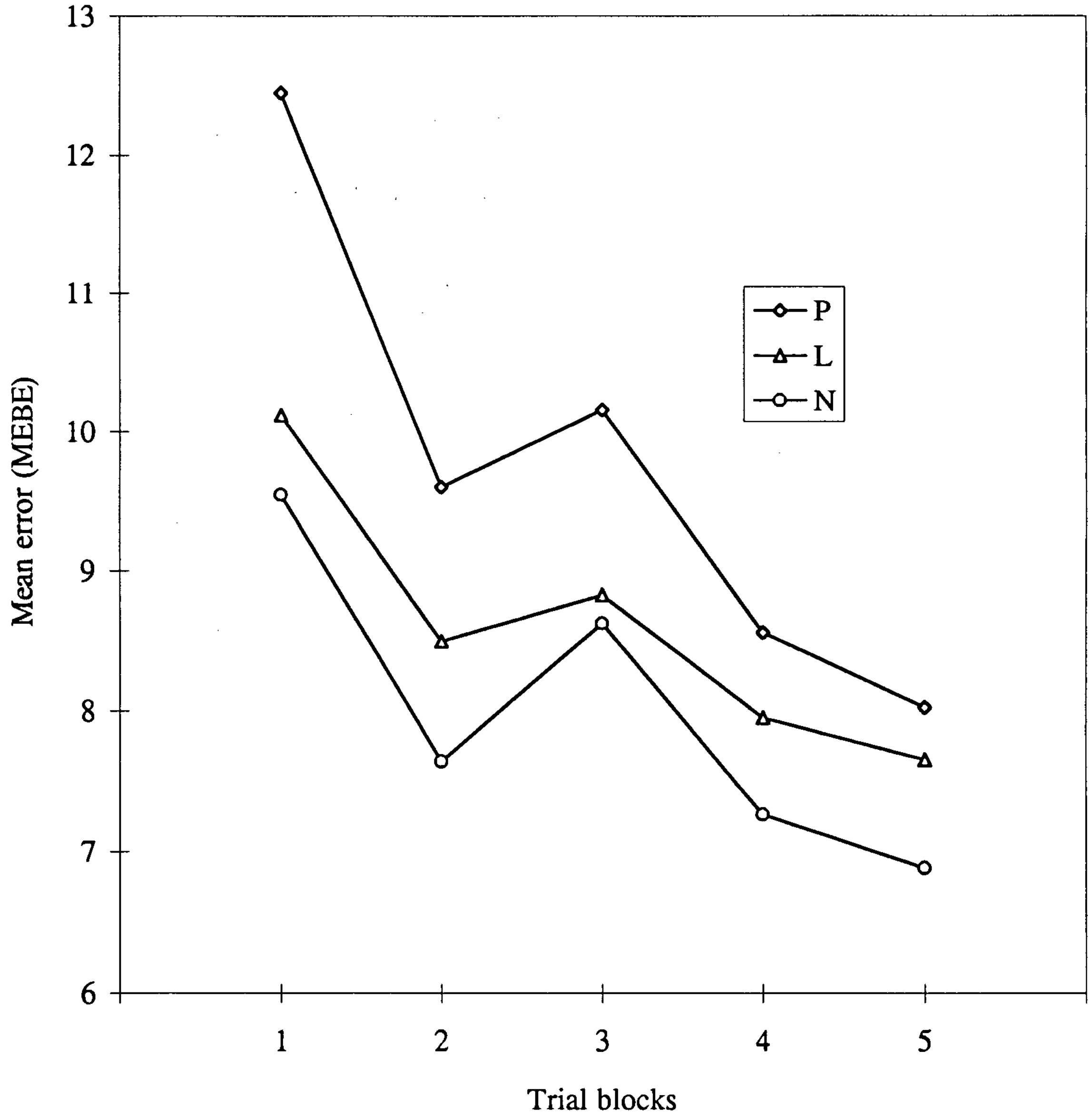
Matching index. The main effect for the LPN factor fell just outside the significance level of .01, $F(2, 115) = 3.8$, $p = .025$. Thus, H1a was not supported with the matching index. However, treatment means were in the anticipated direction (the unweighted mean r_m scores, adjusted for the covariate for the none, learning, and proving conditions were 0.93, 0.92, and 0.90 respectively).

Consistency index. The main effect for the LPN factor was significant only at the .01 level. Comparison between the learning and the proving conditions was in the correct direction but was not significant. H1a was therefore not supported with the consistency index.

Performance

Hypothesis 1b tests whether assigned learning goals lead to better performance than proving goals. To test this hypothesis, the mean error from the best estimate (MEBE) was used as the dependent variable. Briefly, MEBE is the mean difference between each participant's prediction and the best linear estimate of the stock price given all the information presented prior to that particular trial. A detailed explanation of MEBE is presented on page 56.

Figure 6. Performace (MEBE) across trials



The analysis found a significant main effect for the LPN factor, $F(2, 115) = 5.86, p = .004$. The unweighted means for MEBE, adjusted for the covariate for the none, learning, and proving conditions were 7.99, 8.61, and 9.76 respectively. Pairwise comparisons using the Dunn-Bonferroni procedure (i.e., $\alpha_{Bon} = \alpha_{ind} /m = .01/3$) found a significant difference between the no-goal and the proving conditions, $F(1, 115) = 11.35, p = .001$. The difference between the learning and proving goals was as predicted, but it did not attained significance, $F(1, 115) = 4.86, p = .03$. Finally, the difference between the learning and no-goal condition was not significant, $F(1, 115) = 1.4, p = .24$

Task Familiarity

Hypothesis 1c predicted that for each of the three dependent variables (i.e., the matching, consistency, and performance), the differences between means of the assigned learning goal condition and that of the assigned proving goal condition would be larger when the task was unfamiliar. To test H1c, separate 2x2 repeated measure ANCOVAs were performed for each of the indices (Zrm, Zrs, MEBE). The between factor was learning vs. proving and the within factor was trial blocks 1 and 5. As explained previously, trial blocks 1 and 5 were chosen for comparison because they were the extreme points of task familiarity in this experimental task.

From a statistical perspective, hypothesis 1c postulated a two-way interaction between the assigned goals (learning vs. proving) and the trial blocks (TB1 vs. TB5). Thus, the analytical strategy was to look for a significant interaction effect in the ANCOVA, and if found, to follow with simple effect analysis at trial blocks 1 and 5.

A significant interaction effect was found for performance. Simple effect analysis at trial blocks 1 using the Dunn-Bonferroni procedure (i.e., $\alpha_{Bon} = \alpha_{ind} /m = .01/3$) found that those with learning goals did better than those with proving goals, $F(1, 123) = 14.11, p = .0003$. In contrast, no significant difference between the two conditions was found at trial block 5. Thus, hypothesis 1c was supported for performance.

Similar analyses on both the learning indices found no significant interaction effects. Thus, hypothesis 1c was not supported for the learning indices. However, differences between the two treatment conditions were as predicted (i.e., the differences were larger at trial block 1 than at trial block 5).

Effects of Assigned Learning and Proving Goals on Goal Orientations (H2)

H2a : Assigned learning goals induce a learning orientation.

H2b : Assigned proving goals induce a proving orientation.

The purpose of these hypotheses was to see if it was possible to induce learning and proving orientations with assigned goals. Testing these hypotheses also serves as a manipulation check on the effectiveness of the instructions given to participants.

To test hypotheses 2a and 2b, a 3x3x5 ANOVA was used for each of the 4 goal orientation measures (i.e., learning orientation intention scale (LOIS), proving orientation intention scale (POIS), learning orientation retrospective scale (LORS), and proving orientation retrospective scale (PORS)). The between factors were the LPN (learning, proving, none) and DSN ("do your best", specific difficult, none) factors. The within factor was the 5 trial blocks.

The DSN factor was included for the same reasons as in the analysis of hypothesis 1. The ANCOVA partial out the effects of the various factors and covariate before performing statistical comparisons. This approach removes the confounding effects of both the DSN factors and the covariates. It also allows exploratory observations about "do your best" and specific difficult goals.

Learning Orientation Intention Scale

The comparison between the assigned learning and the assigned proving condition showed that those in the assigned learning condition had stronger learning orientation, $F(1, 116) = 5.93$, $p = .016$. However, since p fell outside the .01 level of significance, hypothesis 2a was supported with the learning orientation intention scale.

All other analyses to test hypotheses 2a and 2b found no significant effects.

The Effects of Goal Orientations on Learning and Performance (H3)

H3a : Participants with a learning orientation learn better than those with a proving orientation.

H3b : Participants with a learning orientation perform better than those with a proving orientation.

H3c : The effects of learning and proving orientations on performance are larger when the task is unfamiliar than when the task is familiar.

Dweck's (1986) thesis centered on the variable goal orientation. However, Elliott and Dweck (1988) did not establish the relationship between goal orientation and learning and performance directly. Their analysis really tested the relationship between the manipulations and the outcomes. Hypotheses 1 through 3 attempted to verify the relationships among assigned goals, goal orientation, and the outcomes learning and performance.

Hypotheses 1a through 1c tested the linkage between assigned goals and the dependent variables; hypotheses 2a through 2b tested the linkage between assigned goals and goal orientations; and hypotheses 3a through 3c tested the linkage between goal orientations and the dependent variables.

However, the literature on goal orientation was not clear as to whether learning and proving orientations were two ends of a bipolar construct, or were two separate dimensions. The near zero correlation found in this study, between learning orientation scales and proving orientation scales, supports the latter conceptualization.

Thus, to test hypotheses 3a and 3b on each of the learning and proving dimensions, participants were classified into 3 approximately equal groups according to their scores. The top, middle, and bottom one-third were labeled as "high", "medium", and "low" respectively. The two cells with a relatively "pure" learning orientation (i.e., Learning(High)-Proving(Low) (LHPL)) and proving orientation (i.e., Proving(High)-Learning(Low) (PHLL)) were compared. Comparisons were performed with *t*-tests. The dependent variables were the learning indices, Zr_m and Zr_s, and the performance index, MEBE (for the entire 100 trials).

To test hypothesis 3c, the statistical procedures used to test hypothesis 1c were used (see page 75). As in H1c, 2 (learning vs. proving) x 2 (TB1 vs. TB5) ANCOVAs were used to look for interaction effects. When an interaction was found, simple effects analyses were conducted.

The analyses to test H3a through H3c found no significant effects. Thus, H3a through H3c were not supported.

Perceived Failure to Meet Goals

Hypotheses 4 through 5 are hypotheses relating to the contingency when participants perceive that they have not met their goals. These hypotheses predict that under such a situation, there will be a difference between those with a strong learning orientation and those with a strong proving orientation. Implicitly, the hypotheses also suggest that there will be differences between those who perceive that they have met their goals and those who perceive that they have not.

Thus, participants were first classified along two dimensions: (1) their goal orientation; and (2) whether they met their personal goals. For goal orientation the classifications used were the same as those used in H1 and H3. The following procedure was used to classify participants into the 'not met goal' and 'met goal' categories. Participants who felt that they did not achieve their goals on 3 or more trial blocks (out of the 5 trial blocks) were classified as the 'not met goal' group. The other participants were classified into as the 'met goal' group.

Two by two ANCOVAs were used. The high learning response (LHPL) and the high proving response (PHLL) formed 2 levels of the first factor. The "not met goal" (NM) and "met goal" (M) formed the second factor. Separate analyses were made for goal orientation classification using (1) the intention scales, and (2) the retrospective scales.

Hypotheses 4 and 5 postulate a two-way interaction effect between goal orientation and whether goals were met. Thus, the analytical strategy was in two phases. The first phase was to look for a significant interaction effect. Whenf found, the simple effects analysis was used to determined if the differences were in the hypothesized direction.

Cell sizes for ANCOVAs using the intention measure for classification were LHPL/NM = 11, LHPL/M = 9, PHLL/NM = 5, PHLL/M = 11). Cell sizes for ANCOVAs using the retrospective measure for classification were LHPL/NM = 9, LHPL/M = 8, PHLL/NM = 6, PHLL/M = 5). All the analyses used unweighted means.

Goal Orientations and Ability Attribution (H4a)

H4a : When participants do not attain their personal goals, those in the proving orientation attribute the cause to a lack of ability.

In the first analysis, learning orientation intention scale and proving orientation intention scale were used to classify participants into the learning and proving orientation factor levels. The dependent variable was the mean ability attribution score across the 5 trial blocks. The covariates were (1) the mean performance score (MEBE) across the 5 trial blocks, and (2) locus of control. MEBE was used as a covariate to control for attribution biases resulting from past performance. For instance, those with better performance were more likely to make internal causal attributions whereas those with poorer performance were more likely to make external causal attributions. Locus of control was to control for dispositional attributional tendencies. For instance, those with strong internal locus of control were more likely to attribute their performance to internal causes and vice versa.

The analysis did not find the hypothesized interaction effect. Thus, the hypothesis was not supported. Contrary to expectations, those with high learning orientation (LHPL) tended to attributed their performance more to ability than those with high proving orientation (PHLL) no matter whether they met their goals. This result, however, fell outside the .01 significance level, $F(1, 30) = 4.96, p = .03$.

The second analysis that used retrospective measures to classify participants into goal orientation categories also did not find the hypothesized interaction effect. Hypothesis 4a was, therefore, not supported with both the intention and retrospective measures.

Goal Orientations and Learning Time Attribution (H4b)

H4b : When participants do not attain their personal goals, those in the learning orientation attribute the cause to insufficient learning.

In this analysis, MEBE was dropped as a covariate. All other aspects of the analyses were identical to that used in 4a.

Two analyses were done. The analysis with the retrospective measure found no significant effect. With the intention measure, the first stage analysis found a significant two-way interaction between goal orientation and whether goals were met (see Figure 7). Simple effects analysis at "met goals" and "not met goals" found that the attributions were as predicted, but the results were not statistically significant. Thus, hypothesis 4b was not supported.

Exploratory Analyses

Since hypotheses 4a and 4b were not significant, exploratory analyses with 3x3x2 ANCOVAs were done with the other attribution measures, effort, chance, and task difficulty. The between factors were learning and proving orientations, each having 3 levels (high, middle, low). Locus of control was used as the covariate as it might affect attribution tendencies. The analyses suggest that the retrospective measures may be insensitive. Fewer and weaker effects were found with the measure. Thus, only the intention scales were used in this exploratory analysis. Analysis on task attribution found no significant effects.

The analyses with the causal attribution variables - effort and chance - are as follows. With effort attribution, a main effect for learning orientation was found, $F(2, 106) = 8.52$, $p = .0004$. The high learning oriented condition attributed their performance more to effort than those with moderate or weak learning orientation (LH = 7.2, LM = 6.1, LL = 6.1). These findings are consistent with Dweck's

Figure 7. Learning time attribution

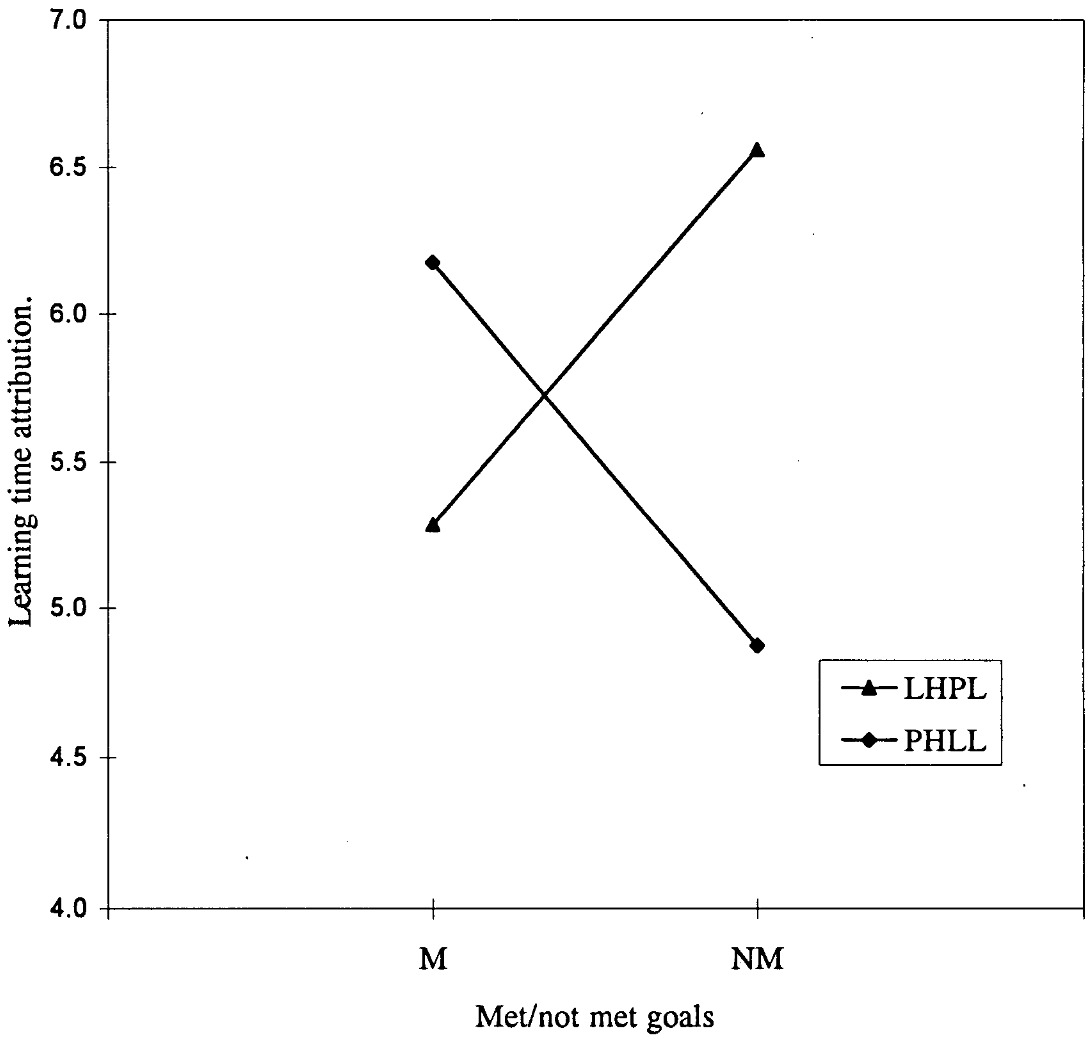
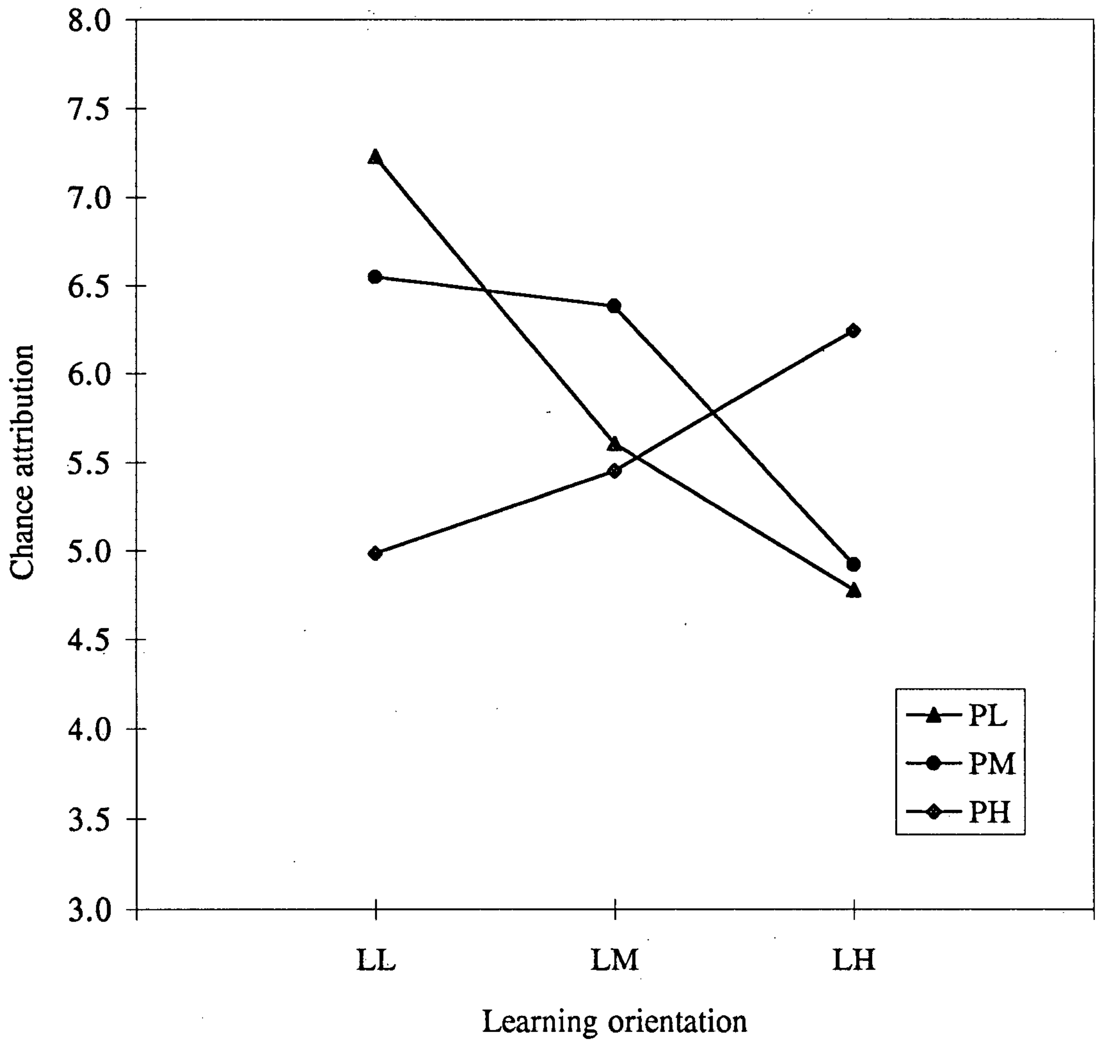


Figure 8. Learning x proving orientation - Chance attribution



observations. The met/not-met factor was also significant, $F(1, 106) = 12.32$, $p = .0007$. The met goal condition had higher effort scores than the not-met condition. This finding is consistent with the effects of attribution bias.

With chance attribution, the learning x proving orientation effect was significant, $F(4, 105) = 3.72$, $p = .007$. Chance attribution scores were lower as we moved to the groups with a higher level of learning orientation (see Figure 8). Groups with weak or moderate proving orientations attributed their performance less to chance as their level of learning orientation increased. Conversely, those with a high level of proving orientation attributed their performance more to chance as the learning orientation increased. These results suggest that those with a strong proving orientation are more likely to adopt defensive strategies that protect their self image.

Goal Orientations and Changes in Self-Efficacy (H5a), Personal Goals (H5b), and Performance (H5c)

H5a : When participants do not attain their personal goal, the self-efficacy of participants with a proving orientation is more likely to decline than the self-efficacy of participants with a learning orientation.

H5b : When participants do not attain their personal goal, the personal goal level of participants with a proving orientation is more likely to decline than the personal goal level of participants in the learning condition.

H5c : When participants do not attain their personal goal, the performance of participants with a proving orientation is more likely to decline than the performance of participants in the learning condition.

To test hypotheses 5a, 5b, and 5c, 2x2 ANCOVAs were used. The high learning response (LHPL) and the high proving response (PHLL) formed 2 levels of the first factor, and "not met goal" (NM) and "met goal" (M) form the second factor. The independent variables for 5a, 5b, and 5c were the number of declines in self-efficacy, personal goals, and performance respectively. Separate analyses were made for goal orientation classification using (1) the intention scales, and (2) the retrospective scales.

The hypotheses suggest (1) that "met" and "not met" conditions differ, and (2) that in the not-met condition, those with a learning orientation have fewer declines in the scores of the various dependent variables. Thus, in the analyses, the strategy was to first look for an interaction effect. When the interaction effect was significant, we checked for differences among cells.

Hypothesized interaction effects for H5a, H5b, and H5c were not significant with both the intention and retrospective scales as orientation classification. However, the results for H5c (the performance variable) were in the expected direction. With both intention and retrospective classification of goal orientation, the PHLL/"not met"goal group showed the highest number of declines in performance. Hypotheses 5a, 5b, and 5c were not supported.

Nature of DYB and SD Goals

Hypotheses 6 through 9 test an explanation for the observation that SD goals sometimes impair performance. Briefly, the explanation suggests that SD goals induce participants to strive for elite performance. This is proving oriented behavior. In a new and complex task, a proving orientation could hurt performance through the self-regulatory mechanisms of performance attribution and self-efficacy. For further details please see page 45.

Achieving Elite Performance (H6)

H6 : Participants in the SD goal conditions are more likely to infer that they are trying to attain a level of elite performance than those in the DYB condition.

The purpose of this hypothesis is to see if SD goals cue participants to strive for an elite performance. Striving to outdo others is a behavioral indication of a proving orientation.

To test H6, two questionnaire items were used to measure the dependent variable. They were:

1. To what extent were you striving for an elite level of performance during the task?; and,
2. How much did you want to be among the top 10 percent of your peers?

The analyses used 3x3 ANCOVAs. The independent factors were the LPN (assigned learning, proving, and no(LPN) goals) and DSN ("do your best", specific difficult, and no(DSN) goals) factors. The covariates were initial self-efficacy and performance. Three separate analyses were made using the following as the dependent variable: (1) the mean of the two items; (2) only item 1; and (3) only item 2. No significant effects were found with any of the 3 analyses. Thus, hypothesis 6 was not supported.

Inducing a Proving Orientation (H7)

H7 : SD goals are more likely to cue a proving orientation than DYB goals.

The findings for this hypothesis were partly derived from the analyses done in H2. Those analyses used 3 (LPN) x 3 (DSN) x 5 repeated measure ANCOVAs to analyze each of the learning and proving orientation measures. Comparisons between the SD and DYB conditions were not significant. Thus hypotheses 7 was not supported.

Inference of Success and Failure (H8a and H8b)

H8a : With a new and complex task, participants in SD goal condition are more likely to view their performance as failures.

H8b : With a new and complex task, participants in the DYB condition are more likely to view their performance as successes.

The purpose of H8a and H8b is to see if SD and DYB goals induce different attributions about performance. Differences in attributions may, in turn, contribute to differences in self-efficacy and performance.

To test these hypotheses, participants were asked to rate the degree of success or failure they felt as a result of the previous 20 predictions. A 3x2 ANCOVA with repeated measures was used to analyze the responses. The between factor was the DSN factor ("do your best", specific difficult, and no(DSN) goal) and the within factor was trial block 1 and trial block 5. Trial blocks 1 and 5 were chosen for comparison because these two points represented the extremes in task familiarity for participants in this experiment.

One possible confounding element that affects how participants attribute performance is their previous performance itself. When participants achieve good performance, they are likely to feel successful, and vice versa. Thus, to partial out the effects of performance from the effects of goals on the perception of success/failure, the performances at the respective trial blocks were used as covariate. The analysis found no significant effects. Thus, hypotheses 8a and 8b were not supported.

Decline in Self-Efficacy (H9)

H9 : With a new and complex task, the self-efficacy of participants in the SD condition is more likely to decline than the self-efficacy of participants in the DYB condition.

Hypothesis 9 was to see if DYB and SD goals induced different levels of self-efficacy.

To test the hypothesis, a 3x2 ANCOVA with repeated measures was used to analyze the data. The DSN factor ("do your best", specific difficult, and no(DSN) goal) was the between factor. Trial blocks 1 and 5 was the repeated measure. Overall performance was used as a covariate for trial block 1 and performance in trial block 1 as a covariate in trial block 5.

Contrary to expectations, self-efficacy increased instead of declined in all treatment conditions, $F(1, 121) = 22.51$, $p < .0000$. Moreover, neither the DSN factor nor the interaction effect was significant. The absence of a significant interaction effect meant that the differences across trial block 1 and 5 among DYB, SD, and no(DSN) conditions were not significantly different. Hypothesis 9 was, therefore, not supported.

No support was found for H6 through H9. Thus, there is no support for our proposition that SD goals cue the striving for elite performance, which in turn lead to a proving orientation, a greater likelihood of attributing failure, and a greater likelihood of declining self-efficacy.

Summary

Only hypotheses 1b and 1c were fully supported for the performance index. Those with assigned learning goals performed better than those with assigned proving goals. When the effects of the assigned goals were compared at trial block 1 and then at trial block 5, the results showed that the goal effects were larger when the task was unfamiliar. Those with assigned learning goals learned and performed significantly better when the task was unfamiliar, but the difference diminished by trial block 5.

Table 5. Table of hypotheses and the results

	Hypotheses	Results
H1a	Participants with assigned learning goals learn better than those with assigned proving goals.	Not supported.
H1b	Participants with assigned learning goals perform better than those with assigned proving goals.	Supported
H1c	The effects of assigned learning and proving goals on learning and performance are larger when the task is unfamiliar than when the task is familiar.	Supported for performance (MEBE).
H2a	Assigned learning goals induce a learning orientation.	Not supported
H2b	Assigned proving goals induce a proving orientation.	Not supported.
H3a	Participants with a learning orientation learn better than those with a proving orientation.	Not supported.
H3b	Participants with a learning orientation perform better than those with a proving orientation.	Not supported.
H3c	The effects of learning and proving orientation on performance are larger when the task is unfamiliar than when the task is familiar.	Not supported.
H4a	When participants do not attain their personal goals, those with a proving orientation attribute the cause to a lack of ability.	Not supported.
H4b	When participants do not attain their personal goals, those with a learning orientation attribute the cause to insufficient learning.	Not supported.

Table 5. Table of hypotheses and the results (continue)

H5a	When participants do not attain their personal goal, the self-efficacy of participants with a proving orientation is more likely to decline than the self-efficacy of participants with a learning orientation.	Not supported.
H5b	When participants do not attain their personal goal, the personal goal level of participants with a proving orientation is more likely to decline than the personal goal level of participants with a learning orientation.	Not supported.
H5c	When participants do not attain their personal goal, the performance of participants with a proving orientation is more likely to decline than the performance of participants with a learning orientation.	Not supported.
H6	Participants in the SD goal conditions are more likely to infer that they are trying to attain a level of elite performance than those in the DYB condition.	Not supported.
H7	SD goals are more likely to cue a proving orientation than DYB goals.	Not supported.
H8a	With an new and complex task, participants in SD goal condition are more likely to view their performance as failures.	Not supported.
H8b	With an new and complex task, participants in the DYB condition are more likely to view their performance as successes.	Not supported.
H9	With a new and complex task, the self-efficacy of participants in the SD condition is more likely to decline than the self-efficacy of participants in the DYB condition.	Not supported.

VI DISCUSSION

In the previous chapter the analyses and the results were presented. This chapter will focus on the interpretation and discussion of the findings. The chapter is organized as follows. The first part presents a summary and overview of the major findings. The second section discusses the findings that are related to each of the hypotheses in detail. The final chapter presents the overall conclusions.

Overview of the Major Findings

This study showed that proving goals were detrimental to the performance of the complex task. Across the trials, those with proving goals made poorer predictions of the stock prices with the cues given when compared with those with no-goals. The poorer performance was especially evident when the task was unfamiliar. During the initial trial block those with proving goals performed poorer than those with either learning goals or no-goals.

These findings contrasted against the null results found with SD and DYB goals. This suggests that, in unfamiliar and complex tasks, it may be more fruitful to investigate learning and proving goals instead of SD and DYB goals.

An unexpected finding was the lack of performance differences between the learning goal and no-goal conditions. These findings suggested that assigned learning goals did not benefit the participants, and that the differential effects of the assigned goals were due to suppressive effects of the assigned proving goals.

However, the mechanism that was responsible for the suppressive effects of proving goals was unclear. From the literature reviewed, we would expect that the self-regulatory system postulated by Bandura (1990, 1991), Latham and Locke (1991), and Dweck and Leggett (1988) would mediate between the assigned goals and performance. However, contrary to expectations, this study found little evidence that the self-regulatory system contributed to the observed differential effects between assigned learning and proving goals.

Dweck and her colleagues (Dweck, 1986; Dweck & Leggett, 1988; Elliott & Dweck, 1988) argued that the key variable that mediated the relationship between learning and proving goals, and outcomes, was goal orientation (i.e., learning versus proving orientation). However, in this study, the results relating to goal orientation were disappointing. Assigned learning and proving goals did not affect learning nor proving orientation. Furthermore, learning and proving orientations did not affect the outcome variables - learning or performance. Neither did the two goal orientations affect key intervening variables in the way that would be consistent with Dweck and her colleagues' explanation of how learning and proving goals affected performance attributions. The results showed that learning and proving orientations did not differentially affect performance attributions nor the decline in the self-regulatory variables - specifically self-efficacy, personal goals, and performance.

This study did however, provide several interesting exploratory results, one of which was that a learning orientation moderately correlated with self-efficacy and personal goals - both of which are important mediators in goal setting and self-efficacy theories. Thus, a learning orientation may still be a useful variable in the self-regulatory system.

Surprisingly, contrary to previous research, self-efficacy and personal goals were poorly correlated with performance. This contradiction could be due to the task used. The tasks used in previous research were simple, thus easily familiarized. In contrast, this study used an unfamiliar and complex task. While the variables within the self-regulatory system, such as self-efficacy and personal goal levels were good predictors of performance in simple or familiar tasks, they could be poor predictors in unfamiliar and complex tasks. Goal setting theory and self-regulatory theory suggest that both self-efficacy and personal goals affect performance through the motivational mechanism. However, in complex tasks, theorists (e.g., Campbell, 1984; Wood, Mento, & Locke, 1987) have argued that the contribution of any motivation mechanism to performance will be limited. In contrast, the contributions from mechanisms that help people learn an appropriate task strategy will have a much greater effect on performance (e.g., Earley, Connolly, & Lee, 1989; Wood & Bailey, 1985). These assertions are consistent with our findings. Firstly, learning and proving goals resulted in the greatest differential in performance when the task was unfamiliar at trial block 1. But as trials progressed, the differential diminished. By trial block 5 the difference was insignificant. Secondly, the correlation between self-efficacy and performance was lowest at trial block 1 but gradually increased as trials progressed.

But what is the mechanism that learning, and proving goals provide that help or hinder performance? One possibility is that either the goals or the process of setting the goals cue different cognitive strategies. These cognitive strategies may, for instance, take the form of scripts as described by schema theory (Ableson, 1981; Schank & Ableson, 1977). These scripts provide a sequence of mental procedures for generating task strategies automatically, without much conscious effort or awareness. Learning goals may have cued a learning script whereas a proving goal may have cued a proving script. These scripts in turn influence the process with which task strategies are generated. They also influence the amount of time it takes to find an appropriate task strategy.

If learning and proving goals each cue different scripts, then how do we explain the lack of difference in performance between the assigned learning goal condition and the no goal condition? One possibility is that when no goals are set, an unfamiliar and complex task will cue a learning script. Intuitively, in such a situation, a learning script is likely to be more appropriate than a proving script. This would account for the observation that those assigned the proving goal showed poorer performance.

Cognitive strategies, however, need not be automatic like a script. Some may require conscious processing. This is more likely to be the case when a proving cognitive strategy is cued in the context of an unfamiliar and complex task. This is because there are fewer occasions where a proving cognitive strategy is used in the context of a new task. Thus, people have fewer opportunities for overlearning and for developing an automated procedure. Without the benefit of a script, using a proving cognitive strategy may place greater cognitive burden on the person. The person must divide his or her cognitive resources between performing the unfamiliar task and executing a cognitive strategy that is not habitually used. This reduction in cognitive resources available for the task may have also contributed to the poorer performance for those in the proving goal condition.

Interpretation of the Findings

Assigned Goals on Learning and Performance (H1)

This study responded to two criticisms leveled at goal setting studies. The first, is that too much research emphasis has been given to specific difficult (SD) and "do your best" (DYB) goals; more effort should be made to explore other goal attributes (Austin & Bobko, 1985). The second is that too many studies have used simple tasks (Wood & Bailey, 1985; Wood, Mento & Locke, 1987); more need to be done to understand complex tasks.

Theorists point out that we know little about the goal setting process in complex tasks where the learning and formulating of task strategy are critical (e.g., Earley et al., 1987; Locke et al, 1981; Wood, Mento & Locke, 1987). Thus, the work of Dweck and her colleagues (Dweck, 1986, 1990; Elliott & Dweck, 1988; Dweck & Leggett,

1988) in the area of learning and proving goals offered potentially fruitful avenues for goal setting research. Dweck and Leggett (1988) reported that the children in the proving goal condition showed a greater performance variance than those in the learning goal condition. Children given both the proving goal and low task ability manipulations exhibited maladaptive behaviors when setbacks occurred. These maladaptive behaviors included the repetition of ineffective strategies, the development of fewer new strategies, and the failure to use known and more effective strategies. Those who were given the learning goal, however, exhibited self-instruction and self-monitoring, more analysis and development of strategies, greater use of appropriate task strategies, and more transfer of learning to new situations.

Dweck and her colleagues' work is particularly important to goal setting research because of the current interest in strategy development. Their work suggests that the assignment of learning or proving goals may effectively alter learning, performance, and possibly strategy development. It also implies that these goals may be potentially useful in influencing the outcomes of complex tasks whose performance is dependent upon the effective development and learning of task strategies.

However, Dweck's findings are based on children as subjects working on a task that has little resemblance to reality. Hence, the results may not be generalizable to an adult population and to the work-place. To test the generalizability to Dweck's work, this study recruited young adults as participants, and chose a task that closely resembled a work-place task.

It was anticipated that Dweck's ideas would be generalizable. Thus, it was hypothesized that the assignment of learning goals would be superior to proving goals in inducing learning (H1a) and performance (H1b). It was also anticipated that the differential effects of these two goals would be larger when the task was unfamiliar (H1c).

This study did not find any significant results with the learning indices. However, with the performance index, the results showed that learning goals were better than proving goals when the task was unfamiliar but no better when the task was familiar. This finding is consistent with the Elliott and Dweck (1988) findings. But, in their experimental design, control groups were not included. Thus, they were are not able to tell whether the differential effects were due to the enhancement effects of learning goals, or the suppression effects of proving goals, or both. To correct for this weakness, this study included control groups. By comparing the effects of each goal against that of the control group, the true nature of the differential goal effects could be inferred.

Comparisons with the control group showed that assigned learning goals were generally not superior to no-goals. For instance, although learning goals resulted in better overall performance (i.e., aggregated over 100 trials) than proving goals, the difference fell short of significance. No-goals, however, were significantly superior to proving goals but were not different from learning goals. This suggests that learning goals were not superior, but that proving goals had a detrimental effect on performance.

Detrimental effects of proving goals. The notion that proving goals are damaging is also consistent with Elliott and Dweck's (1988) evidence. However, the results of this study suggest that proving goals may be more damaging than were first evidenced by their study. They found the detrimental effects of proving goals only in the treatment group with the most adverse manipulations. In that treatment, participants were led to believe that they had low task ability, were given a task where they could not evaluate their own progress and were given repeated false and negative feedback on all 3 tests. Thus, the experimental context may have approached a "helpless" situation.

Consequently, these participants experienced failure. In other words, the detrimental effects of proving goals did not appear to be very strong. They were manifested only in subjects who were made to feel that they were not good at the task (i.e., low self-efficacy) and after having failed on the "test" repeatedly.

In this study a measure of perceived failure revealed that few participants felt that they had failed even when they did not meet their personal goals. Yet, proving goals resulted in poorer performance. Hence, these results suggest that assigned proving goals may be very damaging. The suppressive effects of proving goals on performance existed even under normal task situations (as opposed to a "helpless" situation) where participants did not perceive failure. Furthermore, the effects are robust because the results were obtained after initial self-efficacy had been partialled out with analysis of covariance procedures.

Reduced importance of motivation. The lack of difference between the DYB and SD groups was even more surprising since the SD group had set for themselves significantly higher personal goal levels than the other two treatment conditions, $F(1, 115) = 9.86$, $p = .0022$. In contrast, exploratory analysis found no difference in goal levels among the three treatments in the LPN factor. These results ran counter to predictions made by goal setting theory.

Since personal goal levels reflect the intent of the person, it follows that the adoption of more difficult goals reflects greater motivation to do the task well. Yet, in the absence of greater motivation, those with assigned learning goals and no(LPN) goals did better than those in the assigned proving goal condition. Conversely, those in the SD goal condition had higher motivation than those in the DYB group, and yet they did not show superior performance.

These findings are consistent with the recent arguments put forth by goal setting theorists on the importance of strategy development (e.g., Campbell & Ilgen, 1976;

Earley, Connolly & Lee, 1989; Locke et al., 1981; Wood, Mento, & Locke, 1987). They argue that performance in complex tasks is less contingent upon the motivational mechanisms of attention, direction, effort, and persistence than upon learning and developing an appropriate strategy.

In summary, the findings highlight two important points. Firstly, motivation may not be sufficient for eliciting superior performance in new and complex tasks. Secondly, processes other than the motivation mechanisms may be influencing performance in goal setting. Thus, goal setting theory in its present form may be inadequate for understanding complex tasks. There are two reasons for this. Firstly, existing goal setting theory relies heavily on the motivation mechanism to explain differences in performance. Secondly, the theory is based extensively on empirical studies using simple tasks. Thus, goal setting in complex tasks should be viewed as a separate area for investigation. New models and theories should be developed to deal specifically with complex tasks.

Ineffectiveness of SD and DYB goals. While the learning and proving goals showed differential effects on performance, the traditional SD and DYB goals did not. The DSN (DYB, SD, none) goal factor had no independent effect on learning and performance in this complex experimental task.

These findings are consistent with Kanfer and Ackerman (1989, experiment 1) but are contradictory to those of Earley, Connolly, and Ekegren (1989). Earley et al. (1989) found that those in the "do your best" goal condition did better than those in the specific difficult goal condition. Since our task is similar to that used by Earley et al. (1989), a comparison of the two studies may give me some insight. In this study, the DYB, SD, and no(DSN) goals were crossed with assigned learning, proving, and no(LPN) goals. The cross factor design allowed for the separation of the learning versus proving goal effect from the "do you best" versus specific difficult effect. In

Earley et al.'s study, only DYB and SD goals were used as treatments. Since the two effects were not separated, the SD goal condition might have been contaminated by a proving goal. However, this explanation is purely speculative as little information was reported about the goal manipulation process.

Summary. In summary, the findings of this study show that the distinction between learning and proving goals is useful to goal setting in new and complex tasks. This study found that assigning a proving goal suppressed performance. The suppressive effects seemed more serious than were evidenced in Elliott and Dweck (1988). In the current study, performance were impaired even when perceived failure did not accompany setbacks. The findings also showed that traditional SD and DYB goals did not affect learning and performance; they might be of little benefit in new and complex tasks. Motivation as reflected by personal goal levels also did not affect learning and performance in this study. This suggested that the motivational mechanisms identified by both goal setting theory and social cognitive theory contributed little to the learning and performance of this complex task.

A further contribution of this research is the finding that task familiarity moderates the effects of proving goals. When the task was unfamiliar, proving goals resulted in poorer performance. However, as participants became more familiar with the task, the adverse effects of the proving goals diminished.

The findings also suggest that the mechanisms governing simple tasks may be different from those that govern unfamiliar complex tasks. However, we still know little about the mechanisms that operate in complex tasks despite their importance at the work-place. More research attention is therefore needed in this area.

Assigned Goals on Learning and Proving Orientations (H2)

A key purpose of this study was to test Dweck and Leggett's (1988) social cognitive explanation of how learning and proving goals affect learning, performance, and adaptive behaviors in children. Their main thesis is that the goal orientation (either a learning or proving orientation) and not the assigned goals per se, affect learning and performance on a task. Those with a proving orientation seek to "maintain positive judgments of their ability and avoid negative judgments by seeking to prove, validate, or document their ability and not to discredit it." Those with a learning orientation, however, seek to "increase their ability or mastery at the new task" (Dweck, 1986).

However, Elliott and Dweck (1988) did not establish the relationship between goal orientation and learning and performance directly. The analysis really tested the relationship between the manipulations and the outcomes. Furthermore, the manipulation, which included evaluation and video taping of the proving goal condition, might have been contaminated. Thus, the results could just as easily be explained as a social facilitation effect of "mere presence" or external evaluation. Without analyses using goal orientation as the independent variable, we cannot be certain that goal orientation was the mechanism through which learning and proving goals affected learning and performance. As a result, Elliott and Dweck conceded that "future studies are necessary to tease apart the aspects of the manipulations that affected the observed results."

To verify the theoretical importance of goal orientation, we need to know if assigned learning and proving goals actually affect learning and proving orientation; and if so, if goal orientation affects performance. Hypotheses 2a and 2b tested the former; hypothesis 3 tested the latter.

Hypotheses 2a and 2b stated that assigned learning and proving goals would induce the respective learning and proving orientations. These hypotheses, in part, served as a manipulation check. Hypothesis 2a was not supported because p fell just outside the .01 level of significance level. Nonetheless, assigned learning goals induced the highest learning orientation whereas assigned proving goals induced the lowest learning orientation, $F(1, 116) = 5.93$, $p = .016$. The no goal group fell between the learning and proving goal groups. This rank ordering suggested that the treatments were effective; assigned learning goals enhanced learning orientation while proving goals suppressed learning orientation.

On the other hand, the proving orientations among treatment groups were not different. At least two possibilities can account for the results. The first is that the proving manipulation was not strong enough to induce differential proving orientations between treatment groups. The second is that the proving orientation instruments were insufficiently sensitive.

The weak manipulation explanation is based on the comparison of this study with Elliott and Dweck (1988). In their study, they used two manipulation devices. Besides using embedded cues in the instructions, they told the children that they were being filmed and evaluated by experts. Thus, their manipulations confounded a proving goal with external evaluation. To avoid this confound, participants in this study were told that they would not be evaluated. Those in the proving goal group were told that the task was meant for them to assess their own ability to predict stock prices.

By eliminating the external evaluation component, the study might have weakened the manipulation. This would happen if the adverse effects of evaluation on performance operated wholly or in part through the variable of proving orientation. If this explanation is correct, a proving orientation may provide a potentially useful mechanism for explaining social facilitation effects (Bond, 1982; Carver & Scheier, 1981).

The second possible explanation for the lack of difference in goal orientation between the treatments is that the measures were insufficiently sensitive. This is also a possibility because the scale used in this study was the first attempt at clarifying and measuring the two goal orientations. Thus, it lacked the reliability and validity of a well-developed scale. Further scale development would therefore help research on goal orientation.

In summary, the results provided some evidence that the manipulations were successful in affecting learning orientation. Thus, the similar performance found for those in the assigned learning group and those in the no-goal group (H1c) was unlikely to have been the result of manipulation failure. In the following sections, other possible explanations will be presented.

Effects of Learning and Proving Orientations on Learning and Performance (H3)

The previous hypotheses (H1 and H2) were designed to test whether assigned goals affected both the outcome variables (learning and performance) and the process variables (learning and proving orientation). The purpose of H3 was to test Dweck and Leggett's (1988) argument that it was goal orientations rather than assigned goals that were responsible for their results. The hypotheses tested if those with high learning and low proving orientations differed from those with high proving and low learning orientations in both their learning and performance.

Unfortunately, the hypotheses were not supported. Goal orientations (learning and proving orientations) affected neither learning nor performance. One possible explanation is that while learning and proving orientations differentially affected certain aspects of learning, these were not adequately captured by the outcome variables. The matching index r_m, measured how closely the participant's prediction rule matched the task rule; the consistency index, r_s measured how consistently the prediction rule was used; and the performance index - MEBE, measured prediction errors. All these indices detect only short term learning and performance effects. Learning that does not affect short term results but does affect longer term results ise not captured. For instance, exploratory behavior such as experimenting with different combination rules may have longer term meta-cognitive benefits; but in the short term, more errors occur and participants appear less consistent in using their strategy. These short term consequences will be penalized by the set indices used.

Goal orientations are relevant: exploratory analyses showed that learning orientations were correlated with both self-efficacy and personal goal levels. Correlations between the learning orientation score (intention measure) and self-efficacy and personal goal levels were moderately high at 0.31 and 0.34 respectively. Since both self-efficacy and personal goal levels are important mediating variables in the self-regulatory and goal setting processes (see Bandura, 1991; Locke & Latham, 1990), it would be premature to conclude that goal orientations are irrelevant. A more likely explanation is that both learning and proving orientations are part of the self-regulatory system. But in complex and unfamiliar tasks, the self-regulatory variables of self-efficacy, personal goal levels, and goal orientations may be contributing less to performance than in simple tasks.

But why should self-efficacy have a smaller effect in new and complex tasks? There are several possible explanations. From a psychometric perspective, there could be insufficient variance in the self-efficacy variable, the outcome variables, or both. Unlike working on a simple task, a person must spend more time and cognitive resources to discover and try out different task strategies. During this initial discovery process, task performance might not have varied widely among participants. Furthermore, self-efficacy scores might not have much variance as well. University students could have been fairly homogeneous in their self-efficacy with respect to the experimental task. Another possible contributor to the observed weak relationship between self-efficacy and performance could be the reliability of self-efficacy measures in unfamiliar and complex tasks. Although people could estimate their self-efficacy on a new task (Bandura 1990, 1991), the measure's reliability was apt to be lower for a complex task than on a simple task because it was more difficult to anticipate how to perform a complex task and what outcomes will result. Consequently, participants could only give a fairer and more reliable account of their self-efficacy after gaining sufficient experience on the task.

The most theoretically interesting explanation for the weak relationship between self-efficacy and performance concerns the role of motivation in new and complex tasks. Self-efficacy affects task performance through motivation. Self-efficacy beliefs influence the goal levels people choose to undertake and the amount of effort and persistence they put forth (Bandura 1982, 1986, 1990). However, the motivational mechanism may contribute little to performance in new and complex tasks. Goal setting theorists (e.g., Locke et al., 1981; Wood, Mento, & Locke, 1987) argue that in complex tasks, performance is less contingent upon the motivational effects than upon developing an appropriate strategy. To extend their argument, motivational effects associated with both goal setting and self-efficacy theory can be conceived as having two parts. The first is the motivation to execute a known task strategy; and the second is the motivation to learn. When people are given new and complex tasks, they are unlikely to have the appropriate task strategy in their repertoire. Neither is the appropriate task strategy easily formulated. Thus, it will take some time to discover or develop a suitable task strategy, even if they are highly motivated to execute the task well. Thus, motivation may not translate directly into performance in the short term.

In this study, self-efficacy was measured before each trial block of predictions. The design was meant to observe the effects of self-efficacy on performance. When self-efficacy before each set of predictions was correlated with the performance for that particular trial block, the correlation was low (r = 0.14). This was in marked contrast to the mean correlation of 0.39 found in a recent review of ten major goal setting studies (Locke & Latham, 1990). Furthermore, when the task was unfamiliar, at trial block 1, the correlation between self-efficacy and performance was only 0.06; as participants gained experience, the correlation gradually increased. By trial block 5, the correlation was 0.23. These results are consistent with the explanation that when a task is unfamiliar and complex and time is required to gain familiarity, self-efficacy may have less influence on initial task performance.

But if motivational mechanisms do not account for the differential performance variances between learning and proving goals, then what mechanism can? One possibility is that the manipulation instructions might have provided or cued different approaches or meta-strategies (Earley, Connolly, and Ekegren, 1989). These in turn might have affected strategy development, learning and performance. For instance, learning how to do the experimental task as well as doing the task itself may be seen as a meta-task. The learning and proving manipulation instructions may be viewed as providing different approaches for performing this meta-task. Thus, it is possible that it is the use of these different approaches that account for the differences in performance observed with assigned learning and proving goals. This explanation has the same logic as that of Earley (1985) and Earley and Perry (1987).

Earley (1985) gave participants information on how to work on the task and on why the task and goal were important. He found that information influenced performance motivationally and directly. In a later study, Earley and Perry (1987) showed that task plans affected performance even when the plans were primed unobtrusively. These two studies showed that unobtrusive and implicit task strategies could affect performance directly without going through motivational mechanisms.

Thus, task approaches or meta-strategies embedded unintentionally in manipulation instructions might also affect performance directly. Manipulation instructions can be conceived as having two components, a program of action or meta-strategy for participants to execute the task and a device that induces change in states of intra-personal variables. While the change in intra-personal variables takes time because of the need for the assimilation of the instructions, executing a set of instructions can take effect almost immediately.

The effects of implicitly embedded task approaches in manipulation instructions can be very strong, especially with new and complex tasks. In these situations, participants are less sure of themselves. Thus, they experience more uncertainty and anxiety than if they are given a simple or familiar task. In such situations, experimenters are also more likely to be seen as "experts" or resource persons. The presence of these two conditions may make participants more willing to adopt any hints, or task strategies that the "expert" experimenter might give. Thus, any program of action that is implicitly embedded in the instructions may have a strong effect on the outcome.

Hence, the observed effects of the assigned goals may be explained as follows. Assigned goals or the process of assigning goals either contain or cue programs of action. That is, learning goals are associated with "learning programs of action" while proving goals are associated with "proving programs of action." These different programs of action cause differences in performance. With a new and complex task, a "learning program of action" may be more appropriate than a "proving program of action". Consequently, those in the learning goal condition will do better than those in the proving goal condition.

However, these explanations do not explain the lack of difference found between the assigned learning goal and no(LPN) conditions. One possible explanation is that people by default adopt a learning program when they work on an unfamiliar complex task. Thus, participants in both the no(LPN) goal and learning goal conditions adopt "learning programs of action." The learning goal manipulations therefore, may serve merely to reinforce and maintain a learning orientation. Some evidence of this is found in this study. The different goals result in different patterns of goal orientation across trials. Those with assigned learning goals maintained their learning orientation as trials progressed. Those with no goal or assigned proving goals declined in learning orientation as trials progressed.[1]

A "proving program of action" may also cause cognitive interference resulting in poorer performance. When a person is given a new and complex task (e.g, in the no goal condition of this study), the person may intuitively use a "learning program of action." With frequent use, this program may be executed automatically and without much cognitive effort. Schema theory calls such a program a script (see Fiske & Taylor, 1991). In contrast, if a "proving program of action" is not frequently used in new and complex tasks, the execution of the program may not be automatic.

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[1] Exploratory regression by groups (using BMDP 1R) with initial self-efficacy and trial blocks as independent variables and learning orientation as the dependent variable revealed regression lines that were not equal, $F(6, 606) = 3.82$, $p = .0096$. The beta coefficient for trial blocks was not significant for the assigned learning group. The no(LPN) and proving groups had negative beta coefficients of -.96 ($t(1, 202) = 1.93$) and -.94 ($t(1, 197) = 1.10$), with significance probabilities of .06 and .07 respectively. These results suggested that learning goals were maintained whereas proving goals and no goals declined in learning orientation.

Consequently, some cognitive resources will have to be devoted to executing the program of action. Since we have cognitive limits, devoting more resources for the program of action will take away resources from working on the task. In other words, the use of a "proving program of action" increases the cognitive burden of the problem solver. Not only must the participant deal with an unfamiliar and complex task, he or she must also deal with the use of an unfamiliar cognitive strategy. With this reduction of cognitive resources available for the task, we will expect poorer performance.

In summary, while learning and proving orientations (as measured in this study) did not affect learning and performance, learning orientation scores correlated with self-efficacy and personal goals. Both self-efficacy and personal goals are important intervening variables in the self-regulatory and goal setting process. Empirical evidence also shows that these variables are good predictors of performance. However, in this study, exploratory analysis showed that both self-efficacy and personal goals correlated poorly with performance. The correlation was especially low when the task was unfamiliar, but gradually increased with familiarity. The unexpected low correlation between self-efficacy and performance suggests that the self-regulatory system may be less influential in new and complex tasks.

Given that assigned proving goals diminished performance, other more influential mechanisms might be at work. One such mechanism is implicit "programs of action." These might have been embedded in the goal manipulations or cued by the goals. The "proving program of action" associated with the proving goal may have interfered with learning and performance by first, providing a less effective approach process for mastering the task and then, by increasing the cognitive burden of the problem solver.

Goal Orientations and Attributions about Performance (H4)

The purpose of hypotheses 4a and 4b was to test Dweck and colleagues' (Dweck, 1986, 1990; Elliott & Dweck, 1988; Dweck & Leggett, 1988) explanation of goal orientation effects on learning and performance. They suggested that with a proving orientation, children attributed their setbacks more to ability than those with a learning orientation (H4a). In contrast, those with a learning orientation were more likely to attribute their performance to causes outside themselves. Thus, this study hypothesized that those with a learning goal would be more likely to attribute the cause of their performance to the amount of time they were given for learning the task (H4b). The results of this study, however, do not support their explanation. Those with a high proving orientation did not attribute their performance more to ability after failing to meet their personal goals. Neither did those with a high learning orientation attribute their performance more to the amount of time given for learning the task.

In Elliott and Dweck's (1988) study, children with learning goals attributed their performance more to effort than those with proving goals. Exploratory analysis was therefore made with the causal attribution variable effort. The results partially supported Dweck's observations. Participants who were high on learning orientation attributed their performance more to effort than those who had a mid or low level of learning orientation. But different levels of proving orientation did not affect their performance attributions. Also, the results did not find any significant interaction effects between learning and proving orientations. These results suggest that only differences in learning orientation affect effort attributions. Thus learning and proving orientations should be viewed as separate dimensions instead of extreme points on a bipolar dimension. Future research and theory development should treat learning and proving orientations as separate constructs. The effects of each on learning and performance should be studied separately.

The findings of this study differ from what Elliott and Dweck (1988) postulated. One possible explanation for this can be traced to the different experimental manipulations. Elliott and Dwecks' (1988) experiment was interested in the psychology of learned helplessness. They wanted to demonstrate that patterns of behavior similar to those with learned helplessness could be induced through goals and setbacks. As noted previously, their manipulations were very strong, with repeated false feedback on a task where "subjects were unsure of the correctness of their responses." The children that exhibited maladaptive behaviors and verbal responses were led to believe that they had low task ability. They were also given the proving goal manipulation. Thus, it was possible that the two treatment manipulations, the task, and the experimental context together induced a sense of failure in the participants. This sense of failure and not the proving goal, might have caused the maladaptive patterns of behavior. The proving goal could have been the proverbial straw that broke the camel's back - the final element that helped induce the sense of failure.

In contrast, this study neither gave false feedback nor intervened in the learning process. This study was interested in examining the processes associated with learning and performing a new and complex task. There was no interest in examining the psychology of failure. However, Elliott and Dweck (1988) reported that participants remarked that they had failed. Thus, two exploratory analyses using the success/failure measure as the dependent variable were performed. The first exploratory analysis used the retrospective measures of learning and proving orientations to categorize subjects into their respective cells. The second used the intention measures of learning and proving orientations for classification. The two analyses found significant main effects for the learning/proving factor and the met/not met goal factors. Those with high learning and low proving orientations felt more successful than those with high proving and low learning orientations. Those who met their goals naturally, felt more successful. No significant interaction effects were found. More importantly, the mean scores of the high proving and low learning orientation group on the success/failure measure were very close to the neutral point of 4 (3.9 and 4.0 for the first and second exploratory analyses respectively). Thus, unlike participants in Elliott and Dweck's study, those in this study appeared to feel little failure when they did not meet their goals. The participants probably did not feel that they failed because they did better as trials progressed. Furthermore, feedback after each trial allowed them to see this progress. It was this progress on the new task that might have prevented perceptions of failure even when the participants did not meet their goals.

A comparison of the two studies suggests that a sense of failure may have moderated the participants' attributions of performance. If this explanation is correct, Elliott and Dwecks' (1988) findings may only be generalizable to situations where people experience failure. Future research should focus around perceptions of failure, their antecedents, and their effects on learning and performance.

Although the results did not support hypotheses 4a and 4b, they provided some useful information. Exploratory analysis using attributions of effort partially supported Dweck and her colleagues' ideas. The results indicated that a strong learning orientation induced desirable attributions of performance. Those with a strong learning orientation were more likely to attribute the cause of their performance to effort and less to chance. By attributing performance more to effort, which was improvable, and less to chance, which was not, the person was more likely to persist and expend further effort when goals were not met. Furthermore, those with a high learning orientation and a low proving orientation were less likely to feel that they had failed even when they failed to achieve their personal goals. By reducing the possibility of perceiving severe failure, we may be able to reduce the incidences of low self-efficacy and low motivation. These findings may have useful practical implications for managers.

Goal Orientations and Changes in Self-Efficacy, Personal Goals, and Performance (H5)

This study attempted to verify Dweck and her colleagues' (Dweck, 1986; Dweck & Leggett, 1988; Elliott & Dweck, 1988) explanation of how goal orientation affected performance. The intent was to extend Elliott and Dweck's (1988) work. In that study, they showed that the assignment of learning and proving goals affected behaviors and performance. But with their experimental design, they could not show that it was the social cognitive processes that were responsible for the observed results.

Since Dweck and her colleagues explained the effects of goals through a social cognitive perspective, both goal setting and social cognitive theories were applicable. From both a goal setting theory (Locke & Latham, 1990) and a social cognitive theory (Wood & Bandura, 1989) perspective, self-efficacy and personal goal levels mediated between assigned goals and performance. Performance of the prior period also affected self-efficacy in the current period. Self-efficacy, in turn, affected personal goal levels and performance. Hypotheses 5a through 5c tested the argument that participants with both high learning and low proving orientations would view setbacks as part of learning rather than inability (Dweck, 1986; Dweck & Leggett, 1988). If the argument were correct, we would expect self-efficacy, personal goals, and performance of those with both high learning and low proving orientations to be more resistant to deterioration when they failed to meet their goals. In contrast, those with both high proving and low learning orientations would view setbacks as a reflection of inability. Thus, we would expect self-efficacy, personal goals, and performance of this group to deteriorate more severely.

The results however, did not support these hypotheses. Those with both high proving and low learning orientations were not more vulnerable to declines in self-efficacy, personal goal levels, and performance when setbacks occurred. Furthermore, exploratory ANCOVAs also showed no difference in personal goals, and performance levels between the two groups. On self-efficacy, the analysis showed that those with both high proving and low learning orientations had lower self-efficacy than those with both high learning and low proving orientations. The difference however, was not significant.[2] The results, therefore, do not support Dweck and her colleagues' (Dweck, 1986; Dweck & Leggett, 1988) explanation on how learning and proving orientations affect performance.

One possible explanation is that in a new and complex task, participants are more likely to view setbacks as part of learning even when they have a high proving orientation. Furthermore, participants in this study, unlike those in Elliott and Dweck's (1988) study, were given accurate feedback after each trial. Thus, they were able to see continual improvements as trials progressed. Given that there were indications of progress, participants might have perceived the setbacks as minor, or might not have perceived any setbacks at all. This was in sharp contrast with the participants in Elliott and Dweck's study where they perceived themselves to have failed. Thus, the newness and complexity, or the perception of progress, or both could have mitigated the ill effects of high proving orientation. This would reduce the variance in the dependent variables from what they otherwise would have been - resulting in the non-significant findings.

In summary, the results from this study suggest that detrimental levels of low self-efficacy may not be as easily induced by setbacks as suggested by Dweck (1986). Dweck (1986) argued that a child with a proving orientation needed to have confidence (self-efficacy) in his or her task ability to sustain involvement (maintain high personal goal levels). She further argued that with a proving orientation confidence was difficult to maintain because children attributed setbacks to lack of task ability.

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2 The significant probability fell just outside the .05 level of significance.

This study, in contrast, showed that although a proving orientation might induce lower self-efficacy, it did not necessarily induce a sense of failure, uncontrollability, or hopelessness. This study did not find that a strong proving orientation led to more frequent occurrences of declines in self-efficacy, personal goal levels, and performance. Accurate feedback and progress on the task might have prevented perceptions of failure. The findings related to hypotheses 4 through 5 suggest that Elliott and Dweck's findings may have limits: they may only apply to situations where setbacks are very serious and/or where the people involved feel that they have failed. The results also suggest that when theorizing and investigating adaptive and maladaptive behaviors, a useful distinction should be made between perceived setbacks and perceived failure.

Differences between DYB and SD Goals (H6 through H9)

A core finding of goal setting research is that specific difficult (SD) goals result in better performance than "do your best" (DYB) goals (Locke & Latham, 1990; Locke, Shaw, Saari, & Latham, 1981). However, few of these studies have used complex tasks (Wood & Bailey, 1985; Wood, Mento & Locke, 1987). Moreover, in those few studies, researchers have found equivocal results. For instance, Bandura and Wood (1989) and Wood, Bandura and Bailey (1990) found that SD goals resulted in no better performance than DYB goals. Earley, Connolly and Ekegren (1989), and Kanfer and Ackerman (1989) found contrary results. This study suggests that the equivocal findings may have been caused by learning and proving goals. These goals may either have been implicitly embedded in or are an integral dimension of SD and DYB goals. Hypotheses 6 through 9 were meant to test this possibility.

In formulating the hypotheses, it was argued that SD goals enabled participants to adopt a proving orientation but DYB goals did not. SD goal manipulations provided normative information about an elite level of performance. Thus, when participants accepted the SD goal, they had the option of accepting the goal on the basis of trying to prove that they were among the best. In contrast, with DYB or no goals, people were less likely to adopt a proving orientation because the normative information about elite performance was not available. Furthermore, people could not gain much information about their ability from accomplishing ill defined goals.

The results did not support the above assertions. Participants in the SD goal condition were no more likely to strive for an elite performance than those in the DYB goal condition (H6).

When H8a through H9 were formulated, it was argued that SD goals would induce a proving orientation. Thus, it was expected to observe an increased likelihood in failure perceptions (H8a) among those in the SD goal condition and a corresponding increased likelihood in success perceptions (H8b) among those in the DYB goal condition. It was also expected that self-efficacy would be more likely to decline among those in the SD condition (H9). Contrary to our expectations, the results showed that SD goals did not, in fact, induce a proving orientation. Thus, it was not surprising that the H8a, H8b, and H9 were not supported.

VII CONCLUSION

In the previous chapter, the findings were discussed in relation to the hypotheses. In this chapter, a more holistic view will be adopted to discuss the contributions to and implications for theory development, research, and practice. Finally, some of the limitations of this study will be highlighted.

Implications for Theory Development and Research

Self-Regulatory System in Goal Setting

The only other study in goal setting that investigated "learning goals" is Winters and Latham (in press). In that study, the researchers investigated the effects of "learning goal," specific difficult goal, and "no-goal." on a simple task and a complex task. Learning goals were operationally as goals relating to the number of task strategies to be generated coupled with a DYB performance goal while "no-goal" was a DYB strategy generation goal coupled with a DYB performance goal.

This study investigates learning and proving goals as defined by Dweck and her colleagues. Learning goals are goals that encourage participants to develop their task and learning skills, knowledge, and abilities. Proving goals focuses on demonstrating one's abilities. Thus, this study focused on goals relating to the processes of learning and performing a task. in contrast, Winter and Latham (in press) focused on goals relating to the outcomes of task strategy making. Furthermore, this study explicitly separates learning and proving goals from performance goals (i.e., DYB and SD goals).

Thus, this study contributes to existing research in two ways. Firstly, not only does it examine the effects of goals on outcome variables such as performance, but it also examines the process through which goals affect outcomes. Towards this latter end, the study was designed to track various process variables (e.g., self-efficacy, personal goal levels, goal orientation, attributions) across trial blocks. Secondly, unlike most previous studies, this study employed a complex task instead of a simple task. Since the goal setting effects and processes associated with simple tasks were well studied and documented, there was no need to include a simple task for comparison. The current body of research findings provided that means of comparison.

This study suggested that the usefulness of traditional SD and DYB goals in complex tasks were limited. It also showed that assigned proving goals suppressed performance in such tasks especially when the task was unfamiliar. The mechanism that was responsible for the suppressive effects of proving goals was however, unclear. Originally, it was hypothesized that the motivational and self-regulatory mechanisms postulated by Bandura (1990, 1991), Latham and Locke (1991), and Dweck and Leggett (1988) would mediate between assigned goals, learning, and performance. However, the results failed to support this notion.

In this study, which used a complex task, known motivation mechanisms contributed little to learning and performance. In other words, the differences observed with learning and proving goals cannot be explained through mechanisms that have been effective with simple tasks. This study also found that task familiarity moderated the effects of the two goals. This highlights another contextual variable that was never an issue with simple tasks. This is a serious limitation because of the rapid technological changes we are experiencing today. Jobs are becoming increasingly more complex and the nature of the jobs are changing more rapidly. Career assignments are likely to include more new and complex tasks.

We need to identify and understand the key variables and processes that contribute to task performance and effectiveness in complex tasks. Specifically, we need to theorize about the processes that link assigned goals to task performance. We need to relate these processes to existing literature on the self-regulatory system.

Research is also needed to address the issue of task familiarity and how it affects performance on complex tasks. Specifically, we need to understand how task familiarity moderates the effects of goals on performance effectiveness. We also need to know if the mechanisms that are crucial to performance effectiveness are the same for familiar and unfamiliar tasks.

As a starting point, a simple model may help explain how goals affect performance in unfamiliar and complex tasks (see Figure 8). The model suggests that the process of assigning goals or the goals themselves can implicitly cue certain heuristics and meta-cognitive strategies. In other words, goals and the associated process for establishing them may provide direction by cueing scripts (Ableson, 1981), heuristics, or meta-cognitive strategies about how to deal with a task or problem. These in turn aid or hinder the development of task strategies, which in turn affect learning and performance.

Future studies can test the linkages among the various elements of the model. Any insights gained can then be used for further theory development. For instance, research can identify the major elements in goals and the goal establishment process that cue scripts and meta-strategies. It will be also be useful to know whether commonly used generic scripts and meta-strategies have a substantive effect on strategy development. Research can also identify processes that enhance strategy development and how these processes can be influenced externally though the goal setting process. Future research can also look at the relative contributions of the self-regulatory system and the strategy development processes under various task contingencies and how these two processes are linked.

Besides investigating learning and proving goals, this study also tried to "arrive at" an explanation for the equivocal results obtained with SD and DYB goals in complex tasks. Contrary to expectations, this study found that the SD and DYB goals produced no differential effects on learning and performance after partialling out the effects of learning and proving goals. However, the results must be treated cautiously since this was the first study of this nature. To clarify this issue, we will need more empirical studies that look into the effects of goal orientations.

Dweck's Theory

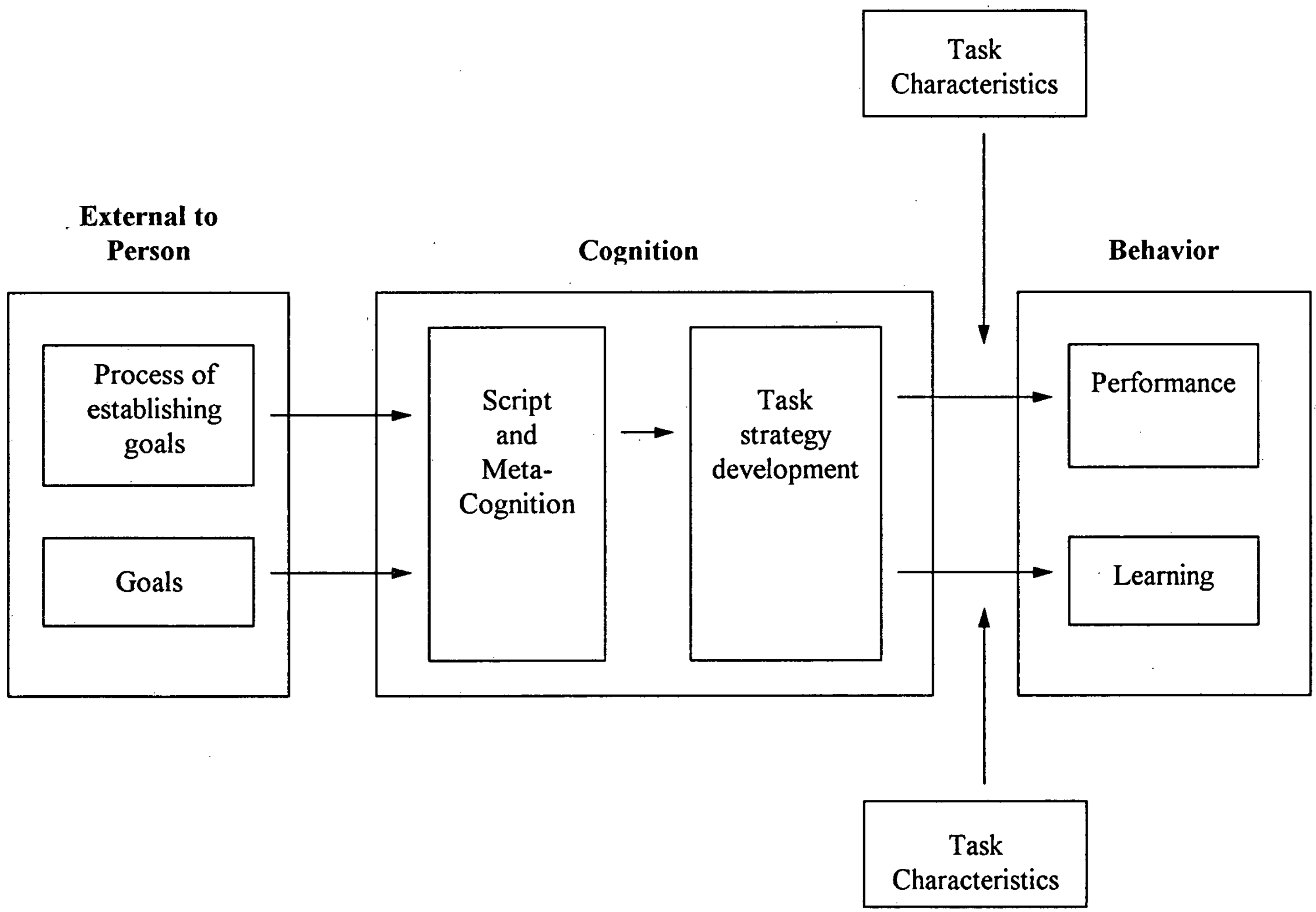
This study did not support Dweck and her colleagues' social cognitive explanation of how learning and proving goals affect learning and performance. The key variable in determining if people will exhibit maladaptive behaviors seems to be the strength of their perception of failure. When people do not feel that they have failed, as in this study, proving goals may suppress performance but need not induce maladaptive patterns of behavior. For instance, in this study, those with assigned proving goals did not learn or do as well as those in the other conditions, but they did not exhibit maladaptive behaviors. Despite not meeting their personal goals, those in the assigned proving goal condition maintained similar motivation with those in the learning and no goal conditions. This was evident from the personal goals they had set, which were not lower than those of the other two treatment conditions.

Thus, it appears that response to setbacks may be influenced by the contextual conditions. One attempt at identifying task-related factors that influence the individual's response to setbacks is the theory of constructive failure (Clifford, 1984).

Constructive Failure

Clifford's (1984) article was a response to educational trends in North America. Educators had moved towards establishing learning environments that maximize academic success and minimized error making. This move is based on the assumption that setbacks led to low self-esteem and inferior learning. Clifford argued that, on the contrary, setbacks could produce increases in motivation and performance.

Figure 9. Model of goal setting in unfamiliar and complex tasks



After reviewing the literature in learned helplessness, attribution theory, and intrinsic motivation, she identified the task related factors that influenced responses to setbacks.

Clifford's theory could account for the different results between Elliott and Dweck's (1988) and this study. She suggested that the following conditions would lead to constructive responses to setbacks: (1) readily available and unambiguous feedback; (2) a task that offered possibilities for challenge, skill improvements, and progress; and (3) a task that was meaningful to the individual.

In contrast, the following conditions would contribute to maladaptive behaviors: (1) ambiguous feedback; (2) a task that offered little chance of progress; (3) a task giving individuals little expectation of control; and (4) a situation where people attributed setbacks to low ability.

The comparison drawn between Elliott and Dweck (1984) and this study in the discussion section offers tentative support for Clifford's (1984) theory of constructive failure. The task contexts and the results are consistent with Clifford's predictions. The ability to account for the different findings of the two studies shows the power of a more integrative and holistic approach to theory building. Furthermore, Clifford's general approach may also be more useful to organizational science because it does not focus on special situations (e.g., learned helplessness) or deal only at the individual's level. The contextual focus offers opportunities for practical interventions through organizational design.

Finally, Clifford's approach is consistent with Staw, Candlepins, and Dutton's (1981) call for a multilevel approach to the understanding of how organizations adapt in the face of adversity.

Implications for Practice

The main implication for practice is that it is better to avoid goals that challenge the individual to prove their ability when the task is new or has changed significantly. Instead, performance in such situations may be enhanced by setting learning and developmental goals. Organizational practice often violate this principle. For instance, new incumbents are often placed on "probation" where they are expected to prove their worth to their superiors before being "confirmed" on the job. Instead, new incumbents should be given developmental goals that will help them achieve their performance targets.

The setting of development goals need not be at the expense of setting performance targets since the findings suggest that specific difficult goals do not interfere with learning goals. Thus, specific difficult performance targets and learning goals may be set simultaneously without conflict. Such an approach is consistent with the use of performance and appraisal systems as developmental tools (e.g., Campbell & Lee, 1988; Latham & Wexley, 1993; Meyer, Kay, & Frence, 1965). Having both learning and specific difficult goals are beneficial because most jobs have a mix of familiar and unfamiliar task components. Learning goals will enhance the performance of unfamiliar task components while the SD goals will increase the performance of familiar routine task components.

Learning goals may also be beneficial when the environment of an organization changes significantly. For instance, in the information technology industry, companies have to constantly cope with rapid changes in product and process technologies and customer needs. People in these organizations have to constantly re-define and re-learn the organization's services, products, and customers. With global competition, employees must also find new ways to deliver value to customers. Such an exercise calls for a tremendous amount of learning by individuals within the organization. Yet, the initial reaction of many organizations when faced with environmental threats is to tighten performance goals (i.e., set more difficult goals). Another common response is to put more emphasis on evaluation with the view of identifying candidates for "downsizing." The findings of this study suggest that both approaches may be ineffective in improving individual job performance. First, specific difficult goals have little effect on performance in learning situations. Secondly, evaluations for the purpose of downsizing cue a proving heuristic which interferes with learning, adaptation, and performance. Instead, it will be more appropriate to include learning goals to help organizational members learn about the changed environment and develop new task strategies and competencies.

Another benefit of learning goals is that they tend to induce more effort attributions and less chance attributions about performance on the job. By attributing performance more to effort and less to chance, persistence and further expenditure of effort are more likely to be forthcoming even when goals are not met. During corporate re-positioning, when project success is less certain, learning goals may be particularly useful in sustaining effort and persistence.

Limitations of the Study

As with all research designs, this study has its limitations. In the goal setting process, the quality of feedback is a key element in determining effective performance. In the present study, participants were given specific and objective feedback immediately after each trial. In contrast, feedback on organizational tasks is often ambiguous, less objective, less frequent, and less regular. This difference in the quality of feedback may limit the generalizability of the results to actual organizations. On the other hand, Locke's (1986) review of goal setting found goal setting effects in the field to be similar to those found in the laboratory. Nonetheless, external validity can only be established with field studies using learning and proving goals.

A second limitation of this study was the short time that participants had to complete each trial. This time constraint might have restricted the variety of people's strategies. Furthermore, the short time frame might not have permitted much reflection, and it might have promoted cursory learning instead of in-depth understanding of the task rule, thus, restricting the range of learning and performance results. It might also have restricted the range of the participants' learning orientations if participants felt that their learning opportunities were limited. This restriction of range could have resulted in fewer effects for the impact of learning orientations on learning and performance.

Another limitation is the lack of psychometric development of the measures of learning and proving orientations. Other than Dweck's work and this study, no other study discuss or attempt to operationalize goal orientations. The reliability and validity of the instruments used to measure learning and proving orientations is, therefore, less than satisfactory. Thus, the results pertaining to goal orientations must be viewed cautiously. Since part of the construct of a learning orientation correlates with important self-regulatory variables, self-efficacy and personal goals, the construct of goal orientations remains promising. Thus, there is a need for further conceptual and instrument development. For instance, it would be useful to know if learning and proving orientations are enduring or temporary states, or both. Perhaps the variables can be conceived as an attitude towards learning and proving respectively. If this is the case, the instrument should define the attitude objects clearly and include a means of capturing and combining the valence and direction of the evaluation of the attitude objects.

Finally, because of the process nature of this study, many hypotheses were tested. Furthermore, goal orientation turned out unexpectedly to be two dimensions instead of one, thus doubling the number of statistical tests made. As a result, a very conservative level of significance had to be adopted to contain the experimental-wise type-I error rate. This conservative α level resulted in loss of statistical power.

Summary

In summary, this research shows that in the complex and unfamiliar task studied, traditional goals (SD and DYB goals) had little effect on learning and performance. In contrast, non-traditional goals (learning and proving goals) did affect performance. Another important finding is that this study confirmed what theorists have already suspected: that the motivational processes postulated by goal setting and self-regulatory theories work well in simple tasks but not in complex tasks. The findings specifically highlight the limitations of both goal setting and self-efficacy theories. However, this study also suggests directions for theory extension and development. One promising avenue for research is to investigate how goals and the goal setting process cue meta-strategies such as heuristics and scripts; how these meta-strategies in turn affect task strategy development; and how task strategies interact with task characteristics to affect performance. Clearly, much more research will be needed before we can understand the cognitive and behavioral processes involved in complex tasks. This represents both a challenge and an opportunity for researchers in goal setting.

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APPENDICES

Appendix 1: Statistical Parameters Used in MCPL Tasks

Excerpt from: Brehmer, B. (1979). Preliminaries to psychological inference. *Scandinavian Journal of Psychology, 20,* 193-210.

Main Focus of Interst: Relation between Systems

While the modelling of cognitive systems is an interesting and important undertaking, Social Judgment Theory (SJT) considers the modelling of the relationship between the cognitive system and the cognitive task a more important one. For this purpose, SJT uses the so-called "lens model equation", originally developed by Hursch, Hammond, and Hursch (1964) and then modified by Tucker (1964), whose version is given as equation 1. (Björkman, 1967, 1973, has discussed the case where the variables involved are nonmetric.)

$$r_a = G R_e R_s + C \sqrt{(1 - R_e^2)} \sqrt{(1 - R_s^2)} \qquad (1)$$

where r_a is the correlation between the judgments and the criterion values, G is the correlation between the linearly predictable variance in the task system and that in the cognitive system, R_e is the multiple correlation between the cues and the criterion, R_s is the multiple correlation between the cues and the judgments, and C is the correlation between the residuals in the two systems (after the linear components have been partialled out).

In equation 1, r_a, which is called the index of achievement, shows the extent to which the judgments match the criterion values. The correlation between the linear components, G, shows the extent to which the linear components of the two systems match, i.e., the extent to which the person has been able to detect and utilize the linear aspects of the task system. In the same way, C, the correlation between the residuals, shows the extent to which the cognitive system has succeeded in detecting and using the nonlinear aspects of the task.

Although Equation 1 makes it possible to analyze achievement into linear ($G R_e R_s$) and a nonlinear ($C \sqrt{(1 - R_e^2)} \sqrt{(1 - R_s^2)}$) component, thus enabling the investigator to diagnose important aspects of the cognitive system, it is conceptually awkward. This is because it does not have clear measures of task predictability and of cognitive system predictability; R_e *and* R_s in equation 1 give predictability only for the linear aspects of the systems. Therefore in recent analyses, the two systems are often transformed to linear form, using the same transformation for both systems (usually that which reduces the task system to linear form). In this case equation 1 reduces to equation 2.

$$r_a = G R_e R_s \quad (2)$$

Equation 2 is more convenient because the parameters can be given a clear interpretation. In this form, G is a measure of the extent to which the systematic aspects of the cognitive system matches the task system. R_e gives a direct measure of total task predictability. It thus shows the upper limit of achievement; r_a can never exceed the predictability of the task system. That is, the quality of the information available for the judgments sets a limit to the quality of these judgments. This point is often overlooked in studies of cognitive function, and shows that just because a person's judgments are incorrect, it does not mean that he has an inadequate judgment process, it is not sufficient to look only at the extent to which a person's judgments agree with the actual outcomes. It is also neccessary to consider the limits of achievement imposed by the predictability of (the) system. When this is done, we may find that the judgments are as good as can be, given the circumstances. It does not seem unlikely that in many situations, e.g., experiments on person perception and clinical inference, the power of human judgment has been underestimated because the investigators have uncriticallyaccepted the idea that judgment may be perfect and forgotten that there may be limits of achievement.

R_e shows the proportion of the variance in the subject's response system that can be explained in terms of the optimal model for the task. If this model is an inadequate model of the cognitive systen, i.e., if the system features of the cognitive system match those of the task so that G is unity, R_s can be interpreted as an index of the consistency of the system, i.e., of the extent to which the judge uses the same rule to arrive at his judgments from case to case. If G is not unity, other measures of the consistency are needed. However, in most applications, G is found to be very high, and sufficiently close to unity to warrant this interpretation. It is, of course, also possible that R_s may be an inadequate measure of consistency despite a low value of G. This is when the cognitive system follows a linear model but when the relative weights in the cognitive system do not match those for the task system. A low G value is, however, a sign that the cognitive system needs closer examination to determine how the value of R_s should be interpreted.

To summerize, equation 2 shows that achievement is a function of the properties of the task system and those of the cognitive system. Specifically, within the limits set by system predictability, a person's achievement depends on the extent to which he has been able to detect and use the systematic features of the task system, and the extent to which he uses his knowledge in a consistent way. The equation also shows what is required for optimal performance. Optimal Performance, $r_a = R_s$, is obtained if a subject manages to match the systematic features of his cognitive system to those of the task system to that $G = 1.0$.

Equation 2 thus gives substance to what was said earlier in the paper about knowledge requiring that the cognitive system be a model of the task, and gives a measure of the extent to which this is true in the *G* index. However, the equation also shows that the cognitive system should model only the systematic features of the task , but not the randomness in the system. The problem for empirical studies, then, is now defined: it is to investigate under what circumstances a match between the systems is achieved.

Excerpt from: Sniezek, J.A. (1986). The role of variable labels in cue probability learning tasks. *Organizational Behavior and Human Decision Processes, 38,* 141-161.

Prediction behavior can be examined within the framework of the lens model proposed by Brunswik (1943) and developed by others. (For further discussion of the lens model, see Dudycha and Naylor (1966), Hammond, Steward, Brehmer, and Steinmann (1975), and Slovic and Lichenstein (1971).) Regression analysis is used to capture the judge's policy for estimating Y_e from the n cues by the descriptive model

$$\hat{Y}_s = B_{so} + \Sigma\, B_{si} X_i.$$

Similarly, the true relationship of Y_e to the n cues is expressed in the optimal model by a (least - squares) regression equation

$$\hat{Y}_e = B_{eo} + \Sigma\, B_{ei} X_i.$$

The descriptive model can be compared to the optimal model to evaluate performance. The amount of linear association between predictions from these two models is given by the matching index:

$$r_m = \hat{r}\, \hat{Y}e\; Ys.$$

The extent to which the judge adheres to the policy revealed in the descriptive model is assessed by

$$r_s = r_{\hat{Y}e\; Ys} \quad \text{an index of consistency.}$$

The third measure of performance,

$$r_a = r_{Ye\; Ys},$$

reflects prediction achievement. It quantifies (linear) agreement between the judge's criterion predictions and the actual criterion outcomes. As such, it can be thought of as a measure of overall performance.

To reach a high level of achievement, the judge must first determine the appropriate cue weighting strategy, then apply it consistently. This can be seen in the lens model (under the assumption that the descriptive and optimal policies are linear):

$$r_a = r_e\, r_m\, r_s + C\,[(1 - r_s^2)\,(1 - r_e^2)]$$

where C is the correlation between residuals in the response system and the ecology. [For the development of this equation, see Hurch, Hammond, and Hurch (1964), Tucker (1964), and Castellan (1973).] Under the assumption that residuals are uncorrelated, the model becomes

$$r_a = r_e\, r_m\, r_s.$$

The maximum possible level of achievement is always less than 1. The two remaining components of achievement, matching and consistency, are statistically independent.

Appendix 2: Fisher's Z Transformation

Excerpt from: Charter, R.A. & Larsen B.S. (1983). Fisher's Z to R. *Education and Psychological Measurement, 43,* 41-42.

The present note will supply the Fisher's Z to r transformation for two commonly used r to Fisher's Z transformation formulas. The first formula to convert r to Fisher's Z is

$$Z = 0.5 \log_e [(1 + r)/(1 - r)],$$

where $\log_e$ is the natural logarithm. Solving for r we get

$$r = (e^{2Z} - 1)/(e^{2Z} + 1),$$

where e is equal to 2.71828. The second formula to convert r to Fisher's Z is

$$Z = 1.1513 \log_{10} [(1 + r)/(1 - r)].$$

Solving for r, we get

$$r = (10^{Z/1.1513} - 1)/(10^{Z/1.1513} + 1).$$

Appendix 3: Embedded Treatment Manipulation in the Form of "Some suggestions for doing the task"

Some Suggestions For Doing The Task

Learning

At first glance, this task appears to be simple and unrealistic, but it nonetheless captures the fundamental processes involved in judging and predicting how well stocks will do. This task was originally developed to train stock analysts and portfolio managers. In most cases, it has proven successful in improving the prediction skills even for very experienced stock analysts. More recently, several studies have also shown that this task can help individuals learn to better manage their personal investments.

Treat this task as an opportunity for learning and self-improvement. Take advantage of the task to learn as much as you can, and to develop your knowledge, skills, and abilities to the fullest. To learn well, you should keep your attention and efforts focused on finding ways of learning better. If you keep these pointers in mind during the task, you will learn more and do better.

Although we will not be evaluating how well you do on your predictions, and no one will be able to link your predictions to you, please be diligent in performing the task and in following the instructions carefully. This task will, however, let you understand how various factors influence stock prices, and also let you understand and develop your learning skills.

Proving

At first glance, this task appears to be simple and unrealistic, but it nonetheless captures the fundamental processes involved in judging and predicting how well stocks will do. This task was originally developed to assess how good analysts and portfolio managers were at predicting stock prices at various points in their careers. In most cases, it has proven successful at predicting job performance. More recently, several studies have also shown that this task can help individuals assess how well they might do on their personal investments.

Treat this task as an opportunity to assess how good you are at predicting stock prices. See whether you have all the knowledge, skills, and abilities necessary to do well at this prediction task. To do well, you have to keep your attention and efforts focused on your performance as indicated by your prediction accuracy. If you keep these pointers in mind during the task, your prediction performance will be better.

We will not be evaluating how well you do on your predictions, and no one other than yourself will know what you have written on these pages. But the task will let you know how ready you are and how well you might do at managing your own investments.

"Do Your Best" (DYB)

It often helps people get the most from doing this task when they "stretch" themselves. So we want you to do your very best to predict stock prices. Be as accurate as you possibly can. By keeping your attention and efforts focused on this goal, you will do better.

Although we will not be evaluating how well you do on your predictions, and no one will be able to link your predictions to you, please be diligent in performing the task and in following the instructions carefully.

Specific difficult (SD)

It often helps people get the most from doing this task when they "stretch" themselves by aiming for some specific benchmark. So we want you to try to achieve a prediction accuracy of within $6. By keeping your attention and efforts focused on this goal, you will do better.

Although we will not be evaluating how well you do on your predictions, and no one will be able to link your predictions to you, please be diligent in performing the task and in following the instructions carefully.

Learning/DYB goal

At first glance, this task appears to be simple and unrealistic, but it nonetheless captures the fundamental processes involved in judging and predicting how well stocks will do. This task was originally developed to train stock analysts and portfolio managers. In most cases, it has proven successful in improving the prediction skills even for very experienced stock analysts. More recently, several studies have also shown that this task can help individuals learn to better manage their personal investments.

Treat this task as an opportunity for learning and self-improvement. Take advantage of the task to learn as much as you can, and to develop your knowledge, skills, and abilities to the fullest. To learn well, you should keep your attention and efforts focused on finding ways of learning better. Also, it often helps people learn better when they "stretch" themselves. So we want you to do your very best to predict stock prices. Be as accurate as you possibly can. If you keep these pointers in mind during the task, you will learn more and do better.

Although we will not be evaluating how well you do on your predictions, and no one will be able to link your predictions to you, please be diligent in performing the task and in following the instructions carefully. This task will, however, let you understand how various factors influence stock prices, and also let you understand and develop your learning skills.

Learning/SD goal

At first glance, this task appears to be simple and unrealistic, but it nonetheless captures the fundamental processes involved in judging and predicting how well stocks will do. This task was originally developed to train stock analysts and portfolio managers. In most cases, it has proven successful in improving the prediction skills even for very experienced stock analysts. More recently, several studies have also shown that this task can help individuals learn to better manage their personal investments.

Treat this task as an opportunity for learning and self-improvement. Take advantage of the task to learn as much as you can, and to develop your knowledge, skills, and abilities to the fullest. To learn well, you should keep your attention and efforts focused on finding ways of learning better. Also, it often helps people learn better when they "stretch" themselves by aiming for some specific benchmark. So we want you to try to achieve a prediction accuracy of within $6. If you keep these pointers in mind during the task, you will learn more and do better.

Although we will not be evaluating how well you do on your predictions, and no one will be able to link your predictions to you, please be diligent in performing the task and in following the instructions carefully. This task will, however, let you understand how various factors influence stock prices, and also let you understand and develop your learning skills.

Proving/DYB goal

At first glance, this task appears to be simple and unrealistic, but it nonetheless captures the fundamental processes involved in judging and predicting how well stocks will do. This task was originally developed to assess how good analysts and portfolio managers were at predicting stock prices at various points in their careers. In most cases, it has proven successful at predicting job performance. More recently, several studies have also shown that this task can help individuals assess how well they might do on their personal investments.

Treat this task as an opportunity to assess how good you are at predicting stock prices. See whether you have all the knowledge, skills, and abilities necessary to do well at this prediction task. To do well, you have to keep your attention and efforts focused on your performance as indicated by your prediction accuracy. Also, it often helps people do better when they "stretch" themselves. So we want you to do your very best to predict stock prices. Be as accurate as you possibly can. If you keep these pointers in mind during the task, your prediction performance will be better.

Although we will not be evaluating how well you do on your predictions, and no one will be able to link your predictions to you, please be diligent in performing the task and in following the instructions carefully. This task will, however, let you know how ready you are and how well you might do at managing your own investments.

Proving/SD goal

At first glance, this task appears to be simple and unrealistic, but it nonetheless captures the fundamental processes involved in judging and predicting how well stocks will do. This task was originally developed to assess how good analysts and portfolio managers were at predicting stock prices at various points in their careers. In most cases, it has proven successful at predicting job performance. More recently, several studies have also shown that this task can help individuals assess how well they might do on their personal investments.

Treat this task as an opportunity to assess how good you are at predicting stock prices. See whether you have all the knowledge, skills, and abilities necessary to do well at this prediction task. To do well, you have to keep your attention and efforts focused on your performance as indicated by your prediction accuracy. Also, it often helps people do better when they "stretch" themselves by aiming for some specific benchmark. So we want you to try to achieve a prediction accuracy of within $6. If you keep these pointers in mind during the task, your prediction performance will be better.

Although we will not be evaluating how well you do on your predictions, and no one will be able to link your predictions to you, please be diligent in performing the task and in following the instructions carefully. This task will, however, let you know how ready you are and how well you might do at managing your own investments.

Appendix 4: Embedded Treatment Manipulation in the Form of Hints

The following manipulations took the form of "Some useful hints" which appeared before each trial block.

Learning

Some Useful Hints

* *Focus on learning and the learning process.*
* *Find ways of learning better.*
* *Develop your knowledge, skills, and abilities.*
* *See how and where you can improve.*
* *Understand and develop your learning skills.*

Proving

Some Useful Hints

* *Focus on getting a good performance.*
* *Find ways of performing better.*
* *Use your knowledge, skills, and abilities .*
* *Try to top your best performance.*

DYB

Some Useful Hints
* *Keep doing your very best to predict stock prices as well as you possibly can.*

SD

Some Useful Hints
* *Keep trying for a prediction accuracy of within $6.*

Learning/DYB goal

Some Useful Hints
* *Focus on learning and the learning process.*
* *Find ways of learning better.*
* *Develop your knowledge, skills, and abilities.*
* *See how and where you can improve.*
* *Understand and develop your learning skills.*
* *Keep doing your best at predicting the stock prices.*

Learning/SD goal

Some Useful Hints

* *Focus on learning and the learning process.*
* *Find ways of learning better.*
* *Develop your knowledge, skills, and abilities.*
* *See how and where you can improve.*
* *Understand and develop your learning skills.*
* *Keep trying for a prediction accuracy of within $6.*

Proving/DYB goal

Some Useful Hints

* *Focus on getting a good performance.*
* *Find ways of performing better.*
* *Use your knowledge, skills, and abilities .*
* *Try to top your best performance.*
* *Keep doing your best at predicting the stock prices.*

Proving/SD goal

Some Useful Hints

* *Focus on getting a good performance.*
* *Find ways of performing better.*
* *Use your knowledge, skills, and abilities .*
* *Try to top your best performance.*
* *Keep doing your best at predicting the stock prices.*
* *Keep trying for a prediction accuracy of within $6.*

Appendix 5: Embedded Treatment Manipulation in the Form of Questions

Learning; Learning/DYB; Learning/SD

1. How committed are you to the goal of "learning as much as you can" from this task? (check one answer)

   1. [ ] I definitely will not try at all to learn.
   2. [ ] I probably will not try to learn.
   3. [ ] I might not try to learn.
   4. [ ] I am uncertain whether I will try to learn.
   5. [ ] I might try to learn.
   6. [ ] I probably will try to learn.
   7. [ ] I definitely will try my hardest to learn.

Proving; Proving/DYB; Proving/SD

2. How keen are you to test and find out your stock price prediction ability? (check one answer)

   1. [ ] I definitely will not try to test my ability.
   2. [ ] I probably will not try to test my ability.
   3. [ ] I might not try to test my ability.
   4. [ ] I am uncertain whether I will try to test my ability.
   5. [ ] I might try to test my ability.
   6. [ ] I probably will try to test my ability.
   7. [ ] I definitely will try my hardest to test my ability.

SD; Learning/SD; Proving/SD

3. How committed are you to the assigned goal of attaining a prediction error of less than 6 dollars?

   1. [ ] I definitely will not try at all to achieve this goal.
   2. [ ] I probably will not try to achieve this goal.
   3. [ ] I might not try to achieve this goal.
   4. [ ] I am uncertain whether I will try to achieve this goal.
   5. [ ] I might try to achieve this goal.
   6. [ ] I probably will try to achieve this goal.
   7. [ ] I definitely will try my hardest to achieve this goal.

Appendix 6: Data Collection Booklet

Personal Identification Code
Choose a code that is known only to yourself.

Thank you for participating in this study.		
Dr. Merle Ace	Dr. Gerald Gorn	Dr. Ralph Hakstian
Dr. Keith Murnighan	Mr. Chia, Ho-Beng	

Goals, Tasks, and Performance Study (CHB 1)

Data Collection Booklet

N

INFORMATION ABOUT THE TASK

The task you will be doing is to predict stock prices of 100 companies listed in a relatively new stock exchange that is situated in a developing country. To enable you to make the prediction for each company, you will be given the company's effectiveness ratings for the marketing, production, and research and development divisions.

The business environment which these companies operate in is very different from that of North America. You should therefore disregard what you know about stock price behavior in the North American stock markets. Each of the effectiveness ratings can have a strong or weak effect on stock prices. For instance, marketing effectiveness could have no impact on the stock price. Alternatively, it could lead to a tremendous price increase. The same is true for the production and R&D divisions.

Furthermore, as in all business environments there is always inherent uncertainty. Thus, stock prices will randomly vary around their true value. Other than variations in marketing, production, R&D effectiveness, and chance, you can safely assume that all other factors are constant.

The rating information ranges from

0%, - completely ineffective, to 100%, - completely effective.

The stock prices have a range of between

$2 to $100 and a mean of $50

SEQUENCE OF EVENTS

There will be 5 quarterly periods. In each quarter, you will be making predictions on 20 companies. For each company, you will be shown the effectiveness ratings of the 3 divisions (marketing, production, and R&D). Using this information, you will then write your price prediction. Next, you will see the actual price. Record it next to your prediction.

Between quarters, we will be asking you to fill in a short questionnaire. The responses will help us better understand how people approach tasks like this one. At the end of the task, there will be a final questionnaire. A briefing and a question and answer session will be conducted in Tuesday's class.

Although we will not be evaluating how well you do on your predictions, and no one will be able to link your predictions to you, please be diligent in performing the task and in following the instructions carefully.

[Manipulation instructions were embedded as here as an additional paragraph entitled "Some suggestions for doing the task". Please see Appendix C for details of each treatment manipulation.]

QUESTIONNAIRE A

4. Please indicate how much emphasis you will be giving to the following qualitative goals during your next 20 predictions. *[Learning(L) and proving(L) orientaion intention items.]*

1 = Almost no emphasis.	4 = Average emphasis.
2 = Very little emphasis.	5 = Above average emphasis.
3 = Below average emphasis.	6 = A great deal of emphasis.
	7 = Almost all the emphasis.

1.	See how good I am at this task.*[P]*	1	2	3	4	5	6	7
2.	Learn something from this task.*[L]*	1	2	3	4	5	6	7
3.	Try not to humiliate myself.*[P]*	1	2	3	4	5	6	7
4.	Gain some insight about how I think and/or how I do things.*[L]*	1	2	3	4	5	6	7

5. Please rate your confidence in achieving the following levels of performance during the next 20 predictions:*[self-efficacy measure.]*

Level of performance = *average difference* between predictions and actual price.

For each performance level, rate how confident you are in achieving that level of accuracy during the next 20 trials.

Average difference of:	No confidence at all									Total confidence
$0 and $2	1	2	3	4	5	6	7	8	9	10
$0 and $4	1	2	3	4	5	6	7	8	9	10
$0 and $6	1	2	3	4	5	6	7	8	9	10
$0 and $8	1	2	3	4	5	6	7	8	9	10
$0 and $10	1	2	3	4	5	6	7	8	9	10
$0 and $12	1	2	3	4	5	6	7	8	9	10
$0 and $14	1	2	3	4	5	6	7	8	9	10
$0 and $16	1	2	3	4	5	6	7	8	9	10
$0 and $18	1	2	3	4	5	6	7	8	9	10
$0 and $20	1	2	3	4	5	6	7	8	9	10
$0 and $22	1	2	3	4	5	6	7	8	9	10
$0 and $24	1	2	3	4	5	6	7	8	9	10
$0 and $26	1	2	3	4	5	6	7	8	9	10
$0 and $28	1	2	3	4	5	6	7	8	9	10
$0 and $30	1	2	3	4	5	6	7	8	9	10

NOTE: Please make sure that you have 15 circled responses.

Please turn to the next page and continue.

Next Page

QUESTIONNAIRE A

[Manipulation in the form of a questionnaire item relevant to assigned SD, Learning/SD, and Proving/SD goal treatments was inserted here. Please see Appendix E for details.]

6. During the next 20 predictions, I am aiming to have my price predictions come within $ ______ of the actual price.*[Personal goals.]*

7. How committed are you to attaining the personal goal level you have indicated in item 6? *[Commitment to personal goals.]* (check one answer)

1. [ ] I definitely will not try at all to achieve this goal.
2. [ ] I probably will not try to achieve this goal.
3. [ ] I might not try to achieve this goal.
4. [ ] I am uncertain whether I will try to achieve this goal.
5. [ ] I might try to achieve this goal.
6. [ ] I probably will try to achieve this goal.
7. [ ] I definitely will try my hardest to achieve this goal.

[Manipulation in the form of a questionnaire item relevant to assigned learning and proving goal treatment was inserted here. Please see Appendix E for details.]

Now go to the stock prediction record sheet and get ready for the prediction task.

STOP here! Go to Record Sheet

QUESTIONNAIRE B

Please reflect on what happened during the last 20 predictions when answering the questions below.

8. Please use the following scales to indicate how much you agree with the following statements.*[learning and proving orientation retrospective items.]*

1 = Definitely disagree	5 = Slightly agree
2 = Disagree	6 = Agree
3 = Slightly disagree	7 = Definitely agree
4 = Neither agree nor disagree	

1.	While performing the task, I focused on how and what I learned rather than on how well I did. *[L]*	1	2	3	4	5	6	7
2.	While performing the task, I was concerned about how well my performance will compare with others.*[P]*	1	2	3	4	5	6	7
3.	I believe that performance on this task depends on the amount of effort and learning rather than on ability.*[L]*	1	2	3	4	5	6	7
4.	I believe that performance on this task is unimportant, it is learning new skills that is important.*[L]*	1	2	3	4	5	6	7
5.	I was anxious to do well on this task because a poor performance score will reflect badly on me.*[P]*	1	2	3	4	5	6	7

9. Did your latest 20 predictions exceed or fall short of your goal? *[Perception og goal attainment]*

1. [ ] exceeded 2. [ ] met the goal 3. [ ] fell short

10. My performance in the previous 20 predictions makes me feel that I... *[Perception of success/failure]*
1. [ ] have failed completely
2. [ ] have failed
3. [ ] have failed a little
4. [ ] am neither successful nor have failed
5. [ ] am somewhat successful
6. [ ] am successful
7. [ ] am very successful

11. Please rate the extent the following causes contributed to your better or worse than expected performance in the previous 20 predictions? *[Causal attributions]*

Cause		No contribution									Maximum contribution
(a)	Personal ability	1	2	3	4	5	6	7	8	9	10
(b)	Chance or luck	1	2	3	4	5	6	7	8	9	10
(c)	Effort	1	2	3	4	5	6	7	8	9	10
(d)	Task difficulty or	1	2	3	4	5	6	7	8	9	10
	ease	1	2	3	4	5	6	7	8	9	10
(e)	Sufficient or insufficient learning time										

Please turn to the next page and continue.

Next Page

QUESTIONNAIRE B

Please think about what you intend to do during the next 20 predictions when answering the questions below.

12. Please indicate how much emphasis you will be giving to the following` qualitative goals during your next 20 predictions.

1 = Almost no emphasis.
2 = Very little emphasis.
3 = Below average emphasis.
4 = Average emphasis.
5 = Above average emphasis.
6 = A great deal of emphasis.
7 = Almost all the emphasis.

1.	See how good I am at this task.	1	2	3	4	5	6	7
2.	Learn something from this task.	1	2	3	4	5	6	7
3.	Try not to humiliate myself.	1	2	3	4	5	6	7
4.	Gain some insight about how I think and/or how I do things.	1	2	3	4	5	6	7

13. Please rate your confidence in achieving the following levels of performance during the next 20 predictions:

Level of performance = *average difference* between predictions and actual price.

For each performance level, rate how confident you are in achieving that level of accuracy during the next 20 trials.

Average difference of:	No confidence at all									Total confidence
$0 and $2	1	2	3	4	5	6	7	8	9	10
$0 and $4	1	2	3	4	5	6	7	8	9	10
$0 and $6	1	2	3	4	5	6	7	8	9	10
$0 and $8	1	2	3	4	5	6	7	8	9	10
$0 and $10	1	2	3	4	5	6	7	8	9	10
$0 and $12	1	2	3	4	5	6	7	8	9	10
$0 and $14	1	2	3	4	5	6	7	8	9	10
$0 and $16	1	2	3	4	5	6	7	8	9	10
$0 and $18	1	2	3	4	5	6	7	8	9	10
$0 and $20	1	2	3	4	5	6	7	8	9	10
$0 and $22	1	2	3	4	5	6	7	8	9	10
$0 and $24	1	2	3	4	5	6	7	8	9	10
$0 and $26	1	2	3	4	5	6	7	8	9	10
$0 and $28	1	2	3	4	5	6	7	8	9	10
$0 and $30	1	2	3	4	5	6	7	8	9	10

NOTE: Please make sure that you have 15 circled responses.

Please turn to the next page and continue.

Next Page

QUESTIONNAIRE B

[Manipulation in the form of a questionnaire item relevant to assigned SD, Learning/SD, and Proving/SD goal treatments was inserted here. Please see Appendix E for details.]

14. During the next 20 predictions, I am aiming to have my price predictions come within $ ______ of the actual price.

15. How committed are you to attaining the personal goal level you have indicated in item 14? (check one answer)

1. [ ] I definitely will not try at all to achieve this goal.
2. [ ] I probably will not try to achieve this goal.
3. [ ] I might not try to achieve this goal.
4. [ ] I am uncertain whether I will try to achieve this goal.
5. [ ] I might try to achieve this goal.
6. [ ] I probably will try to achieve this goal.
7. [ ] I definitely will try my hardest to achieve this goal.

[Manipulation in the form of a questionnaire item relevant to assigned learning and proving goal treatments was inserted here. Please see Appendix E for details.]

Now go to the stock prediction record sheet and get ready for the prediction task.

STOP!
here.
Go to
Record Sheet

[Questionnaire B was repeated as questionnaires C through E. Each was administered before the respective trial blocks 3 through 5.]

Final Questionnaire

Please reflect on what happened during the last 20 predictions when answering the questions below.

16. Please use the following scales to indicate how much you agree with the following statements.

1 = Definitely disagree
2 = Disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Agree
7 = Definitely agree

1.	While performing the task, I focused on how and what I learned rather than on how well I did.	1	2	3	4	5	6	7
2.	While performing the task, I was concerned about how well my performance will compare with others.	1	2	3	4	5	6	7
3.	I believe that performance on this task depends on the amount of effort and learning rather than on ability.	1	2	3	4	5	6	7
4.	I believe that performance on this task is unimportant, it is learning new skills that is important.	1	2	3	4	5	6	7
5.	I was anxious to do well on this task because a poor performance score will reflect badly on me.	1	2	3	4	5	6	7

17. Did your latest 20 predictions exceed or fall short of your goal?

1. [ ] exceeded 2. [ ] met the goal 3. [ ] fell short

18. My performance in the previous 20 predictions makes me feel that I...

1. [ ] have failed completely
2. [ ] have failed
3. [ ] have failed a little
4. [ ] am neither successful nor have failed
5. [ ] am somewhat successful
6. [ ] am successful
7. [ ] am very successful

19. Please rate the extent the following causes contributed to your better or worse than expected performance in the previous 20 predictions?

Cause		No contribution									Maximum contribution
(a)	Personal ability	1	2	3	4	5	6	7	8	9	10
(b)	Chance or luck	1	2	3	4	5	6	7	8	9	10
(c)	Effort	1	2	3	4	5	6	7	8	9	10
(d)	Task difficulty or ease	1	2	3	4	5	6	7	8	9	10
(e)	Sufficient or insufficient learning time	1	2	3	4	5	6	7	8	9	10

Please turn to the next page and continue.

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Final Questionnaire

20. Please estimate how much influence each of the 3 effectiveness ratings had on stock prices. Indicate this by distributing 100 points among the 3 ratings. Also indicate whether stock prices increased with the ratings (+) or decreased with the ratings (-).

Effectiveness rating	Weighting	Relationship between rating and prices (circle one).
Marketing	______	+ or - ?
Production	______	+ or - ?
R&D	______	+ or - ?
	100	

Please reflect on all of your predictions and answer the following questions.

21. To what extent were you striving for an elite level of performance during the task ? *[Striving for elite performance]*
1. [ ] Always
2. [ ] Almost always
3. [ ] Often
4. [ ] Sometimes
5. [ ] Seldom
6. [ ] Almost never
7. [ ] Never

22. How much did you want to be among the top 10 percent of your peers? *[Striving for elite performance]*
1. [ ] wanted very much
2. [ ] wanted quite a lot
3. [ ] wanted slightly
4. [ ] indifferent
5. [ ] didn't slightly
6. [ ] didn't quite a lot
7. [ ] didn't at all

23. Please use the following scales to indicate how much you agree with the following statements. *[Manipulation checks]*
1 = Definitely disagree
2 = Disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Agree
7 = Definitely agree

1.	I wanted to do my best.	1 2 3 4 5 6 7
2.	I tried to get my predictions within $6 of the actual price.	1 2 3 4 5 6 7
3.	Learning was an important objective for me.	1 2 3 4 5 6 7
4.	Proving to myself and/or other that I can do this task well was an important objective for me.	1 2 3 4 5 6 7
5.	I wanted than other people to o better on this task.	1 2 3 4 5 6 7
6.	I wanted to do well on this task.	1 2 3 4 5 6 7
7.	I tried to used this task to improve myself.	1 2 3 4 5 6 7
8.	I wanted to learn how to succeed on this task.	1 2 3 4 5 6 7

Final Questionnaire

24. How novel was this task for you?	Very Familiar	1	2	3	4	5	6	7	Very Novel

25. **Important question.** Different people have different ways of doing this task. To help us learn more about human processes, it is important that you candidly tell us (1) what went through your mind, and (2) how you felt as you worked through the task.

26. What do you think the study was about?

27. How could we improve this study?

Please turn to the next page and continue.

Next Page

Final Questionnaire

28 Below are 23 pairs of statements. From each pair, circle one statement that most closely reflect your beliefs.*[Locus of control scale]*

1 a..Many of the unhappy things in people's lives are mainly due to bad luck.
b..People's misfortune results from the mistakes they make.

2 a..One of the reasons why we have wars is because people don't take enough interest in politics.
b..There will always be wars, no matter how hard people try to prevent them.

3 a..In the long run people get the respect they deserve in this world.
b..Unfortunately, an individual's worth often passes unrecognized no matter how hard the person tries.

4 a..The idea that teachers are unfair to students is nonsense.
b..Most students don't realize the extent to which their grades are influenced by accidental happenings.

5 a..Without the right breaks one cannot be an effective leader.
b..Capable people who fail to become leaders have not taken advantage of their opportunities.

6 a..No matter how hard you try, some people just don't like you.
b..People who can't get people to like them don't understand how to get along with others.

7 a..I have often found that what is going to happen will happen.
b..Trusting to fate have never turn out as well for me as making a decision to take a definite course of action.

8 a..In the case of a well prepared student there is rarely if ever such thing as an unfair test.
b..Many times exam questions tend to be so unrelated to coursework that studying is really useless.

9 a..Becoming a success is a matter of hard work, luck has little or nothing to do with it.
b..Getting a good job depends mainly on being in the right place at the right time.

10 a..The average citizen can have an influence on government decisions.
b..The world is run by the few people in power, and there is not much the little guy can do about it.

11 a..When I make plans, I am almost certain that I can make them work.
b..It is not always wise to plan too far ahead because many things can turn out to be a matter of good or bad fortune.

12 a..In my case getting what I want has little or nothing to do with luck.
b..Many times we might just as well decide what to do by flipping a coin.

Final Questionnaire

13 a..Who gets to be the boss often depends on who was lucky enough to be in the right place first.

b..Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.

14 a..As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.

b..By taking an active part in political and social affairs the people can control the world events.

15 a..Most people don't realize the extent their lives are controlled by accidental happenings.

b..There is really no such thing as "luck".

16 a..It is hard to know whether or not a person really likes you.

b..How many friends you have depends on how nice a person you are.

17 a..In the long run the bad things that happen to us are balanced by the good ones.

b..Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

18 a..With enough effort we can wipe out political corruption.

b..It is difficult for people to have much control over the things politicians do in office.

19 a..Sometimes I can't understand how teachers arrive at the grades they give.

b..There is a direct connection between how hard I study and the grades I get.

20 a..Many times I feel that I have little influence over the things that happen to me.

b..It is impossible for me to believe that chance or luck plays an important role in my life.

21 a..People are lonely because they don't try to be friendly.

b..There's not much use in trying hard to please people, if they like you, they like you.

22 a..What happens to me is my own doing.

b..Sometimes I feel that I don't have enough control over the direction my life is taking.

23 a..Most of the times I can't understand why politicians behave the way they do.

b..In the long run the people are responsible for the bad government on a national as well as on a local level.

Background information.

This information will help us ensure that various groups are equally represented in the sample.

Age [ ]　　Male/Female　　Ethnic group ________

Once again, thank you for participating in this study.

[Example of the record sheet.]

STOCK PRICE RECORD: QUARTER 1

Quarter 1 Companies	Your Prediction	Actual Price	Notes
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

Please return to Questionnaire B on page xx
and continue.