GOAL SETTING: UNLOCKEING THE RESEARCH

by

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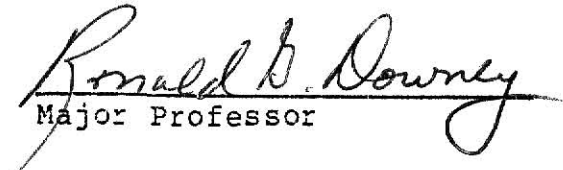
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INTRODUCTION

As Steers and Porter (1974) observe, "organizational researchers and practicing managers have long been concerned with discovering methods for improving the effectiveness and efficiency of organizations". Methods for improving the performance of workers have included goal setting (Latham & Locke, 1975), modifying reinforcement contingencies (Deci, 1972), job enlargement (Lawler, 1969), job enrichment (Lawler, Hackman and Kaufman, 1973) and participative management (Wood, 1973).

One universally agreed upon measure of the effectiveness or level of performance of an employee or work unit has been the ability to meet standards or goals. Thus the concern of organizations with improving human performance leads naturally to a concern for determining the factors and situations which affect whether or not individuals or groups reach predetermined goals.

In 1935, Mace (note 1) performed one of the earliest experiments on goal setting where subjects were asked to perform complex computations. Those subjects, who were given a specific standard to meet, performed a significantly higher number of computations than subjects told to "do your best to improve". Gradually researchers came to view goal setting as an important means of stimulating performance.

Ryan (1958) has argued that:

Tasks (intentions, goals, etc.)...are to be treated as causal factors in behavior. By this I mean that a task is a necessary condition for most kinds of

behavior. (To find and account for the exceptions is an

empirical problem)...I shall assert

that a very large proportion of behavior is initiated

by tasks, and that a very large proportion of tasks

lead to the behavior specified by the tasks.

(page 79).

In 1968, E. A. Locke set forth a theory of goal setting containing three major hypotheses: (1) hard goals produce a higher level of performance (output) than easy goals; (2) specific hard goals produce a higher level of output than a goal of "do your best"; and (3) behavioral intentions regulate choice behavior.

An application of this theory is the management by objectives (MBO) program in which managers and workers jointly set performance goals. MBO is in wide use in industry today (Luthans and Kreitner, 1975).

As will be discussed below, the evidence for Locke's approach to performance and goal difficulty seems to be strong. There are counter predictions, but few if any attempts have been made to study counter views within the same experimental setting. Also, as will be pointed out, there remain several areas of concern with Locke's approach to the issues.

A major competitor to goal setting as a theory of work motivation is expectancy theory. Expectancy theory grew out of the path-goal theory of Georgopolous, Mahoney, and Jones (1957) which Vroom (1964) developed into expectancy theory. Significant modifications have since been made by Lawler and Porter (1967) and Campbell, Dunnette, Lawler, and Weick (1970). While goal setting theory would predict a positive relationship

between effort and goal difficulty, expectancy theory would seem to predict the opposite (see Landy and Trumbo, 1980, p. 368).

In this paper specific research on goal setting will be highlighted and major issues discussed begining with attempts to define goals as a concept. As with all theories of motivation, goal setting must explain people's willingness to expend effort, direction of the effort, and persistence in the task. Another prevailing set of issues has been the effects of feedback and participation. Finally, the effect of expectation of success and the value a person places on goal attainment have begun to garner more research time and effort. Expectation and values will be studied using an expectancy theory framework.

The Concept of Goal Setting

A variety of definitions of goals have been put forth; goals can be conceptualized as future states of desired affairs (Etzioni, 1964; Vroom, 1960), constraints placed on present and future behavior as a result of past and present decisions and committments (Cyert & March, 1963; Simon, 1964), and "what an individual is trying to accomplish; it is the object or aim of an action" (Locke et. al., 1981). Goals are similar in meaning to the concepts of purpose, intent, performance standard, quota, work norm, task, objective, deadline, and budget.

Locke et. al.'s (1981) goal setting theory has assumed that goals are regulators of human action. The correspondence between goals and actions is not one-to-one because people may

make errors, lack the ability to attain their objectives (Locke, 1968), or have subconscious conflicts or premises which subvert their conscious goals.

Goal setting is often applied in organizations through management by objectives (MBO) programs. "MBO is the process through which employees of an organization, working together, identify common objectives or goals and coordinate their efforts toward goal attainment" (Luthans and Kreitner, 1975).

For the purposes of this study, it will not be necessary to go into all of the possible definitions of a goal. Rather it will be sufficient to adopt the following rather broad definition: a goal is an objective or outcome toward which effort (performance) is directed.

Motivation

The concept of motivation is used to explain the vigor (effort), direction, and persistence of action (Atkinson, 1964). Goal setting, as a theory of motivation, offers an explanation for all three. Increasing effort is required with increasingly difficult goals, effort is directed toward the actions which lead to the goal, and action persists over time until the goal is reached (most goals have some time limits or bounds).

Each of these concepts is discussed in detail below.

Effort

Locke et. al. (1981) state: "Since different (levels of)

goals may require different amounts of effort, effort is mobilized simultaneously with direction in proportion to the perceived requirements of the goal or task." Kahneman (1973) and Shapira (Note 2) have suggested that more effort is expended on hard tasks (which are accepted) than on easy tasks. Sales (1970) found higher work loads produced higher output per unit time than lower work loads. Latham and Locke (1975) and Bassett (1979) found people worked faster under shorter time limits than under longer time limits. Also higher goals produced higher performance than lower goals or no goals because people simply work harder for the former (Locke, 1968; Terborg, 1976; Terborg and Miller, 1978). The more difficult the goal, the more effort must be expended to reach it and increased effort generally leads to increased performance. This proposition has led to a large body of research on the relation between goal difficulty and performance.

In his initial work, Locke (1968) found evidence for a positive, linear relation between goal difficulty and task performance. In other words, as people are given more difficult goals they tend to produce at a higher level. Presumably this function tails off at some point, but it seems to hold over a fairly wide range of goal difficulties. Three experimental field studies have demonstrated that harder goals lead to better performance than easy goals: Latham and Locke (1975) with logging crews; Yukl and Latham (1978) with typists; and a simulated field study by Bassett (1979).

Twenty-five experimental laboratory studies have obtained similar results with a wide variety of tasks: Bavelas (1978) with a figure-selection task; Bavelas and Lee (1978) in five of

six experiments involving brainstorming, figure selection, and sum estimation tasks; Campbell and Ilgen (1976) with chess; Hannan (Note 3) with a coding (credit applications) task; Laporte and Nath (1976) with prose learning; Latham and Saari (1979) with brainstorming; Locke and Bryan (1969b) with simple addition; Locke, Cartledge, and Knerr (1970) in four studies, three with reaction time and one with simple addition; Locke, Mento, and ∧atcher (1978) with perceptual speed; London and Oldham (1976) with card sorting; Masters, Furman, and Barden (1977) in two studies of 4 and 5-year-old children working on a color discrimination task; Mento, Cartledge, and Locke (1980) in two experiments using a perceptual speed task; Rothkopf and Billington (1975) and Rothkopf and Kaplan (1972) in more complex prose-learning studies than those of Laporte and Nath (1976); and Sales (1970), using anagrams. Ness and Patton (1979) found that a harder task led to better weight-lifting performance when subjects were deceived as to the actual weights.

Four experimental studies provided partial support for a positive relation between goal difficulty and performance, with one subsample of the subjects in the experiment or for one of several experimental treatments or criteria showing the predicted relationship. Becker (1978) with an energy conservation task, Erez (1977) with a clerical task, and Strang, Lawrence, and Fowler (1978) with a computation task all found that subjects who had high goals and who received feedback regarding their performance in relation to those goals performed better than subjects with low goals.

Six experimental laboratory studies have found no relation

between goal level and task performance. These are: Bavelas and Lee (1978) with an addition task; Frost and Mahoney (1976) with a jigsaw puzzle task; Oldham (1975) with a time sheet computation task; Organ (1977) using an anagram task; Motowildo, Loehr, and Dunnette (1978) using a complex computation task; and Forward and Zander (1971) on a team-coding task.

Fifteen correlational studies have lent some support to the experimental studies finding a positive relation between goal difficulty and task performance. Andrews and Farris (1972) found that time pressure was associated with high performance among engineers. Hall and Lawler (1971), with a similar sample, found no relation between time pressure and performance but found a significant relation between both quality and financial pressure (implied goals?) and work performance. Ashworth and Mobley (Note 4) found a significant relation between performance goal level and training performance for Marine recruits. Blumenfeld and Leidy (1969), in a field experiment, found that soft-drink servicemen who were assigned higher goals serviced more machines than those assigned lower goals. Hamner and Harnett (1974) found that subjects in an experimental study of bargaining who expected to earn a high amount of money earned more than those who expected to earn less. Locke et al. (1970), in the last of their five studies, found a significant correlation between grade goals on an hourly exam and actual grade earned.

Other correlational studies found only a conditional positive relationship between goal difficulty and performance and/or effort. Carroll and Tosi (1970) found a positive

relation only for managers who were mature and high in self assurance; Dachler and Mobley (1973) found it only for production workers (in two plants) with long tenure (1 or 2 years or more); Dossett, Latham, and Mitchell (1979), found it in two studies of clerical personnel, but only for those who set goals participatively; Hall and Hall (1976) found it for the class performance of second through fourth grade students in high-support schools; and Ivancevich and McMahon (1977a, 1977b ,1977c) found it for skilled technicians who had higher order need strength, were white, and had higher levels of education. Negative results were obtained by Forward and Zander (1971) with United Fund campaign workers, Hall and Foster (1977) with participants in a simulated management game, and Steers (1975) with first level supervisors.

One problem with this research becomes apparent, however, in reviewing these studies; the vague definition (and corresponding operationalization) of goal difficulty. Locke et. al. (1981) say that a high difficulty goal should be one that requires a high degree of effort to attain and which many people do not attain, but they do not specify any values (what is high) for this parameter. The common procedure has been to give a pretest to a group of subjects and then set the goal difficulty levels based on the performances of the pretest scores.

If you asked all players on a basketball team to try to score individually the team average of 10 points per game, the goal would be very easy for a player who averages 15 points per game and very difficult for a player who averages 5 points per game. On the other hand, if you assigned each player a goal of

scoring 25% more points than his or her average, the goal would be of approximately equal difficulty for all players. Potentially these two methods of setting goals have different effects on performance. One would expect that setting a goal which is challenging to everyone would yield higher performance than a goal which varies in difficulty from easy to impossible for given individuals.

Direction

In a study by Locke and Bryan (1969a), drivers were given feedback regarding five different dimensions of driving performance but were assigned goals with respect to only one dimension. The dimension for which a goal was assigned showed significantly more improvement than the remaining dimensions. Locke et. al. (1970) found that subjects modified their speed of reaction (to make it faster or slower) on a simple reaction-time task in the direction of their overall objective. Reynolds, Standiford, and Anderson (1979) found that subjects spent more time reading prose passages which were relevant to their goals than to reading parts which were not relevant. Terborg (1976) found that subjects with specific goals spent a greater percentage of the time looking at the text material to be learned than did subjects with nonspecific goals or no goals. Rothkopf and Billington (1979) found that subjects with specific learning goals, as compared with subjects with no specific learning goals (do-your-best instructions) spent an equal or greater amount of time inspecting passages with goal relevant material and significantly less time looking at

incidental passages.

These studies indicate that goals can serve to direct attention towrd a specific task or stimulus. The dimension on which goals are set is where the payoff is.

In order for a goal to successfully direct attention and action it must be specific.

Locke (1968) found that specific and challenging (difficult) goals led to higher output than vague goals such as "do your best". Subsequent research has supported these results and also has found no difference between the performance of groups asked to "do your best" and groups not assigned a goal. It appears that no goal subjects typically do as well as they can on the assigned task probably due to the demand characteristics present in most experimental situations.

Locke et. al. (1981) reviewed 53 studies investigating the effects of specific goals. From this review they concluded that the superiority of specific goals over vague or general ones is well supported. People seem to perform better when they know exactly what they are supposed to accomplish. The experimental evidence concerning goal attributes seems, on the face of it, to support Locke's contention that specific, difficult goals produce higher performance than less difficult or less specific goals.

It is apparent that while goals can be established on only one dimension (e.g. improve the number of units in x time) the world often requires more complex behaviors from workers with either complex feedback and/or complex goals being offered and demanded. And while both the effort and directive functions of goals have been shown, they have rarely been applied outside of

a time bound function.

Persistence

Persistence is directed effort over time (Locke et. al., 1981). Most laboratory experiments have time limits which make it difficult to study persistence and field studies to date have measured only the end results of goal setting rather than how they were obtained. LaPorte and Nath (1976) allowed some subjects unlimited time to read a prose passage. Those asked to read the passage to get 90% of 20 postreading questions correct spent more time on the passage than subjects asked to get 25% of the postreading questions correct. Rothkopf and Billington (1979) found that more time was spent on goal relevant than on incidental passages. The limited evidence available indicates that higher goals result in greater persistence. If a goal is more difficult, it may take longer to attain it and people will generally be willing to spend the extra time at the task. More research is needed to study the interactive effects of persistence and difficulty and persistence and direction.

In summary, the available research suggests that difficult goals lead people to expend more effort for a greater length of time and this effort is directed toward actions which are most likely to lead to goal attainment. These three concepts (effort, direction, and persistence) are general mechanisms, another more specific mechanism has been studied in the context of goal setting; strategy development.

Strategy Development

In addition to direction, effort, and persistence, goals may be attained by using more efficient strategies. Whereas the first three mechanisms are relatively direct in their effects, this last mechanism is indirect. It involves developing strategies or action plans for attaining one's goals. This involves skill development or creative problem solving.

Bandura and Simon (1977) found that dieting subjects with specific quotas for number of mouthfuls eaten changed their eating patterns (e.g., by eating more low-calorie foods which did not count in their quotas). They also engaged in more planning (e.g., by saving part of their quotas for a dinner out). Similarly, Latham and Baldes (1975) found that truck drivers assigned specific hard goals with respect to truck weight recommended minor modifications of their trucks to help them increase the accuracy of their judgements of weight.

Terborg (1976) found that subjects who set specific goals were more likely to employ relevant learning strategies (e.g., writing notes in the margins) than those who did not set goals. Separate measures of direction of effort and statey use were obtained. When these mechanisms were partialled out, there was no relation between goals and task performance.

Kolb and Bayatzis (1970) found that behavioral changes in a T-group were greatest for participants who developed plans for evaluating their performance in relation to their goals. Evidently such plans were developed only for behavior dimensions which the subjects were trying to change.

Bavelas and Lee (1978) made detailed analyses in three

experiments to determine the strategies subjects used to attain hard goals. They found that subjects would frequently redefine the task in a way which would permit them to give "looser" or lower quality answers. For example, subjects asked to list very large numbers of "white, hard, edible objects" were more likely to list objects which were white but not very hard or hard but not very edible than were subjects given easier goals.

Subjects given hard goals in Rosswork's (1977) study simply wrote shorter sentences to meet their quota, which was expressed in terms of total sentences written. The subjects in Sale's (1970) study who were given a high work load made more errors, presumably by lowering their standards, than those given a low work load. Christensen-Szalanski (1980) found that subjects who were given a short time limit in problem solving used less complex and less adequate strategies than subjects given a longer time limit.

It would seem that subjects can increase performance by working harder, working smarter (using different strategies), or by some combination of the two. Another possibility which researchers have not investigated is that people may cheat or try to "beat the system" in order to attain the goal. This strategy would come as no surprise to supervisors. While all of the above factors have been found to be important in improving performance, they are only effective when people have information on how they are performing relative to the goal.

Knowledge of Results (Feedback)

Early in goal setting research, studies were performed to

separate the effects of goal setting and knowledge of results, also known as feedback. The question was: is the positive relation between goal difficulty and performance due to the goals themselves or goals in combination with feedback?

Locke et. al. (1981) reviewed nine studies investigating the effect of feedback on performance. These studies indicated that both goals and knowledge of results (feedback) were necessary to improve performance. Feedback, by letting people know how they are performing relative to the goal, increases the likelihood that they will reach the goal.

What researchers have not investigated is whether feedback can serve as a distractor as well as its focusing role. It has been shown that goals direct attention, but it is possible that feedback can also serve this purpose. It would seem likely that, if feedback is given on performance dimensions on which goals have not been set, people may try to improve their performance on these dimensions regardless of their relevance to the established goals. Feedback in the "real world" is frequently complex, that is, it often concerns several dimensions of performance not all of which may be related to established goals.

Attitudinal Factors

A variety of attitudinal fctors have been linked with goal setting including participation, acceptance, expectations of success, and values.

Participation and Acceptance

Although participation has long been recommended by social scientists as a means of obtaining employee commitment to organizational goals and of reducing resistance to change (Bandura and Walters, 1963), an extensive review of the participation in decision-making literature by Locke and Schweiger (1979) found no consistent difference in the effectiveness of top-down (autocratic) decision making and decisions made with subordinate participation. Several of the studies reviewed involved goal setting.

Locke et. al. (1981) review a number of studies dealing with participation in goal setting. In general the studies found few consistent differences in task performance between assigned and participatively set goal groups. Goals typically are accepted (there is a high level of committment) both when a goal is assigned and when participation is allowed. This indicates that participation in goal setting has not been found to be a critical factor in implementation of a goal setting system.

Expectations of Success

Other things being equal, individuals are more likely to accept or choose a given goal when they have high rather than low expectations of reaching it (Mento et. al., 1980). Such expectations evidently stem from self-perceptions about ability on the task in question (Mento et al., 1980). Presumably these

perceptions are inferences from past performance. Past performance has consistently been found to predict future goals (Cummings, Schwab, and Rosen, 1971; Lopes, 1976; Wilsted & Hand, 1974; Ashworth & Mobley, Note 4). Individuals are more likely to become more confident and set higher goals after success and to become less confident and set lower goals after failure (Lewin, 1958), although failure may lead to higher goals in pressure situations (Forward & Zander, 1971; Zander, Forward & Albert, 1969) or even due to self-induced pressure (Hilgard, 1958).

The concept of expectation of success ties in with the issues of goal difficulty and goal acceptance discussed earlier. The more difficult a goal is, the lower the expectation of success should be, but, as was shown earlier, even very difficult goals are generally accepted. Thus expectation of success does not seem to be a crucial variable in goal setting.

Values

When the perceived value of attaining or trying for a goal is higher, the goal is more likely to be accepted than when the perceived value is low (Mento et al., 1980). The valued outcomes involved may range from intrinsic rewards like the pleasure of acheivement to extrinsic rewards following performance, such as money, recognition, and promotion. Incentives, discussed earlier, are extrinsic rewards and have value. Instrumentality is the belief that goal acceptance or goal attainment will lead to value attainment. Theoretically,

goal choice and goal acceptance should be predictable from the expectancies, values, and instrumentalities the subject holds with regard to the various choices (Dachler & Mobley, 1973).

External factors such as rewards and pressures presumably affect the individual through their effects on expectancies, instrumentalities, and values or valences. Pressure has played an important role in the goal setting literature. Ronan, Latham, and Kinne (1973) found that goal setting among woods workers was only effective when the supervisor stayed on the job with the employees. The mere precense of the supervisor could be considered a form of pressure in this context. In the studies by Forward and Zander (1971) and Zander et al. (1969), competitive or community pressures led to setting goals that were unrealistically high.

Although pressure is something that social scientists have generally been against (Locke et. al., 1981), Hall and Lawler (1971) argued that if used appropriately (e.g., by combining it with responsibility), it can facilitate both high commitment and high performance. Pressure, of course, can also be self-imposed as in the case of the type A personality who appears to be a compulsive goal achiever (Friedman & Rosenman, 1974) or the high need achiever who seems to try too hard in difficult situations (Atkinson, 1957). Attitudinal factors therefore can be seen to play a major role in one of goal setting's major competitors as a theory of work motivation: expectancy theory.

Expectancy Theory

Another way of conceptualizing motivation is in terms of expectancy theory or a concern with the internal attitudes and concerns of the individual. Expectancy theory grew out of the early work of Georgopoulous, Mahoney, and Jones (1957) on what they called Path-Goal theory. The first explicit theoretical formulation of expectancy theory was made by Victor Vroom in Work and Motivation (Vroom, 1964). Mitchell (1974) provides an excellent review of the development of expectancy theory. This theory makes predictions based on the expectations of success and values discussed above.

The individual's expectancy is defined by Vroom as his/her belief concerning the probability that the behavior in question will lead to the outcome of interest. An expectancy is a perceived probability and, therefore, ranges from zero to plus one. It is distinguished from instrumentality in that it is an action-outcome association, while instrumentality is an outcome-outcome association. While expectancies are perceived probabilities, instrumentalities are perceived correlations. In practice, however, both are generally measured as probabilities since people have a better feel for probabilities than correlations.

Galbraith and Cummings (1967) extended Vroom's model. They attempted to test empirically a distinction (first made by Vroom, 1964; then later by Lawler and Porter, 1967) between first- and second-level outcomes. A first-level outcome is one that has a valence which the investigator is interested in predicting. They defined second-level outcomes as events to

which the first level outcomes are expected to lead. The equation for this model is:

$$W = E\left(\sum_{j=1}^{n} I_{ij} V_j\right),$$

where

W=effort;

E=the expectancy that effort leads to performance;

I_{ij} =the instrumentality of performance for the attainment of second-level outcomes;

V_j=the valence of the second-level outcome;

n=the number of outcomes.

Effort is being predicted from the expectancy that a given level of effort leads to a given level of performance weighted by the valence of that performance level. The valence of this performance level is then determined by examining the degree to which it is instrumental for the attainment of second-level outcomes weighted in turn by their valence.

A modification of the expectancy theory was presented by Campbell, Dunnette, Lawler, and Weick (1970). Figure 1 presents their model. These authors state more exactly the nature of task goals for which the individual is seen as striving to attain. They divide these goals into external task goals, which are set by the employer or work group, and internal task goals, which the individual sets for himself. As was pointed out earlier, however, individuals usually accept the goals assigned to them. This would mean that the internal task goals would be
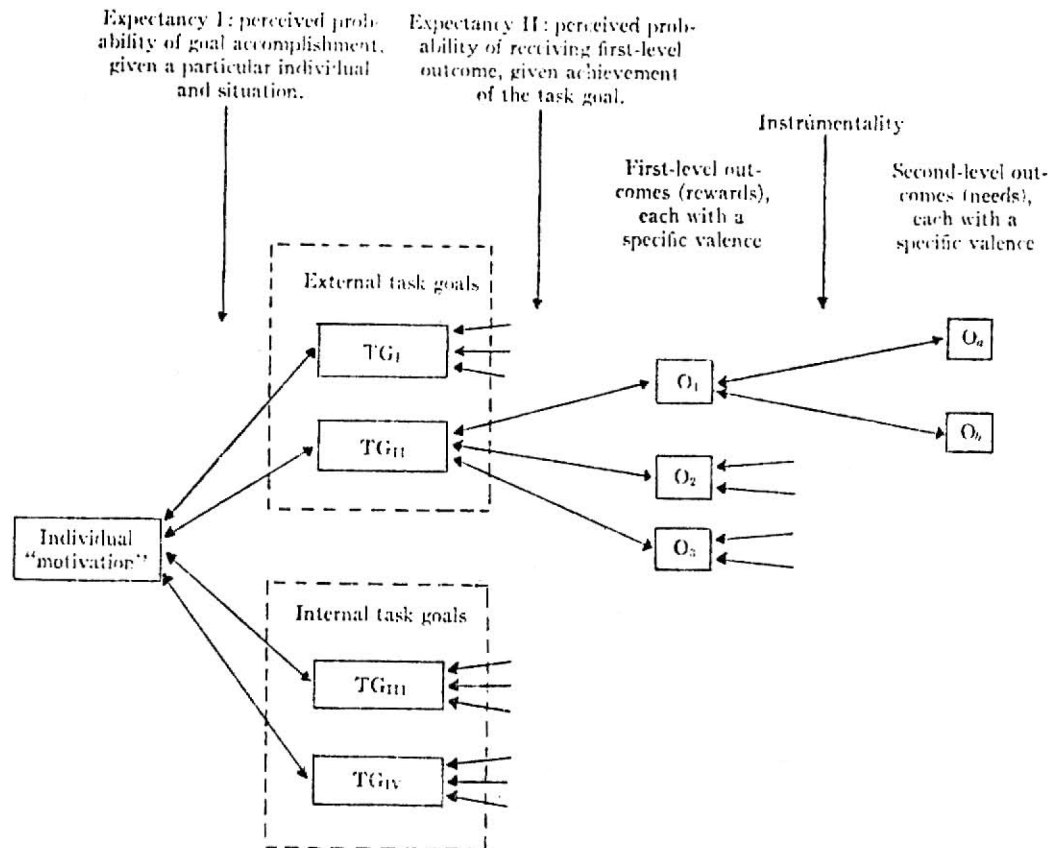
Figure 1. A schematic representation of a hybrid expectancy model of work motivation, outlining the determinants of the direction, amplitude, and persistence of individual effort (Campbell, Dunnette, Lawler & Weick, 1970).

the same as the external task goals which allows expectancy theory to be tested within a goal setting framework. They also divide the original expectancy term into two terms; E(I) where behavior leads to task goals and E(II) where task goals lead to rewards.

W=E(I)E(II)(IV)

where

W=effort.

E(I)=the expectancy that effort will result in meeting the goal.

E(II)=the expectancy that meeting the goal will lead to attainment of the first order outcome.

I=the instrumentality of first-order outcomes leading to second-order outcomes.

V=the valence of the second-order outcomes.

A diagram of this model is presented in Figure 1.

Mitchell (1974) in a review of the literature on expectancy theory concludes "competitive tests of the theory provide mixed support" and "few theorists have tested accurate representations of Vroom's model". More recent research has similarly suffered from methodological problems and mixed results. The Campbell et. al. hybrid expectancy model has not yet been empirically tested.

According to expectancy theory, as goal difficulty increases, the expectancy of meeting the goal (E(I)) decreases. This causes expectancy theory to predict a negative relationship between goal difficulty and effort. As the goal becomes more difficult, people see less chance of achieving it and therefore don't try as hard.

The seemingly contradictory predictions of goal setting and expectancy theories may be due to the way each theory conceptualizes and measures performance and goal difficulties. Also the range of difficulties studied may contribute to the seeming contradiction.

In tests of goal setting theory, performance is usually measured as quantity of output (e.g. number of units produced). In tests of expectancy theory, on the other hand, effort is typically measured by means of ratings made by the subjects of their internal psychological states (expectancies, instrumentalities, and valences).

In the typical experimental situation for goal setting research, subjects may have only a limited basis for judging the difficulty of meeting a particular goal that has been assigned to them. They have not performed the task before and have no context in which to judge the difficulty of the goal so they assume that the goal they have been assigned is a reasonable one and this will influence their perception of the task. The results of Motowidlo et al. (1978) lend support to this hypothesis.

If the difficulty of the goal (expectancy of success) cannot be accurately judged by the subject, expectancy theory would predict no relation between goal difficulty and effort. It is only if the goal is extremely difficult that the subject perceives that the goal is difficult and an expectancy theory prediction of a negative relation between goal difficulty and effort would occur. Locke also says that, if the difficulty of the goal is extreme enough, people seem to "give up" and the relation between goal difficulty and performance begins to

slope downward. Thus the differences in the predictions of goal setting and expectancy theories may simply be differences in definition of goal difficulty.

Purposes of the present study

As discussed earlier, strong support has been found for the positive relationship between performance and goal difficulty. That finding is expected to be replicated in this study.

Hypothesis #1: The relationship between goal difficulty and performance (quantity) is positive when specific goals are set and performance is measured objectively.

The world generally provides feedback and expects changes on more than one aspect of performance. Feedback may serve to direct peoples' attention toward the aspects of performance which are most important. If a foreman tells a worker the number of errors he or she has made, the worker will naturally assume that errors are an important performance dimension and he or she will probably direct effort toward reducing errors. However, the greater the number of dimensions toward which effort is directed, the less effort can be expended on any individual dimension.

Hypothesis #2: Providing feedback on two performance dimensions (quantity and quality) will decrease performance on the first dimension (quantity) and increase performance on the second

dimension (quality) when compared to a group with feedback only on the first dimension when goals are set on a quantity measure of performance.

Providing feedback on the quality of performance should direct a person's attention and concern toward the quality of their performance and somewhat away from the quantity of performance.

Hypothesis #3: Subjects given feedback on both quantity and quality of performance will be less concerned with quantity of performance than subjects given feedback only on quantity of performance.

Hypothesis #4: Subjects given feedback on both quantity and quality of performance will be more concerned with quality of performance than subjects given feedback only on quantity of performance.

As was discussed earlier, people seem to be unable to judge the difficulty of a goal on a task they are unfamiliar with.

Hypothesis #5: There will be no difference in perceived difficulty across goal difficulty conditions.

It would seem likely that, if people cannot judge the difficulty of a goal, they will not know how satisfied to be with their performance toward that goal.

Hypothesis #6: There will be no difference in satisfaction with performance across goal difficulty conditions.

It is possible for the subjects to answer questions through the use of strategies whereby the correct answer can be chosen without having to add up all of the numbers. Subjects in the higher goal difficulty conditions would seem to have greater incentive to use strategies since their goals are very difficult, perhaps even impossible, to reach by increasing effort.

Hypothesis #7: There will be a main effect for goal difficulty on the number of subjects using strategies.

METHOD

PRETEST

A pretest with 11 subjects was conducted prior to the main experiment. The task and procedures were the same as the main experiment. The performance of the subjects in this pretest ($\bar{X}$=34.6 problems) was used to determine the goal levels used in the main experiment.

SUBJECTS

Subjects were 80 general psychology students participating for course credit. In order to increase the homogeneity of the group, participation was limited to subjects between the ages of 18 and 20.

TASK

Subjects performed a simple addition task in which they added three 2-digit numbers together and then chose the correct answer from among four options. An example is given below:

62

76

23

--

Sum=

Place a check ($\checkmark$) next to the correct answer.

(a) 187

(b) 161

(c) 67

(d) 281

The answer options were generated according to the following set of rules: (1) one answer was correct, (2) one answer was four times the tens digit of the largest number in the problem followed by the ones digit the same as the correct answer, (3) two more answers were three times the tens digit of the lowest and middle numbers in the problem with the ones digit randomly generated (the correct digit was excluded), and (4) these answer choices were randomly presented with equal numbers of choices (a) to (d).

The problems were designed so that the questions could be answered more quickly through the use of strategies. By adding up the "ones" column in the problem (2+6+3=11), the subject knows that the correct answer must end with a one. This eliminates two of the options. One of the remaining two options can be eliminated because it is obviously too high. Thus, by discovering appropriate strategies, subjects were able to answer the questions without actually adding up all of the numbers.

Subjects could also "cheat" to reach the goal. Goals were set on the number of problems answered so that answering randomly would allow a subject to meet the goal.

The stimulus materials and instructions can be found in Appendix A.

PROCEDURE

Subjects were randomly assigned to one of eight combinations of two independent factors. The two factors were: goal difficulty and complexity of feedback.

There were four levels of goal difficulty representing 15%, 30%, 45% and 60% increases in performance above the average level of performance obtained by the subjects in the pretest.

The second condition was complexity of feedback. Half of the subjects were in the simple feedback condition and received feedback on the total number of problems completed (quantity of output) while the other half were in the complex feedback condition and received feedback on both the number of problems completed and the number of errors made (quality of output).

Subjects in both conditions could see how many problems they completed since each problem on their answer sheet was numbered. Subjects in the complex feedback condition had their papers scored and returned so they knew how many errors they had made. Subjects in the simple feedback condition did not have their papers scored during the time they participated in the experiment.

Subjects were told that they would receive $2 in coupons redeemable for a meal at McDonald's if they reached the goal.

In the following description of the procedures, it may be helpful to refer to the hybrid expectancy model in Figure 1.

The specific questions asked of subjects may be found in Appendix B.

There were three trials of five minutes duration each. The

first trial was a baseline and gave the subjects a chance to become accustomed to the task. For the second and third trials, subjects were assigned a goal.

At the end of each trial, subjects were asked the degree to which they were concerned about speed and errors. Subjects were also asked how satisfied they were with their performance and how difficult they perceived the task to be.

A variety of procedures were used to quantify the variables in the expectancy model. Before beginning the second and third trials, subjects were asked to judge the probability of meeting the goal. The response to this question is expectancy (I) in the hybrid expectancy model. Expectancy (II) was measured by asking subjects, after the last trial, how likely they thought it was that they would receive the incentive. Instrumentality and valence were measured at the end of the first trial. Instrumentality was measured by asking subjects how likely they thought it was that they would use the coupon if they earned one. Valence (II) was measured by asking subjects how well they like to eat at McDonald's. Internal task goals were measured by asking subjects, after the first trial, how many comparisons they believed they would be able to complete on the second trial.

Analysis

Initially, 4 x 2 x 2 (goal difficulty by feedback by trials) repeated measures ANOVA's were run. Since the trial factor did not interact with other independent variables, a decision was made to average across the two experimental trials.

After the initial analyses determined that there was little if any goal difficulty effect, goal difficulty was redefined as percent improvement over baseline performance (goal challenge). This adjustment was made both to compensate for differences in group performance on the baseline and to represent goals established for an individual rather than a group.

Two by four ANOVA's (feedback by goal difficulty or goal challenge) were run for the following dependent measures: quantity of performance, quality of performance, concern with speed, concern with quality, perceived difficulty, satisfaction, use of strategy, performance expectation, and effort.

Since subjects who discovered the strategy tended to do much better on the task than those who did not, additional analyses were performed to investigate this effect. Two by two by four ANOVA's (strategy by feedback by goal challenge) were performed using a regression approach since block size varied greatly. Descriptive statistics were also computed for all variables.

RESULTS

Analyses were first conducted using a repeated measures approach. There were trials main effects on the performance measures (indicating learning or practice effects), but trials generally did not interact with the independent variables. In subsequent analyses, measures for the two experimental trials were averaged in order to get a more stable measure of performance.

The demographic questions asked on the questionnaire (gender, employment history, math skills) were not found to be significantly related to performance (quantity or quality).

Table 1 shows the overall means and standard deviations for the variables of interest in this study. The correlation between the variables can be found in Appendix C.

It became immediately obvious in analyzing the results of this study that there were large individual differences in the math ability of the subjects and that random assignment had not totally succeeded in producing treatment groups which were equivalent in basic math skills. There was a main effect for goal difficulty, $F(3,71)=2.76$, $p<.05$, on the number of problems solved during the baseline trial (before any experimental manipulations had been introduced). No effects of complexity of feedback or goal difficulty by feedback interactions were found (see Table 2).

An analysis of covariance, using baseline performance as a covariate, allowed the variance due to math ability to be removed from the dependent measure. This analysis showed no

Table 1

Means and Standard Deviations for Dependent Measures

	mean	std. dev.
increase in quantity of performance over baseline	1.24	0.17
errors per trial	0.28	0.54
satisfaction with performance	4.86	1.32
difficulty of reaching the goal	3.42	1.44
concern with speed	3.83	0.89
concern with quality	3.87	1.00
effort	24.35	34.84

Table 2

Quantity of Performance on Baseline

a - Means

		Goal Difficulty				
		1	2	3	4	row mean
Feedback	Simple	37.5	38.3	31.0	36.8	35.9
	Complex	36.2	39.9	36.8	44.2	39.3
	column mean	36.9	39.1	33.9	40.5	37.6

b - Analysis of Variance Summary

	df	MS	F	p
Goal Difficulty (D)	3	166.08	2.76	<.05
Feedback (F)	1	227.08	3.79	ns
D x F	3	78.47	1.30	ns
Error	72	60.17		

significant performance effects (see Table 3).

Using the number of problems answered during the baseline as a covariate removed the variance due to ability, but did not make up for a potential confounding of goal difficulty due to initial differences in performance. For example, subjects in goal difficulty condition 3 (moderately hard) had a goal of 50 problems and an average performance of 33.9 problems on the baseline so they were asked to increase their performance by an average of 16.1 problems. Subjects in goal difficulty condition 4 (hard) had a goal of 55 problems and an average baseline performance of 40.5 problems so they were asked to increase their performance by an average of 14.5 problems. Therefore, even though the fourth goal difficulty condition was more difficult than the third in an absolute sense, it would appear that differences in the ability of subjects in each group resulted in goal difficulty condition 3 being relatively more difficult than condition 4.

One way to get around this confound is to define goal difficulty in terms of individual ability, rather than as the absolute level of performance requested. This new variable could be looked at as the increase in performance requested, however, the simple value of the increase does not seem to be a totally valid measure either. It seems likely that it is more difficult for a person who solves 35 problems during the baseline to increase his performance by 5 problems than it would be for a person who solved 50 problems during the baseline. The most representative way of defining goal difficulty would seem to be in terms of the percentage improvement over baseline performance which the goal

Table 3

Quantity of Performance with Baseline Performance as a Covariate

a - Means

		Goal Challenge				
		1	2	3	4	row mean
Feedback	Simple	46.80	48.40	40.60	45.30	45.27
	Complex	43.75	46.75	44.75	52.70	46.99
column mean		45.27	47.57	42.67	49.00	46.13

b - Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	0.26	0.01	ns
Feedback (F)	1	47.46	1.36	ns
C x F	3	9.93	0.29	ns
Error	72	34.90		

represents.

This approach looks at the difficulty of reaching the goal for each individual rather than the more traditional method of classifying goal difficulty as the average difficulty of meeting the goal for all the members of a group.

For the purposes of analysis, the subjects were broken into four equal groups. The percentage increase over baseline performance which the goal represented for each of these groups was: <6%, 6%-20%, 21%-50%, and 50%>. These levels will be referred to as levels of goal challenge to differentiate them from the earlier conceptualization of goal difficulty levels. The relationship between membership in the goal difficulty and goal challenge groups is shown in Table 4. The correlation was .40 with few subjects moving more than one level away from their original condition. The relationships among other variables are shown in Appendix C.

PERFORMANCE MEASURES

Quantity

An ANOVA on the increase in quantity of performance using goal challenge as an independent variable showed no significant effects (see Table 5).

Ability (measured by baseline performance) accounted for 81% of the variance in the increase in quantity of performance indicating that ability rather than effort was the major determinant of performance.

These results do not support hypothesis #1 (a positive

Table 4

Subject Assignment by Goal Challenge and Goal Difficulty

		Goal Challenge				row total
		1	2	3	4	
	1	40%	30%	25%	5%	100%
Goal	2	30%	45%	15%	10%	100%
Difficulty	3	10%	5%	35%	50%	100%
	4	20%	10%	30%	40%	100%
column total		25%	23%	26%	26%	100%

$\chi^2(9)=25.97$, $\underline{p}<.01$
$\underline{C}=.50$
$\underline{r}(78)=.40$, $\underline{p}<.0001$

Table 5

Quantity of Performance after Goals were set

a - Means

		Goal Challenge				
		1	2	3	4	row mean
Feedback	Simple	121.0	120.2	134.4	131.9	127.3
	Complex	115.3	123.9	117.2	133.3	121.0
	column mean	117.9	122.1	123.7	132.4	124.2

b - Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	636.24	2.09	ns
Feedback (F)	1	425.82	1.40	ns
C x F	3	424.13	1.39	ns
Error	72	304.46		

relation between goal difficulty and task performance). It indicates that task performance does not vary with goal difficulty (or goal challenge) under the conditions present in this study.

Quality

The second hypothesis predicted that subjects in the complex feedback condition would answer fewer problems and make fewer errors. The lack of a feedback effect on the quantity of performance dependent measure (see Tables 3 and 5) does not support the first half of this hypothesis. The second half of the hypothesis, however, was supported. Subjects in the complex feedback condition made significantly fewer errors than subjects in the simple feedback condition, for analyses using goal difficulty, $F(1,72)=6.93$, $p<.05$ (see Table 6), and using goal challenge, $F(1,72)=6.89$, $p<.05$ (see Table 7). This indicates that feedback about the number of errors being made did cause subjects to work at reducing errors. No other significant effects were found.

Hypothesis #2 predicted a tradeoff between the number of errors made and the number of problems answered. As indicated above, this interaction did not occur. An interaction was expected because of differential pressures on subjects in various groups to guess at answers to problems, but the very low error rates (grand mean of 0.27 errors per trial) indicated that few, if any, subjects made any guesses.

Table 6

Quality of Performance

a - Means

Goal Difficulty

		1	2	3	4	row mean
Feedback	Simple	0.30	0.80	0.15	0.45	0.42
	Complex	0.05	0.15	0.20	0.10	0.13
column mean		0.17	0.47	0.17	0.27	0.27

b - Analysis of Variance Summary

	df	MS	F	p
Goal Difficulty (D)	3	0.40	1.54	ns
Feedback (F)	1	1.80	6.93	<.01
D x F	3	0.42	1.60	ns
Error	72	0.26		

Table 7

Quality of Performance

a - Means

		Goal Challenge				
		1	2	3	4	row mean
Feedback	Simple	0.50	0.50	0.44	0.32	0.42
	Complex	0.14	0.22	0.12	0.00	0.13
column mean		0.30	0.36	0.24	0.21	0.27

b - Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	0.14	0.56	ns
Feedback (F)	1	1.98	6.89	<.01
C x F	3	0.01	0.02	ns
Error	72	0.29		

AFFECTIVE MEASURES

If feedback directs attention as hypothesized, these differences should show up in the affective measures as well as in the performance measures. A number of affective responses were measured, including: concern with speed, concern with quality, difficulty of reaching the goal, and satisfaction with performance.

Concern with Speed

Hypothesis #3 predicted that complex feedback would cause subjects to be less concerned with the speed at which they worked. This hypothesis was not supported for either the goal difficulty (see Table 8) or goal challenge analyses (see Table 9). No main effects or interactions were significant.

Concern with Quality

Subjects in the simple feedback condition indicated greater concern for the quality of their performance (errors) than subjects in the complex feedback condition in both the goal difficulty, $F(1,72)=7.20$, $p<.01$ (see Table 10), and goal challenge analyses, $F(1,72)=6.90$, $p<.05$ (see Table 11). This effect is opposite to the direction predicted in hypothesis #4 and is probably due to the feedback subjects received. Subjects in the complex feedback condition made an average of 0.13

Table 8

Speed Rating

a – Means

		Goal Difficulty				
		1	2	3	4	row mean
Feedback	Simple	4.07	3.73	3.70	4.27	3.94
	Complex	3.53	3.37	4.17	3.80	3.72
column mean		3.80	3.55	3.93	4.03	3.83

b – Analysis of Variance Summary

	df	MS	F	p
Goal Difficulty (D)	3	0.88	1.12	ns
Feedback (F)	1	1.01	1.30	ns
D x F	3	1.09	1.39	ns
Error	72	0.78		

Note: Ratings are on a scale of 1 to 5 with 5 indicating extreme concern with speed.

Table 9

Speed Rating

a – Means

		Goal Challenge 1	2	3	4	row mean
Feedback	Simple	4.19	3.63	3.88	4.02	3.94
	Complex	3.97	3.48	3.92	3.24	3.72
column mean		4.07	3.56	3.90	3.76	3.83

b – Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	1.03	1.29	ns
Feedback (F)	1	1.40	1.76	ns
C x F	3	0.61	0.77	ns
Error	72	0.79		

Note: Ratings are on a scale of 1 to 5 with 5 indicating extreme concern with speed.

Table 10

Quality Rating

a - Means

		Goal Difficulty				
		1	2	3	4	row mean
Feedback	Simple	3.97	3.57	4.40	4.77	4.17
	Complex	3.90	2.83	3.97	3.60	3.58
column mean		3.93	3.20	4.18	4.18	3.88

b - Analysis of Variance Summary

	df	MS	F	p
Goal Difficulty (D)	3	4.33	5.45	<.01
Feedback (F)	1	7.20	9.22	<.01
D x F	3	1.09	1.39	ns
Error	72	0.78		

Note: Ratings are on a scale of 1 to 5 with 5 indicating extreme concern for quality.

Table 11

Quality Rating

a – Means

| | | Goal Challenge | |
		1	2	3	4	row mean
Feedback	Simple	4.11	3.70	4.21	4.50	4.17
	Complex	3.27	3.48	3.90	3.57	3.58
	column mean	3.65	3.59	4.02	4.19	3.88

b – Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	1.38	1.49	ns
Feedback (F)	1	6.37	6.90	<.05
C x F	3	0.61	0.66	ns
Error	72	0.92		

Note: Ratings are on a scale of 1 to 5 with 5 indicating extreme concern for quality.

errors per trial. Thus, although subjects in the complex feedback condition, since they received feedback on errors, may have thought they should minimize errors, most subjects were told that they weren't making any errors. This information may have reduced their general level of concern about quality. Subjects in the simple feedback condition did not know how many errors they were making and may have assumed that they were making a larger number and therefore were more concerned.

There was also a main effect for goal difficulty on the concern for quality measure, $F(3,72)=5.45$, $p<.01$ (see Table 10). This effect washed out, however, in the goal challenge analysis (see Table 11). No other effects were significant.

Difficulty

Hypothesis #5 predicted that subjects would not be able to judge the difficulty of the task, but the baseline trial and the nature of the task (everyone has had experience in adding numbers) apparently gave subjects a context in which to judge the difficulty of reaching the goal.

There was a main effect for goal difficulty, $F(3,72)=8.64$, $p<.001$ (see Table 12), and for goal challenge, $F(3,72)=8.33$, $p<.001$ (see Table 13), on the difficulty rating measure with subjects accurately perceiving increases in difficulty or challenge of the goals. This result seems to indicate that defining goal difficulty in relative terms (goal challenge) is an accurate portrayal of the subjects' perception of the situation. No other effects were significant.

Table 12

Difficulty Rating

a - Means

		Goal Difficulty				
		1	2	3	4	row mean
Feedback	Simple	3.30	3.63	3.97	4.13	3.76
	Complex	3.17	3.37	4.10	4.03	3.67
	column mean	3.23	3.50	4.03	4.08	3.71

b - Analysis of Variance Summary

	df	MS	F	p
Goal Difficulty (D)	3	3.44	8.64	<.001
Feedback (F)	1	0.17	0.42	ns
D x F	3	0.14	0.35	ns
Error	72	0.40		

Note: Ratings are on a scale of 1 to 5 with 5 indicating extreme difficulty.

Table 13

Difficulty Rating

a - Means

| | | Goal Challenge | | | | |
		1	2	3	4	row mean
Feedback	Simple	3.00	3.89	3.71	4.19	3.76
	Complex	3.24	3.63	3.97	3.81	3.67
	column mean	3.13	3.76	3.87	4.06	3.71

b - Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	3.24	8.33	<.001
Feedback (F)	1	0.01	0.03	ns
C x F	3	0.54	1.38	ns
Error	72	0.39		

Note: Ratings are on a scale of 1 to 5 with 5 indicating extreme difficulty.

Satisfaction

Hypothesis #6 predicted that, if subjects were unable to judge the challenge of reaching the goal, they would not know how satisfied to be with their performance. Subjects were able to judge the challenge of the goal, however, and this affected their satisfaction. Subjects ratings of satisfaction with their performance decreased as the challenge of the goal increased, $F(3,72)=7.44$, $p<.001$ (see Table 14). As goals become increasingly challenging, fewer subjects reach the goal resulting in lower satisfaction with performance. The trend was the same in the goal difficulty analysis, but it was not significant (see Table 15). No other effects were significant.

Strategy

Hypothesis #7 predicted that more subjects would use strategies as goal difficulty (challenge) increased, but an analysis of the use of strategy showed no significant effects (see Table 16). Very few subjects made use of strategy which may indicate either the strategy was very difficult to discover or that subjects felt using the strategy would be cheating.

Performance Expectation

An analysis was performed on the increase over baseline performance which subjects expected to be able to attain. Locke (1968) said that goals have their effect, at least in part, by altering behavioral intentions. It would therefore be expected

Table 14

Satisfaction Rating

a – Means

| | | Goal Challenge | | | | |
		1	2	3	4	row mean
Feedback	Simple	4.44	4.11	4.04	3.69	4.02
	Complex	4.48	4.33	3.46	3.57	3.96
	column mean	4.47	4.22	3.68	3.65	3.99

b – Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	3.36	7.44	<.001
Feedback (F)	1	0.26	0.58	ns
C x F	3	0.57	1.26	ns
Error	72	0.45		

Note: Ratings are on a scale of 1 to 5 with 5 indicating that a person is very satisfied with his/her performance.

Table 15

Satisfaction Rating

a - Means

		Goal Difficulty				
		1	2	3	4	row mean
Feedback	Simple	4.00	4.36	3.87	3.90	4.02
	Complex	4.13	4.23	3.73	3.73	3.96
column mean		4.07	4.28	3.80	3.82	3.99

b - Analysis of Variance Summary

	df	MS	F	p
Goal Difficulty (D)	3	1.05	1.85	ns
Feedback (F)	1	0.09	0.16	ns
D x F	3	0.09	0.16	ns
Error	72	0.57		

Note: Ratings are on a scale of 1 to 5 with 5 indicating that a person is very satisfied with his/her performance.

Table 16

Strategy

a – Means

| | | Goal Challenge | | | | |
Feedback		1	2	3	4	row mean
Feedback	Simple	1.89	1.89	1.88	1.93	1.90
	Complex	2.00	1.78	1.77	1.71	1.82
column mean		1.95	1.83	1.81	1.86	1.86

b – Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	0.08	0.62	ns
Feedback (F)	1	0.11	0.92	ns
C x F	3	0.09	0.74	ns
Error	72	0.12		

Note: Subjects received a score of 1 if they used a strategy and 2 if they did not.

that goals should affect performance expectations (personal goals). This analysis showed no significant effects for goal difficulty (see Table 17), but a significant main effect for goal challenge, $F(3,72)=3.69$, $p<.05$ (see Table 18), with subjects in higher goal challenge conditions expecting to make greater improvements in performance. No other performance effects were significant.

Effort

Data was collected to test the expectancy model of motivation. This model predicts a negative relation between goal difficulty and effort.

There was no effect of effort as computed by the Campbell et. al. model on either goal difficulty (see Table 19) or goal challenge (see Table 20). ANOVA's run on each component of the model (EI, EII, I, and VII) (see Tables 21-24) showed that only EI varied with goal challenge, $F(3,72)=5.34$, $p<.01$. Subjects perceived less chance of reaching the goal as goal challenge increased. No other effects were significant in any of the analyses.

Inspection of the means in the effort analysis suggested that a relationship between goal difficulty (or challenge) and effort may exist, but was not significant because of very high within-cell variance (effort scores ranged from 1.5 to 200). A square root transformation was performed on effort scores to reduce the effect of some extreme scores and reduce the skew in the distribution. Again, the means suggested that a goal difficulty (or challenge) effect may exist, but there were no

Table 17

Improvement over Baseline Performance Expected by Subjects

a – Means

		Goal Difficulty				
		1	2	3	4	row mean
Feedback	Simple	1.04	1.16	1.31	1.14	1.16
	Complex	1.14	1.12	0.96	1.19	1.10
column mean		1.09	1.14	1.13	1.17	1.13

b – Analysis of Variance Summary

	df	MS	F	p
Goal Difficulty (D)	3	0.02	0.21	ns
Feedback (F)	1	0.07	0.69	ns
D x F	3	0.20	2.06	ns
Error	72	0.10		

Table 18

Improvement over Baseline Performance Expected by Subjects

a - Means

		Goal Challenge				
		1	2	3	4	row mean
Feedback	Simple	1.08	1.07	1.11	1.30	1.16
	Complex	1.06	1.01	1.05	1.38	1.10
column mean		1.07	1.04	1.07	1.33	1.13

b - Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	0.34	3.69	<.05
Feedback (F)	1	0.01	0.05	ns
C x F	3	0.02	0.22	ns
Error	72	0.09		

Table 19

Effort (Campbell et. al. model)

a - Means

		Goal Difficulty				
		1	2	3	4	row mean
Feedback	Simple	42.10	19.40	34.15	23.55	29.80
	Complex	21.25	13.00	22.75	13.70	17.67
column mean		31.67	16.20	28.45	18.63	23.74

b - Analysis of Variance Summary

	df	MS	F	p
Goal Difficulty (D)	3	1121.09	0.92	ns
Feedback (F)	1	2940.31	2.41	ns
D x F	3	191.00	0.16	ns
Error	72	1197.94		

Table 20

Effort (Campbell et. al. model)

a - Means

| | | Goal Challenge | | | | |
		1	2	3	4	row mean
Feedback	Simple	39.00	26.56	24.38	29.07	29.80
	Complex	6.18	20.06	13.88	39.71	17.67
	column mean	20.95	23.31	17.88	32.62	23.74

b - Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	522.88	0.44	ns
Feedback (F)	1	1973.38	1.66	ns
C x F	3	1540.55	1.30	ns
Error	72	1187.59		

Table 21

Expectancy I

a — Means

		Goal Challenge				
		1	2	3	4	row mean
Feedback	Simple	1.89	2.00	2.38	2.39	2.19
	Complex	1.82	1.89	2.31	2.43	2.10
	column mean	1.85	1.94	2.33	2.40	2.14

b — Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	1.51	5.34	$<.01$
Feedback (F)	1	0.05	0.19	ns
C x F	3	0.02	0.06	ns
Error	72	0.28		

Table 22

Expectancy II

a - Means

		Goal Challenge				
		1	2	3	4	row mean
Feedback	Simple	1.78	2.33	1.88	2.21	2.07
	Complex	1.18	2.44	1.46	1.86	1.67
column mean		1.45	2.39	1.62	2.10	1.88

b - Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	3.18	2.43	ns
Feedback (F)	1	1.99	1.45	ns
C x F	3	0.42	0.42	ns
Error	72	1.37		

Table 23

Instrumentality

a - Means

| | | Goal Challenge | | | | |
		1	2	3	4	row mean
Feedback	Simple	2.11	2.00	1.88	1.71	1.90
	Complex	1.36	1.78	1.62	2.57	1.75
column mean		1.70	1.89	1.71	2.00	1.82

b - Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	0.35	0.27	ns
Feedback (F)	1	0.21	0.16	ns
C x F	3	2.18	1.68	ns
Error	72	1.30		

Table 24

Valence II

a – Means

| | | Goal Challenge | | | | |
		1	2	3	4	row mean
Feedback	Simple	2.33	2.22	2.50	2.57	2.42
	Complex	1.91	2.22	2.23	2.86	2.25
	column mean	2.10	2.22	2.33	2.67	2.34

b – Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	1.08	1.08	ns
Feedback (F)	1	0.23	0.23	ns
C x F	3	0.46	0.46	ns
Error	72	1.01		

significant effects (see Tables 25 and 26). Normalizing the effort scores wiped out the trend which had been apparent in the earlier analyses and, again, there were no significant effects (see Table 27 and 28).

A test of the Vroom (1964) expectancy model also showed no significant effects (see Tables 29 and 30).

STRATEGY ANALYSES

Although few subjects discovered the strategy (11 out of 80), those who did increased their performance substantially. Mulitiple regression ANOVA's were performed with strategy (using versus not using) as an independent variable. This analysis has several cells with very low n so the results may be somewhat unstable, but nonetheless, they are quite interesting. Results will be discussed only for goal challenge analyses because the goal difficulty analyses appear to have been influenced a great deal by the initial differences in ability of subjects in the various goal difficulty groups.

Quantity

On the quantity of performance measure an interaction occurred between strategy and goal challenge $F(3,65)=9.21$, $p<.0001$ (see Table 31). There was little difference in the performance of subjects who did not discover the strategy across levels of goal challenge, but subjects who discovered the strategy performed higher in the lowest and highest goal challenge conditions than in the middle goal challenge

Table 25

Square Root of Effort

a - Means

		Goal Difficulty				
		1	2	3	4	row mean
Feedback	Simple	5.25	3.61	5.06	4.07	4.50
	Complex	3.73	3.17	3.88	3.71	3.62
column mean		4.49	3.39	4.47	3.89	4.07

b - Analysis of Variance Summary

	df	MS	F	p
Goal Difficulty (D)	3	5.40	0.66	ns
Feedback (F)	1	14.87	1.83	ns
D x F	3	1.54	0.19	ns
Error	72	8.13		

Table 26

Square Root of Effort

a - Means

		Goal Challenge				
		1	2	3	4	row mean
Feedback	Simple	4.49	4.12	4.36	4.56	4.41
	Complex	2.29	3.98	3.30	5.34	3.53
column mean		3.28	4.05	3.70	4.82	3.97

b - Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	6.74	0.84	ns
Feedback (F)	1	9.11	1.13	ns
C x F	3	7.81	0.97	ns
Error	72	8.04		

Table 27

Normalized Effort Scores

a - Means

		Goal Difficulty				
		1	2	3	4	row mean
Feedback	Simple	0.22	-0.56	0.40	0.21	0.07
	Complex	0.05	-0.25	0.02	-0.21	-0.10
	column mean	0.13	-0.40	0.21	0.00	-0.01

b - Analysis of Variance Summary

	$\underline{df}$	$\underline{MS}$	$\underline{F}$	$\underline{p}$
Goal Difficulty (D)	3	1.50	1.04	ns
Feedback (F)	1	0.54	0.37	ns
D x F	3	0.56	0.39	ns
Error	72	1.44		

Table 28

Normalized Effort Scores

a – Means

		Goal Challenge				
		1	2	3	4	row mean
Feedback	Simple	0.00	-0.15	-0.14	0.37	0.07
	Complex	-0.58	0.22	-0.04	0.15	-0.10
	column mean	-0.32	0.04	-0.08	0.30	-0.01

b – Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	1.21	0.84	ns
Feedback (F)	1	0.16	0.11	ns
C x F	3	0.80	0.55	ns
Error	72	1.45		

Table 29

Valence (Vroom model)

a – Means

			Goal Challenge			
		1	2	3	4	row mean
Feedback	Simple	4.44	4.22	4.38	4.29	4.32
	Complex	3.27	4.00	3.85	5.43	4.00
column mean		3.80	4.11	4.05	4.67	4.16

b – Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	2.35	0.65	ns
Feedback (F)	1	0.88	0.24	ns
C x F	3	4.54	1.26	ns
Error	72	3.61		

Table 30

Force (Vroom model)

a – Means

		Goal Challenge					
		1	2	3	4	row mean
Feedback	Simple	8.44	8.83	10.31	10.36	9.57
	Complex	6.00	7.50	8.69	13.07	8.45
	column mean	7.10	8.17	9.31	11.26	9.01

b – Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	59.44	2.65	ns
Feedback (F)	1	9.50	0.42	ns
C x F	3	25.15	1.12	ns
Error	72	22.39		

Table 31

Quantity of Performance with Strategy as an Independent Variable

a - Means

| | Goal Challenge | | | | |
	1	2	3	4	row mean
Strategy	1.40	1.27	1.37	1.84	1.48
No Strategy	1.17	1.21	1.24	1.21	1.21
column mean	1.25	1.24	1.30	1.53	1.34

Feedback

Simple	Complex
1.37	1.29

b - Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	0.06	3.72	<.05
Feedback (F)	1	0.08	4.65	<.05
Strategy (S)	1	0.59	34.63	<.0001
C x F	3	0.04	2.39	ns
C x S	3	0.16	9.21	<.0001
F x S	1	0.00	0.04	ns
C x F x S	2	0.01	0.48	ns
Error	65	0.02		

Note: Means represent the ratio of experimental to baseline performance.

conditions. There was a main effect for strategy, $F(3,65)=34.63$, $p<.0001$, with subjects who discovered the strategy showing a greater increase in the number of problems solved. There was a main effect for feedback, $F(1,65)=4.65$, $p<.05$, with subjects in the simple feedback condition showing a greater increase in the number of problems solved. There was also a main effect for goal challenge, $F(3,65)=3.72$, $p<.05$, with subjects in higher goal challenge conditions showing a greater increase in the number of problems solved.

Quality

On the quality of performance measure (see Table 32) there was a three-way interaction between feedback, goal challenge, and strategy, $F(2,65)=10.03$, $p<.001$, with a pronounced crossover interaction occurring between goal challenge and strategy for subjects in the simple feedback condition, but much less difference between strategy and nonstrategy subjects in the complex feedback condition. A two-way interaction occurred between feedback and strategy, $F(1,65)=7.68$, $p<.01$, with subjects in the simple feedback condition making more errors if they discovered the strategy and subjects in the complex feedback condition making more errors if they did not discover the strategy. Another two-way interaction occurred between goal challenge and strategy, $F(3,65)=4.77$, $p<.01$, with subjects who discovered the strategy making a relatively large number of errors in the two lowest goal challenge conditions and no errors at all in the two highest goal challenge conditions while subjects who did not discover the strategy

Table 32

Quality of Performance with Strategy as an Independent Variable

a - Means

SIMPLE FEEDBACK

Goal Challenge

	1	2	3	4
Strategy	1.50	3.00	0.00	0.00
No Strategy	0.38	0.19	0.50	0.35

COMPLEX FEEDBACK

Strategy	—	0.25	0.00	0.00
No Strategy	0.14	0.21	0.15	0.00

b - Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	0.14	0.77	ns
Feedback (F)	1	1.80	9.62	<.01
Strategy (S)	1	0.68	3.64	ns
C x F	3	0.00	0.02	ns
C x S	3	0.89	4.77	<.01
F x S	1	1.44	7.68	<.01
C x F x S	2	1.88	10.03	<.001
Error	65	0.19		

Note: Error rates are given in number of errors per trial.

made a rather constant and small number of errors across all goal challenge conditions. There was a main effect for feedback, $F(1,65)=9.62$, $p<.01$, with subjects in the simple feedback condition making more errors than subjects in the complex feedback condition.

AFFECTIVE MEASURES

Satisfaction

On the satisfaction measure (see Table 33), the only significant effect was a main effect for goal challenge, $F(3,65)=7.21$, $p<.0001$, with low goal challenge subjects being most satisfied with their performance.

Difficulty

For the difficulty rating (see Table 34), again, only the goal challenge main effect was significant, $F(3,65)=3.98$, $p<.05$, with subjects in higher goal challenge conditions generally seeing the goal as more difficult.

Concern with Speed

On the speed rating (see Table 35), the only significant effect was a goal challenge by strategy interaction, $F(3,65)=3.46$, $p<.05$, with subjects who discovered the strategy being most concerned with speed in the first, second, and fourth goal challenge conditions and subjects who did not

Table 33

Satisfaction Rating with Strategy as an Independent Variable

a - Means			
Goal Challenge			
1	2	3	4
4.36	3.86	3.58	3.80

b - Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	9.49	7.21	<.0001
Feedback (F)	1	0.70	0.53	ns
Strategy (S)	1	0.23	0.18	ns
C x F	3	2.01	1.53	ns
C x S	3	3.35	2.55	ns
F x S	1	0.33	0.25	ns
C x F x S	2	3.02	2.29	ns
Error	65	1.32		

Note: Satisfaction ratings are on a scale of 1 to 5 with 5 indicating extreme satisfaction.

Table 34

Difficulty Rating with Strategy as an Independent Variable

a - Means

Goal Challenge

1	2	3	4
3.22	3.88	3.48	3.90

b - Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	5.17	3.98	<.05
Feedback (F)	1	0.15	0.12	ns
Strategy (S)	1	0.35	0.27	ns
C x F	3	3.07	2.36	ns
C x S	3	2.73	2.10	ns
F x S	1	0.52	0.40	ns
C x F x S	2	0.50	0.38	ns
Error	65	1.30		

Note: Difficulty ratings are on a scale of 1 to 5 with 5 indicating extreme Difficulty.

Table 35

Speed Rating with Strategy as an Independent Variable

a – Means				
	Goal Challenge			
	1	2	3	4
Strategy	5.00	4.67	3.17	4.50
No Strategy	4.03	3.35	4.05	3.44

b – Analysis of Variance Summary				
	df	MS	F	p
Goal Challenge (C)	3	1.03	1.40	ns
Feedback (F)	1	1.01	1.38	ns
Strategy (S)	1	1.28	1.75	ns
C x F	3	0.71	0.96	ns
C x S	3	2.53	3.46	<.05
F x S	1	0.28	0.38	ns
C x F x S	2	0.07	0.10	ns
Error	65	0.73		

Note: Speed ratings are on a scale of 1 to 5 with 5 indicating extreme concern for speed.

discover the strategy being most concerned with speed in the third goal challenge condition.

Concern with Quality

On the quality rating (see Table 36) there was a significant main effect for feedback, $F(1,65)=7.70$, $p<.01$, with subjects in the simple feedback condition reporting greater concern for quality than subjects in the complex feedback condition.

Effort

On the effort score (Campbell et. al. model) there were no significant effects (see Table 37).

SUMMARY OF RESULTS

Table 38 shows a summary of the results of the various analyses. Only the strategy analysis produced significant results for quantity of performance. A significant strategy by goal challenge interaction was found with subjects who did not discover the strategy performing at approximately the same level in all goal difficulty conditions and subjects who discovered the strategy performing higher in the lowest and highest goal challenge conditions than in the middle two goal challenge conditions. There was also a main effect for feedback with subjects receiving simple feedback performing higher than those who received complex feedback.

Table 36

Quality Rating with Strategy as an Independent Variable

a – Means

Feedback
Simple   Complex
3.93   3.54

b – Analysis of Variance Summary

	df	MS	F	p
Goal Challenge (C)	3	1.38	1.47	ns
Feedback (F)	1	7.20	7.70	<.01
Strategy (S)	1	1.64	1.76	ns
C x F	3	0.66	0.71	ns
C x S	3	0.60	0.64	ns
F x S	1	0.03	0.03	ns
C x F x S	2	1.04	1.11	ns
Error	65	0.94		

Note: Quality ratings are on a scale of 1 to 5 with 5 indicating extreme concern for quality.

Table 37

Analysis of Variance Summary for Effort with Strategy as an
Independent Variable

	df	MS	F	p
Goal Challenge (C)	3	630.79	0.51	ns
Feedback (F)	1	3015.71	2.45	ns
Strategy (S)	1	1413.89	1.15	ns
C x F	3	2136.02	1.73	ns
C x S	3	909.80	0.74	ns
F x S	1	41.37	0.03	ns
C x F x S	2	168.84	0.14	ns
Error	65	1194.51		

Table 38

Summary of ANOVA'S

	Difficulty Analyses			Challenge Analyses			Strategy Analyses					
	D	F	D x F	C	F	D x F	C	F	S	C x F	C x S	C x F x S
Quantity												
Quality		*				**	*	*	**		**	**
Satisfaction				**	**		**					
Difficulty	**			**	**		*					
Concern for Speed											*	
Concern for Quality	**	**			*			**				
Effort												

D - Difficulty; F - Feedback; C - Challenge; S - Strategy

*=p<.05 **=p<.01

On the Quality measure, there was a main effect for feedback in both the difficulty and challenge analyses with subjects who received complex feedback making fewer errors than those who received simple feedback. On the strategy analysis, there was a three-way interaction between goal challenge, feedback, and strategy with a pronounced crossover interaction occurring between goal challenge and strategy for subjects in the simple feedback condition, but much less difference between strategy and nonstrategy subjects in the complex feedback condition.

The satisfaction measure produced a significant effect for goal challenge in both the challenge and strategy analyses. Subjects in the lowest goal challenge condition were most satisfied with their performance.

On the use of strategy dependent measure, there were no significant effects. The difficulty of the goal and the type of feedback had no effect on whether or not subjects discovered a strategy.

For the perceived difficulty measure, the difficulty, challenge, and strategy analyses all produced significant main effects for difficulty (challenge). Subjects reported significantly higher levels of difficulty as actual difficulty of the goal increased.

The concern for speed measure produced only one significant effect, a challenge by strategy interaction. Subjects who did not discover the strategy were more concerned with speed than those who discovered the strategy in the third goal challenge condition and were less concerned with speed in all other goal challenge conditions.

For the concern with quality measure, significant main effects for feedback were found in the difficulty, challenge, and strategy analyses. Subjects who received simple feedback were more concerned with quality than those who received complex feedback. A main effect for goal difficulty was present in the difficulty analysis with subjects in higher goal difficulty conditions generally being more concerned with quality.

No significant effects were found for the effort measure in any of the analyses. A number of approaches were used to try to reduce the high error variance for the effort dependent measure, but no clear patterns emerged using these transformed effort scores.

DISCUSSION

Motivation has long been considered to be composed of many components (Mitchell, 1974). Among these components are effort, direction, persistence, and strategy. Performance may be increased through increases in any or all of these mechanisms. Most theories of motivation emphasize effort as the primary determinant of performance, but the results of the present study suggest that the role of effort may have been overestimated and the other factors underestimated.

This discussion will analyze the evidence this study provides with respect to each of the components of motivation. The effect of goals on attitudinal factors will also be discussed.

The positive relationship between goal "difficulty" and task performance has generally received wide support in goal setting research (see review by Locke, et. al. 1981), but this effect was weak to nonexistant in this study. The finding of little, if any, goal difficulty effect would appear to be the result of problems in conceptually and operationally defining difficulty.

Goal setting studies in which the positive relationship between goal difficulty and task performance is found, have traditionally asked subjects to meet, but not exceed the goal. An example of this is Locke, Cartledge, and Knerr's (1970) research program (a series of 5 studies) where subjects were asked to come within + or - X units of the goal with X varying depending upon the performance measure used. Since the easy and moderate goals were established to be less than the average

subject's initial baseline performance the effect of the instructions would be to suppress the performance of high ability subjects. This suggests that goal setting as discussed by Locke is actually a means of suppressing performance rather than enhancing it. Other studies in which similar types of goal levels and instructions were used include: Bavelas and Lee (1978); Locke (1968); Locke (1982); Locke and Bryan (1967); Locke and Bryan (1969b); and Locke, Bryan, and Kendall (1969).

Another example of inducing a goal effect was Locke, Mento, and Katcher's (1978) research. Not only were subjects asked to suppress their performance, but a total of 37 subjects were dropped from the easy and medium goal difficulty conditions (approximately 1/3 of each group) "for surpassing the assigned goal by an excessive amount" defined as greater than 30% over the goal established. The subjects that were dropped were defined as having a "lack of full goal acceptance".

Goal setting has, for many years, been viewed as a means of increasing performance for people of all ability levels. This view has been held by a number of prominent authors. Mitchell (1979) found "very strong support for the proposition that goals increase (italics added) performance". Locke et. al. (1981) concluded that "the beneficial (italics added) effect of goal setting on task performance is one of the most robust and replicable findings in the psychological literature". Cummings (1982) states that the goal setting literature "clearly demonstrates the ubiquitous nature of the positive (italics added) effects of goal setting on performance...".

The consensus among previous researchers has been that

specific goals somehow cause people to increase the effort they expend in performing a task. The more difficult the goal - the more effort people exert.

The suppressive nature of goals in most goal setting research is only recently beginning to be recognized. Locke (1982) states that:

> The low performance of those with lower goal levels could be viewed as the equivalent of restriction of output, a well-known organizational phenomenon. Restriction of output vitiates the relationship between ability and performance (a phenomenon observed even in the Hawthorne studies; Roethlisberger and Dickson, 1939/1956), to the extent that those with more ability perform to the same level as those with less.

It appears that, in this study, the conceptualization and subsequent operationalization of goal difficulty was somewhat different from that typically used by Locke. Goal setting theory as envisioned by Locke appears to be a method of suppressing the performance of individuals by convincing them to meet but not exceed a goal which is below their ability and probably willingness to perform. It seems puzzling that such a doctrine can be referred to as a theory of motivation.

Locke (1981) said that "Goal acceptance implies that one has agreed to commit oneself to a goal...". Exceeding the goal does not, however, seem to imply that the goal has not been accepted if the object of that goal is to increase performance. In a study by Locke, Mento, and Katcher (1978), goal acceptance was 100% in

the hard goal group and only 66% in the moderate and easy goal groups indicating that people more readily accept goals which challenge them than goals which keep them from working to their potential.

In the present study, subjects were asked to complete X or more problems with X varying depending upon the goal difficulty condition to which a subject was assigned. These instructions gave subjects a goal to strive for, but encouraged them to continue past the goal if they were able. The outcome of this was that subjects in all conditions showed very similar improvements in performance over the baseline level. This suggests that the important factor in stimulating increased performance is not that a goal be highly difficult, but rather that a goal is present which indicates to a person that it is important to perform at a high level on a given performance dimension. In a work setting, organizational goals may simply serve to reduce pressure to conform to a peer group standard of performance (usually low). An example of this is the informal prohibition which often exists in work settings against "rate busting". Thus goals may serve a motivating function if they serve to replace an individual's goal with a higher one.

As noted earlier, goal setting has generally been discussed as causing people to increase their performance across all ability levels. However, if a goal serves to put an upper limit on performance, then it restricts the performance of high ability subjects (those capable of exceeding the goal). The lack of a main effect for goal challenge for the Campbell et. al. expectancy model lends further evidence that the the challenge or difficulty of a goal does not affect the effort people exert on a

task.

It is not surprising that there was no main effect for goal difficulty on the effort measure given the lack of differences in the number of problems solved. Subjects seemed to exert maximum effort in all conditions. Subjects were able to perceive the difficulty of reaching the goal, but the other components of the effort model did not vary with goal difficulty resulting in no significant relationship between goal difficulty and effort.

Feedback appears to direct performance. In this study, giving subjects feedback on two dimensions of performance caused them to improve their performance on the second dimension (errors) although the amount of improvement varied depending upon the level of goal challenge and whether or not the strategy was discovered. Giving feedback on both quantity and quality also caused subjects to decrease the quantity of performance; presumably because of a shifting of attention from the quantity dimension of performance to the quality dimension.

In a work setting, employees may well neglect aspects of their performance on which they receive no feedback to indicate that the dimension is important. If a worker is pushed to produce 1000 widgets every hour and is never told that the quality of the widgets he/she produces is substandard, it makes little sense for the worker to put any effort into increasing the quality of the widgets produced. Performance is seldom unidimensional - feedback should not be either.

If goals serve a performance limiting or demotivating function, the question arises of why no goal or "do your best" conditions result in performance lower than most goal conditions as indicated in 24 out of 25 field studies and 20 out of 21

laboratory studies reviewed by Locke (1981). In order for this to occur, no goal and "do your best" instructions must also serve to limit performance. One possibility is that these instructions provide no direction for performance. A goal of "do 20 problems" tells a subject that the number of problems completed is the most important performance dimension. A subject in the "do your best" condition, on the other hand, may assume that "do your best" means to make as few errors as possible with the number of problems being a secondary concern. Vague or unclear goals have been shown to result in lower performance than clear goals in studies by Kaplan and Rothkopf (1974), Rothkopf and Kaplan (1972), Carroll and Tosi (1970), and Ivancevich and McMahon (1977). The ability of a specific goal to direct attention to a specific aspect of performance has been shown by Locke and Bryan (1969b), Locke et. al. (1970), Reynolds et. al. (1979), Rothkopf and Billington (1979), and Terborg (1976).

This study provides little information on persistence. Subjects had a limited time to perform the task (3 5-minute trials). They were not given the opportunity to perform the task any longer than the 5 minutes alloted for each trial. Within these 5 minute trials, all subjects appeared to spend the entire time performing the task. Subjects continued to perform the task even if they reached the goal.

The interaction between the use of strategy and goal challenge indicates that goal challenge was related to quantity of performance only for those few subjects who discovered the strategy. This indicates that, as goals become more difficult, people who have discovered a strategy may be able to increase their performance to keep up with increasingly difficult goals.

If people are already working at or near maximum effort, more difficult goals may motivate them to seek out ways of increasing performance without increasing effort. One way of doing this is to use a strategy. The impact of this approach is likely to be highly task dependent, however. For some tasks there may be strategies which will greatly increase performance, but for other tasks there may not be a "better" way to do it.

The positive relationship found to exist between goal challenge and satisfaction suggests that some caution may be necessary in implementing goal setting systems. Setting highly difficult goals as Locke suggests may result in a great deal of employee dissatisfaction. Locke et. al. (1970) reviews several studies indicating that people evaluate their performance against the standard of a goal and, if they cannot reach the goal, dissatisfaction results.

The positive relationship between goal challenge and difficulty ratings shows that people can, with a minimal amount of experience, judge the relative difficulty of reaching a goal.

Subjects who discovered the strategy were more concerned about the speed at which they worked than those who did not discover the strategy in 3 out of the 4 goal challenge conditions. This suggests that subjects who were most concerned about speed may have been the most active in searching out a strategy to allow them to increase their speed. This supports the findings of Terborg (1976) and Kolb and Bayatzis (1970) who found that subjects who set goals for themselves (presumed to indicate a desire to do well on the task) were more likely to employ strategies in performing the task. The concern for quality measure showed a main effect for feedback giving another

indication that feedback serves to direct attention.

A number of unanswered questions remain in goal setting research. The most important question is whether or not goal setting is really a useful theory. If goals can serve to increase performance only after they have first been suppressed, then it may be more sensible to talk about goals either suppressing or maintaining performance. Since goals may increase performance only if they serve to replace existing (lower) goals, then the original goals must have been set for a reason. Research should be directed at discovering why the original suppressed goals were set and how new and increased levels of performance can be established in work settngs.

In previous research "do your best" and "no goal" instructions have resulted in lower performance than "difficult" goals. What is the mechanism(s) which leads to lower performance? Locke has suggested that specific goals lead to greater effort, however, alternate explanations are possible. One possibility is that instructions limit performance by creating ambiguity about which performance dimensions are important. For example, an instruction to "do your best" may imply either produce more or produce "better". Research should be directed at this question by appropriate modification of the "do your best" instructions.

It appears that there are trade-offs in performance. There is a limit to the number of things a person can do at once. If a person tries to increase performance on one dimension, performance on another dimension will suffer. Evidence to this effect was reported by Bavelas & Lee (1978). In this study, a tradeoff occurred between quantity and quality. Feedback in a work environment may concern several dimensions of performance.

How do people cope with complex feedback and how is performance effected?

As mentioned earlier, increasing effort is one way to meet a goal, but effort was not related to goal difficulty in this study. Subjects seemed to exert a high level of effort regardless of goal condition. In a real work situation, people may be less inclined to persist in working this hard. More research needs to be conducted in field settings or in lab studies in which subjects perform the task for a lengthy period of time.

Strategy seems to be another way of increasing performance. Are there individual differences that determine who tries to find a strategy? Can people be trained to seek strategies? If increases in productivity can come from doing a task with a better method rather than working harder, both the employer and the worker will benefit.

The affective responses of people who are pushed to increase their performance is often overlooked. In this study, the relationship between goal "difficulty" and a number of affective measures was examined. These measures were merely a small subset of a very large number of potential affective dimensions. The relationships with many other dimensions are as yet unexplored. If goal setting results in short-term gains in performance, but causes negative reactions among the workers, it is unlikely to be successful in the long run.

These are but a few of the more important questions which remain to be answered in goal setting research. The present study has suggested a new interpretation of past goal setting results and poses many new questions.

Summary and Implications

A distinction should be drawn between the effects of goal setting in laboratory and field settings. In laboratory settings, subjects typically come into the study with little preconceived notion of the level at which they should be able to perform the task. The experimenter sets a goal and the vast majority of subjects typically accept this goal as the level to which they will try to perform on the task (see review of goal acceptance studies; Locke, 1981). As mentioned earlier, the goal is often maintained as an upper bound for performance.

In field studies, on the other hand, subjects typically have a great deal of information about their ability to perform the task because the task is a regular part of their job. Many people in work environments set goals for themselves (generally not representing maximum performance) and these self-set goals influence their level of production (Mathewson, 1931; Roethlisberger and Dickson, 1939; Smith, 1953; Whyte, 1955). Goal setting increases performance when the workers accept goals higher than those they had previously set for themselves. Subjects in field studies have never been asked to stop when they reached the goal or thrown out of the study for showing a "lack of full goal acceptance" by exceeding the goal.

It seems that goal setting as it has been conceptualized and tested in the past is really a theory of demotivation rather than motivation. The fact that limits can be placed on performance is not surprising and would appear to have little practical application. Theories of motivation are supposed to address the issue of increasing performance which, of course, can have

important economic ramifications through increasing the productivity of workers. Goal setting can serve to increase performance if the goals which are set serve to replace other, more restrictive, goals. Thus, while goal setting may not be a true theory of motivation, it can have a performance enhancing effect in many work situations.

This study indicates that the emphasis motivation theories have traditionally placed on inducing increases in effort as a means of increasing performance may be misplaced. In this study, subjects seemed to exert a high degree of effort in all conditions and increasing the difficulty of the goal did not cause them to exert any additional effort.

Goal setting does seem to be effective in directing performance. There is strong evidence that both goals and feedback serve to direct performance toward a particular dimension.

There has been little evidence that goals affect persistence, but there have been few good tests of this hypothesis so no firm conclusions can yet be drawn.

The difficulty of goals seems to effect the discovery and use of strategies. More difficult goals motivate people to look harder for strategies, but not all tasks have strategies available.

The ostensible purpose of goal setting, to motivate people to increase their performance on a task, is unquestionably an important issue. Unfortunately, it appears that goal setting has been misinterpretted and perhaps oversold. Goal setting can be useful in three types of circumstances. First, when goals already exist and new goals are established which, if they are accepted,

cause people to increase their performance. Second, when it is necessary to direct attention toward a specific dimension of performance, goals can stimulate people to increase performance on that dimension although possibly at the expense of performance on other dimensions. Third, goals may stimulate people to make better use of strategies. It would appear that goal setting still has a place in the industrial psychologist's bag of motivational tools, but it is a somewhat less useful tool than we have been lead to believe.

Reference Notes

1. Mace, C.A. Incentives: Some experimental studies. Industrial Health Research Board (Great Britian), Report No. 72, 1935.

2. Shapira, Z. Goal difficulty and goal setting as determinants of task motivation. Unpublished manuscript, Hebrew University, 1977.

3. Hannan, R.L. The effects of participation in goal setting on goal acceptance and performance: A laboratory experiment. Unpublished doctoral dissertation, University of Maryland, 1975.

4. Ashworth, D.N. & Mobley, W.H. Relationships among organizational entry performance goals, subsequent goals, and performance in a military setting (Tech. Rep. TR-6). Columbia: Center for Management and Organizational Research, University of South Carolina, July, 1978.

References

Andrews, F.M., & Farris, G.F. Time pressure and performance of scientists and engineers: A five-year panel study. Organizational Behavior and Human Performance, 1972, 8, 185-200.

Atkinson, J.W. Motivational determinants of risk-taking behavior. Psychological Review, 1957, 64, 359-372.

Atkinson, J.W. An introduction to motivation. Princeton, NJ: Van Nostrand, 1964.

Atkinson, J.W., & Cartwright, D. Some neglected variables in contemporary conceptions of decision and performance. Psychological Reports, 1964, 14, 575-590.

Bandura, A., & Simon, K.M. The role of proximal intentions in self-regulation of refractory behavior. Cognitive Therapy and Research, 1977, 1, 177-193.

Bandura, A., & Walters, R.H. Social learning and personality development. New York: Holt, Rinehart & Winston, 1963.

Bassett, G.A. A study of the effects of task goal and schedule choice on work performance. Organizational Behavior and Human Performance, 1979, 24, 202-227.

Bavelas, J.B. Systems analysis of dyadic interaction:

Prediction from individual parameters. <u>Behavioral</u>
<u>Science</u>, 1978, <u>23</u>, 177-186.

Bavelas, J.B., & Lee, E.S. Effects of goal level on performance:
A trade-off of quantity and quality. <u>Canadian Journal of</u>
<u>Psychology</u>, 1978, <u>32</u>(4), 219-240.

Becker, L.J. Joint effect of feedback and goal setting on
performance: A field study of residential energy conservation.
<u>Journal of Applied Psychology</u>, 1978, <u>63</u>, 428-433.

Blumenfeld, W.S., & Leidy, T.R. Effectiveness of goal setting as
a management device: Research note. <u>Psychological Reports</u>,
1969, <u>24</u>, 752.

Campbell, J.P., Dunnette, M.D., Lawler, E.E., III, & Weick, K.E.,
Jr. <u>Managerial behavior, performance, and effectiveness.</u> New
York: McGraw-Hill, 1970.

Campbell, D.J., & Ilgen, D.R. Additive effects of task
difficulty and goal setting on subsequent task performance.
<u>Journal of Applied Psychology</u>, 1976, <u>61</u>, 319-324.

Carroll, S.J., Jr., & Tosi, H.L. Goal characteristics and
personality factors in a management-by-objectives program.
<u>Administrative Science Quarterly</u>, 1970, <u>15</u>, 295-305.

Christensen-Szalanski, J.J.J. A further examination of the
selection of problem-solving strategies: The effects of

deadlines and analytic aptitudes. Organizational Behavior and
Human Performance, 1980, 25, 107-122.

Cummings, L.L. Organizational behavior. Annual Review of
Psychology, 1982, 33, 541-579.

Cummings, L.L., Schwab, D.P., & Rosen, M. Performance and
knowledge of results as determinants of goal setting. Journal
of Applied Psychology, 1971, 55, 526-530.

Cyert, R.M., & March, J.G. A behavioral theory of the firm.
Englewood Cliffs, N.J.: Prentice-Hall, 1963.

Dachler, H.P., & Mobley, W.H. Construct validation of an
instrumentality-expectancy-task-goal model of work motivation:
Some theoretical boundary conditions. Journal of Applied
Psychology, 1973, 58, 397-418. (Monograph)

Deci, E.L. The effect of contingent and noncontingent rewards
and controls on intrinsic motivation. Organizational Behavior
and Human Performance, 1972, 8, 217-229.

Dossett, D.L., Latham, G.P., & Mitchell, T.R. The effects of
assigned vs. participatively set goals, KR, and individual
differences when goal difficulty is held constant. Journal of
Applied Psychology, 1979, 64, 291-298.

Erez, M. Feedback: A necessary condition for the goal
setting-performance relationship. Journal of Applied

Psychology, 1977, 62, 624-627.

Etzioni, A. Modern organizations. Englewood Cliffs, N.J.:
   Prentice-Hall, 1964.

Forward, J., & Zander, A. Choice of unattainable group goals and
   effects on performance. Organizational Behavior and Human
   Performance, 1971, 6, 184-199.

Friedman, M. & Rosenman, R.H. Type A behavior and your heart.
   New York: Knopf, 1974.

Frost, P.J., & Mahoney, T.A. Goal setting and the task process:
   I. An interactive influence on individual performance.
   Organizational Behavior and Human Performance, 1976, 17,
   328-350.

Gailbraith, J., & Cummings, L.L. An empirical investigation of
   the motivational determinants of task performance:
   Interactive effects between instrumentality-valence and
   motivation-ability. Organizational Behavior and Human
   Performance, 1967, 2, 237-257.

Georgopoulos, B.S., Mahoney, G.M., & Jones, N.W. A path-goal
   approach to productivity. Journal of Applied Psychology,
   1957, 41, 345-353.

Hall, D.T., & Foster, L.W.A psychological success cycle and

goal setting: Goals, performance, and attitudes. Academy of Management Journal, 1977, 20, 282-290.

Hall, D.T., & Hall, F.S. The relationship between goals, performance, success, self-image, and involvement under different organizational climates. Journal of Vocational Behavior, 1976, 9, 267-278.

Hall, D.T., & Lawler, E.E. Job pressures and research performance. American Scientist, 1971, 59(1), 64-73.

Hamner, W.C., & Harnett, D.L. Goal-setting, performance and satisfaction in an interdependent task. Organizational Behavior and Human Performance, 1974, 12, 217-230.

Hilgard, E.R. Success in relation to levels of aspiration. In C. L. Stacey & M. F. DeMartino (Eds.) Understanding human motivation. Cleveland, Ohio: Howard Allen, 1958.

Ivancevich, J.M., & McMahon, J.T. Black-white differences in a goal-setting program. Organizational Behavior and Human Performance, 1977, 20, 287-300. a

Ivancevich, J.M., & McMahon, J.T. Education as a moderator of goal setting effectiveness. Journal of Vocational Behavior, 1977, 11, 83-94. b

Ivancevich, J.M., & McMahon, J.T. A study of task-goals attributes, higher order need strength, and performance.

Academy of Management Journal, 1977, _20_, 552-563. c

Kahneman, D. _Attention and effort._ Englewood Cliffs, N.J.: Prentice-Hall, 1973.

Kaplan, R., & Rothkopf, E.Z. Instructional objectives as directions to learners: Effect of passage length and objective-relevant content. _Journal of Applied Educational Psychology_, 1974, _66_, 448-456.

Kolb, D.A., & Bayatzis, R.E. Goal-setting and self-directed behavior change. _Human Relations_, 1970, _23_, 439-457.

Landy, F.J., & Trumbo, D.A. _Psychology of work behavior._ Homewood, Ill.: Dorsey Press, 1980.

Laporte, R.E., & Nath, R. Role of performance goals in prose learning. _Journal of Educational Psychology_, 1976, _68_, 260-264.

Latham, G.P., & Baldes, J.J. The "practical significance" of Lockes theory of goal setting. _Journal of Applied Psychology_, 1975, _60_, 122-124.

Latham, G.P., & Locke, E.A. Increasing productivity with decreasing time limits: A field replication of Parkinson's law. _Journal of Applied Psychology_, 1975, _60_, 524-526.

Latham, G.P., & Saari, L.M. The effects of holding goal difficulty constant on assigned and participatively set goals.

Academy of Management Journal, 1979, 22, 163-168.

Latham, G.P., & Yukl, G.A. Effects of assigned and participative goal setting on performance and job satisfaction. Journal of Applied Psychology, 1976, 61, 166-171.

Lawler, E.E. Job design and employee motivation. Personnel Psychology, 1969, 22.

Lawler, E.E., Hackman, J.R., & Kaufman, S. Effects of job design: A field experiment. Journal of Applied Social Psychology, 1973, 3, 46-62.

Lawler, E.E., III, & Porter, L. W. Antecedent attitudes of effective managerial performance. Organizational Behavior and Human Performance, 1967, 2, 122-142.

Lewin, K. Psychology of success and failure. in C. L. Stacey & M. F. DeMartino (Eds.) Understanding human motivation. Cleveland, Ohio: Howard Allen, 1958.

Locke, E.A. Toward a theory of task motivation and incentives. Organizational Behavior and Human Performance, 1968, 3, 157-189.

Locke, E.A. Relation of goal level to performance with a short work period and multiple goal levels. Journal of Applied Psychology, 1982, 67, 512-514.

Locke, E.A., & Bryan, J.F. Performance goals as determinants of level of performance and boredom. Journal of Applied Psychology, 1967, 51, 120-130.

Locke, E.A., & Bryan, J.F. The directing function of goals in task performance. Organizational Behavior and Human Performance, 1969, 4, 35-42. a

Locke, E.A., & Bryan, J.F. Knowledge of score and goal level as determinants of work rate. Journal of Applied Psychology, 1969, 53, 59-65. b

Locke, E.A., Cartledge, N., & Knerr, C.S. Studies of the relationship between satisfaction, goal setting, and performance. Organizational Behavior and Human Performance, 1970, 5, 135-158.

Locke, E.A., Mento, A.J., & Katcher, B.L. The interaction of ability and motivation in performance: An exploration of the meaning of moderators. Personnel Psychology, 1978, 31, 269-280.

Locke, E.A., Shaw, K.N., Saari, L.M., & Latham, G.P. Goal setting and task performance: 1969-1980. Psychological Bulletin, 1981, 90, 125-152.

Locke, E.A., & Schweiger, D.M. Participation in decision-making: One more look. In B. M. Staw (Ed.), Research in organizational behavior (Vol. 1). Greenwich, Conn.: JAI Press, 1979.

London, M., & Oldham, G.R. Effects of varying goal types and incentive systems on performance and satisfaction. Academy of Management Journal, 1976, 19, 537-546.

Lopes, L.L. Individual strategies in goal-setting. Organizational Behavior and Human Performance, 1976, 15, 268-277.

Luthans, F., & Kreitner, R. Organizational behavior modification. Glenview, Ill.: Scott, Foresman and Company, 1975.

Masters, J.C., Furman, W., & Barden, R.C. Effects of acheivement standards, tangible rewards, and self-dispenced acheivement evaluations on children's task mastery. Child Development, 1977, 48, 217-224.

Mathewson, S.B. Restriction of output among unorganized workers. New York: Viking Press, 1931.

Mento, A.J., Cartledge, N.D., & Locke, E.A. Maryland vs. Michigan vs. Minnesota: Another look at the relationship of expectancy and goal difficulty to task performance. Organizational Behavior and Human Performance, 1980, 25, 419-440.

Mitchell, T.R. Expectancy models of job satisfaction, occupational preference and effort: A theoretical, methodological, and empirical appraisal. Psychological Bulletin, 1974, 81, 1053-1077.

Mitchell, T.R. Organizational behavior. Annual Review of Psychology, 1979, 30, 243-281.

Motowildo, S., Loehr, V., & Dunnette, M.D. A laboratory study of the effects of goal specificity on the relationship between probability of success and performance. Journal of Applied Psychology, 1978, 63, 172-179.

Ness, R.G., & Patton, R.W. The effect of beliefs on maximum weight-lifting performance. Cognitive Therapy and Research, 1979, 3, 205-211.

Oldham, G.R. The impact of supervisory characteristics on goal acceptance. Academy of Management Journal, 1975, 18, 461-475.

Organ, D.W. Intentional vs. arousal effects of goal setting. Organizational Behavior and Human Performance, 1977, 378-389.

Reynolds, R.E., Standiford, S.N., & Anderson, R.C. Distribution of reading time when questions are asked about a restricted category of text information. Journal of Educational Psychology, 1979, 71, 183-190.

Roethlisberger, F.J., & Dickson, W.J. Management and the worker. Cambridge, Mass.: Harvard University Press, 1956. (Originally published, 1939.)

Ronan, W.W., Latham, G.P., & Kinne, S.B., III. Effects of goal

setting and supervision on worker behavior in an industrial situation. Journal of Applied Psychology, 1973, 58, 302-307.

Rosswork, S.G. Goal setting: The effects on an academic task with varying magnitudes of incentive. Journal of Educational Psychology, 1977, 69, 710-715.

Rothkopf, E.Z., & Billington, M. J. A two-factor model of the effect of goal-descriptive directions on learning from text. Journal of Educational Psychology, 1975, 67, 692-704.

Rothkopf, E.Z., & Billington, M. J. Goal-guided learning from text: Inferring a descriptive processing model from inspection times and eye movements. Journal of Educational Psychology, 1979, 71, 310-327.

Rothkopf, E.Z., & Kaplan, R. Exploration of the effect of density and specificity of instructional objectives on learning from text. Journal of Educational Psychology, 1972, 63, 295-302.

Ryan, T.A. Drives, tasks, and the initiation of behavior. American Journal of Psychology, 1958, 71, 74-93.

Sales, S.M. Some effects of role overload and role underload. Organizational Behavior and Human Performance, 1970, 5, 592-608.

Simon, H.A. On the concept of organizational goal. Administrative

Science Quarterly, 1964, 9, 1-22.

Smith, P.C. The curve of output as a criterion of boredom.
Journal of Applied Psychology, 1953, 37, 69-74.

Steers, R.M. Task-goal attributes, n acheivement, and
supervisory performance. Organizational Behavior and Human
Performance, 1975, 13, 392-403.

Steers, R.M., & Porter, L.W. The role of task-goal attributes in
employee performance. Psychological Bulletin, 1974, 81,
434-452.

Strang, H.R., Lawrence, E.C., & Fowler, P.C. Effects of
assigned goal level and knowledge of results on arithmetic
computation: A laboratory study. Journal of Applied Psychology,
1978, 63, 446-450.

Terborg, J.R. The motivational components of goal setting.
Journal of Applied Psychology, 1976, 61, 613-621.

Terborg, J.R., & Miller, H. E. Motivation, behavior, and
performance: A closer examination of goal setting and monetary
incentives. Journal of Applied Psychology. Journal of Applied
Psychology, 1978, 63, 29-39.

Vroom, V.H. The effects of attitudes on perception of
organizational goals. Human Relations, 1960, 13,
229-240.

Vroom, V.H. Work and motivation. New York: Wiley, 1964.

Whyte, W.F. Money and motivation. New York: John Wiley, 1955.

Wilsted, W.D., & Hand, H.H. Determinants of aspiration levels in a simulated goal setting environment of the firm. Academy of Management Journal, 1974, 17, 172-177.

Wood, M.T. Power relationships and group decision making in organizations. Psychological Bulletin, 1973, 79, 280-293.

Yukl, G.A., & Latham G.P. Interrelationships among employee participation, individual differences, goal difficulty, goal acceptance, goal instrumentality, and performance. Personnel Psychology, 1978, 31, 305-323.

Zander, A., Forward, J., & Albert, R. Adaptation of board members to repeated failure or success by their organization. Organizational Behavior and Human Performance, 1969, 4, 56-76.

Appendix A

Stimulus Materials and Instructions

ILLEGIBLE DOCUMENT

THE FOLLOWING
DOCUMENT(S) IS OF
POOR LEGIBILITY IN
THE ORIGINAL

THIS IS THE BEST
COPY AVAILABLE

P-474

Instructions for Subjects

* Hand out informed consent and experimental credit materials.

Your task in the experiment is to solve a series of addition problems. An example is shown on the board.

```
    62
    76
    23
    ---
```

( ) 187
( ) 161
( ) 67
( ) 281

Make an X inside the parentheses beside the correct answer, like this.

* Solve the problem on the board.

There will be three answer periods of five minutes each. You will have five minutes between each answer period to fill out a short questionnaire and to rest.

Are there any questions?

* Answer questions.

If you have a question at any time during the experiment, raise your hand and I will come to your desk.

* Pass out answer form 1, face down.

When I tell you to begin, turn your paper over and begin answering the problems. Do the problems in order and don't skip any. Do your best in answering as many questions as you can.

Start.

Stop.

Remember the number of problems you have completed. Turn your paper over.

During the next two answer periods, I would like you to answer X problems. If you are able to answer X or more problems in either of the next two answer periods, you will receive $2 in gift certificates redeemable for a meal at McDonald's.

* Collect answer forms and pass out questionnaire 1. Score papers for subjects in the complex feedback condition and return them.

Answer the questions on the first questionnaire.

* Collect questionnaire 1 and pass out answer form 2, face down.

Remember to do the problems in order and don't skip any.

Start.

Stop.

remember the number of problems you have completed.

* Pick up answer form 2 and pass out questionnaire 2.

* Score problems for subjects in the complex feedback condition and return them.

Please answer the second questionnaire.

* Pick up questionnaire 3 and pass out answer form 3.

During the next answer period, try again to answer X or more problems. Again, remember to do the problems in order and don't skip any.

Start.

Stop.

* pass out questionnaire 3.

Please answer the third questionnaire.

* Collect the questionnaire and give coupons to those who have earned them. Remember to have them sign for the payment.

* Read the debriefing statement and hand out the yellow form.

```
1.    52          6.    77          11.    88         16.    49
      87                32                 81                91
      36                56                 18                40
      ---               ---                ---               ---

( )  175          ( )   92          ( )   39          ( )  123
( )  325          ( )  152          ( )  187          ( )  133
( )  156          ( )  285          ( )  329          ( )  360
( )   96          ( )  165          ( )  327          ( )  180


2.    97          7.    57          12.    91         17.    81
      39                88                 84                26
      31                96                 59                81
      ---               ---                ---               ---

( )   88          ( )  328          ( )  234          ( )  328
( )  367          ( )  361          ( )  364          ( )  245
( )   98          ( )  241          ( )  153          ( )  188
( )  167          ( )  158          ( )  243          ( )   65


3.    14          8.    49          13.    85         18.    17
      71                21                 48                71
      36                53                 47                27
      ---               ---                ---               ---

( )   97          ( )  203          ( )  126          ( )   38
( )  121          ( )  123          ( )  320          ( )  115
( )   37          ( )   69          ( )  180          ( )  285
( )  281          ( )  129          ( )  136          ( )   68


4.    69          9.    91          14.    83         19.    63
      19                99                 46                81
      98                11                 17                40
      ---               ---                ---               ---

( )  366          ( )   36          ( )   31          ( )  181
( )  186          ( )  366          ( )  326          ( )  184
( )   34          ( )  361          ( )  146          ( )  121
( )  184          ( )  201          ( )  121          ( )  324


5.    77          10.   88          15.    98         20.    89
      11                37                 34                26
      31                51                 90                61
      ---               ---                ---               ---

( )   94          ( )  176          ( )  222          ( )  176
( )  289          ( )  155          ( )  362          ( )  326
( )  119          ( )  326          ( )  277          ( )  184
( )   34          ( )   95          ( )   97          ( )   64
```

```
21.   87          26.   30          31.   43          36.   79
      68                94                88                86
      30                89                49                88
      ---               ---               ---               ---

( ) 185           ( ) 241           ( ) 139           ( ) 323
( )  93           ( )  91           ( ) 129           ( ) 210
( ) 183           ( ) 213           ( ) 180           ( ) 240
( ) 325           ( ) 363           ( ) 320           ( ) 253


22.   87          27.   92          32.   89          37.   89
      38                26                88                60
      12                80                67                59
      ---               ---               ---               ---

( )  99           ( ) 245           ( ) 324           ( ) 328
( )  39           ( )  65           ( ) 244           ( ) 208
( ) 137           ( ) 198           ( ) 188           ( ) 155
( ) 327           ( ) 368           ( ) 248           ( ) 185


23.   63          28.   21          33.   12          38.   58
      90                23                93                22
      67                74                99                94
      ---               ---               ---               ---

( ) 220           ( ) 118           ( ) 204           ( )  63
( ) 360           ( )  61           ( )  38           ( ) 364
( ) 185           ( )  71           ( ) 364           ( ) 174
( ) 195           ( ) 288           ( ) 278           ( ) 153


24.   11          29.   94          34.   87          39.   96
      52                51                92                91
      87                15                14                96
      ---               ---               ---               ---

( )  34           ( ) 160           ( )  30           ( ) 283
( ) 150           ( ) 157           ( ) 240           ( ) 276
( ) 320           ( )  37           ( ) 363           ( ) 256
( ) 154           ( ) 360           ( ) 193           ( ) 363


25.   78          30.   21          35.   26          40.   68
      38                38                53                13
      59                53                31                17
      ---               ---               ---               ---

( ) 151           ( )  66           ( ) 110           ( )  98
( ) 285           ( )  96           ( )  67           ( ) 248
( ) 175           ( ) 112           ( )  97           ( )  37
( )  91           ( ) 202           ( ) 200           ( )  47
```

41. 42
     89
     9̲2̲

( ) 223
( ) 127
( ) 247
( ) 363

42. 47
     69
     4̲4̲

( ) 240
( ) 123
( ) 160
( ) 133

43. 25
     12
     9̲6̲

( ) 64
( ) 363
( ) 34
( ) 133

44. 23
     87
     6̲9̲

( ) 62
( ) 329
( ) 182
( ) 179

45. 92
     16
     7̲3̲

( ) 181
( ) 361
( ) 39
( ) 219

46. 97
     65
     2̲1̲

( ) 183
( ) 363
( ) 61
( ) 181

47. 21
     91
     2̲3̲

( ) 62
( ) 135
( ) 72
( ) 365

48. 62
     76
     2̲3̲

( ) 188
( ) 161
( ) 68
( ) 281

49. 44
     51
     3̲5̲

( ) 130
( ) 200
( ) 129
( ) 99

50. 20
     90
     2̲4̲

( ) 33
( ) 43
( ) 364
( ) 134

51. 25
     92
     6̲7̲

( ) 364
( ) 188
( ) 184
( ) 68

52. 95
     70
     4̲3̲

( ) 127
( ) 208
( ) 368
( ) 217

53. 47
     67
     9̲7̲

( ) 211
( ) 186
( ) 126
( ) 361

54. 33
     29
     6̲2̲

( ) 124
( ) 95
( ) 65
( ) 244

55. 63
     15
     2̲8̲

( ) 246
( ) 65
( ) 35
( ) 106

56. 25
     22
     1̲9̲

( ) 86
( ) 66
( ) 35
( ) 65

57. 80
     78
     4̲7̲

( ) 211
( ) 121
( ) 205
( ) 325

58. 74
     90
     7̲1̲

( ) 365
( ) 217
( ) 227
( ) 235

59. 75
     85
     9̲7̲

( ) 244
( ) 257
( ) 367
( ) 214

60. 80
     75
     4̲1̲

( ) 326
( ) 196
( ) 210
( ) 120

```
61.   28          66.   13          71.   50          76.   99
      32                72                56                65
      46                37                20                10
      ---               ---               ---               ---

( ) 106           ( )  98           ( ) 126           ( ) 364
( )  97           ( ) 282           ( )  68           ( )  32
( ) 166           ( ) 122           ( ) 158           ( ) 182
( )  67           ( )  38           ( ) 206           ( ) 174

62.   92          67.   74          72.   64          77.   50
      44                70                97                70
      67                72                15                31
      ---               ---               ---               ---

( ) 126           ( ) 217           ( ) 176           ( ) 157
( ) 363           ( ) 227           ( ) 366           ( ) 281
( ) 203           ( ) 286           ( ) 183           ( )  97
( ) 186           ( ) 216           ( )  33           ( ) 151

63.   15          68.   17          73.   49          78.   87
      37                31                60                16
      54,               64                57                81
      ---               ---               ---               ---

( )  34           ( )  30           ( ) 127           ( ) 324
( ) 106           ( )  90           ( ) 246           ( ) 249
( )  94           ( ) 242           ( ) 157           ( ) 184
( ) 206           ( ) 112           ( ) 166           ( )  39

64.   42          69.   36          74.   84          79.   49
      47                69                70                44
      21                82                49                33
      ---               ---               ---               ---

( ) 128           ( ) 187           ( ) 212           ( )  97
( )  68           ( )  96           ( ) 323           ( ) 166
( ) 160           ( ) 186           ( ) 203           ( ) 127
( ) 110           ( ) 327           ( ) 122           ( ) 126

65.   83          70.   33          75.   63          80.   73
      14                53                51                96
      90                39                63                60
      ---               ---               ---               ---

( ) 187           ( ) 205           ( ) 247           ( ) 229
( )  36           ( )  98           ( ) 181           ( ) 215
( ) 246           ( )  88           ( ) 177           ( ) 185
( ) 367           ( ) 125           ( ) 171           ( ) 369
```

1.	55	6.	46	11.	28	16.	63
	34		27		16		40
	35		37		52		94
	---		---		---		---

```
( )  91        ( ) 110        ( )  69        ( ) 367
( )  81        ( )  67        ( )  96        ( ) 129
( ) 124        ( )  97        ( ) 206        ( ) 197
( ) 204        ( ) 200        ( )  39        ( ) 189
```

2.	19	7.	78	12.	75	17.	90
	35		29		37		76
	35		58		11		35
	---		---		---		---

```
( )  89        ( ) 165        ( ) 123        ( ) 201
( )  35        ( ) 154        ( ) 283        ( )  94
( ) 129        ( ) 285        ( )  32        ( ) 361
( )  95        ( )  64        ( )  92        ( ) 214
```

3.	61	8.	10	13.	80	18.	18
	62		89		96		24
	34		45		96		30
	---		---		---		---

```
( )  92        ( ) 122        ( ) 244        ( )  69
( ) 182        ( ) 324        ( ) 272        ( )  39
( ) 247        ( ) 144        ( ) 362        ( ) 122
( ) 157        ( )  32        ( ) 274        ( )  72
```

4.	87	9.	14	14.	29	19.	76
	98		15		83		32
	32		76		59		65
	---		---		---		---

```
( ) 242        ( )  48        ( ) 171        ( )  97
( ) 217        ( )  38        ( )  63        ( ) 173
( )  92        ( ) 285        ( ) 321        ( ) 283
( ) 367        ( ) 105        ( ) 153        ( ) 187
```

5.	23	10.	52	15.	87	20.	82
	64		79		99		80
	26		62		27		48
	---		---		---		---

```
( )  61        ( ) 180        ( ) 363        ( ) 210
( )  71        ( ) 283        ( )  65        ( ) 249
( ) 113        ( ) 150        ( ) 213        ( ) 129
( ) 243        ( ) 193        ( ) 245        ( ) 320
```

21.	23 79 84 ---	26.	14 38 17 ---	31.	73 60 99 ---	36.	66 42 97 ---

	21.		26.		31.		36.
( ) 62		( ) 32		( ) 232		( ) 365	
( ) 186		( ) 129		( ) 184		( ) 188	
( ) 326		( ) 69		( ) 214		( ) 128	
( ) 212		( ) 42		( ) 362		( ) 205	

22. 55   27. 70   32. 88   37. 94
    90   82   90   85
    86   49   89   11
    ---   ---   ---   ---

( ) 231   ( ) 201   ( ) 241   ( ) 360
( ) 155   ( ) 218   ( ) 267   ( ) 31
( ) 245   ( ) 128   ( ) 251   ( ) 241
( ) 361   ( ) 321   ( ) 267   ( ) 190

23. 33   28. 78   33. 35   38. 25
    95   20   19   30
    10   85   43   67
    ---   ---   ---   ---

( ) 138   ( ) 216   ( ) 97   ( ) 93
( ) 39   ( ) 183   ( ) 31   ( ) 122
( ) 368   ( ) 323   ( ) 127   ( ) 242
( ) 99   ( ) 66   ( ) 121   ( ) 63

24. 44   29. 48   34. 57   39. 17
    77   63   17   84
    25   17   67   83
    ---   ---   ---   ---

( ) 61   ( ) 248   ( ) 158   ( ) 184
( ) 121   ( ) 126   ( ) 38   ( ) 324
( ) 146   ( ) 128   ( ) 241   ( ) 247
( ) 286   ( ) 36   ( ) 141   ( ) 37

25. 61   30. 19   35. 99   40. 94
    11   60   18   20
    80   25   48   54
    ---   ---   ---   ---

( ) 322   ( ) 104   ( ) 126   ( ) 159
( ) 152   ( ) 66   ( ) 36   ( ) 368
( ) 187   ( ) 36   ( ) 365   ( ) 168
( ) 37   ( ) 244   ( ) 165   ( ) 69

```
41.   73          46.   36          51.   66          56.   86
      40                28                15                50
      66                70                37                93
      ---               ---               ---               ---

( )  122          ( )   62          ( )  118          ( )  151
( )  179          ( )  284          ( )  248          ( )  241
( )  289          ( )  134          ( )   35          ( )  369
( )  182          ( )   92          ( )   95          ( )  229


42.   39          47.   55          52.   27          57.   39
      24                42                92                83
      95                94                89                85
      ----              ---               ---               ---

( )   94          ( )  157          ( )   61          ( )  327
( )  368          ( )  191          ( )  241          ( )  242
( )   64          ( )  127          ( )  208          ( )  207
( )  158          ( )  361          ( )  368          ( )   92


43.   47          48.   55          53.   26          58.   16
      14                17                90                43
      94                45                62                14
      ---               ---               ---               ---

( )  155          ( )  117          ( )   67          ( )   73
( )  126          ( )  207          ( )  187          ( )  163
( )  365          ( )   31          ( )  368          ( )   37
( )   36          ( )  121          ( )  178          ( )   47


44.   34          49.   99          54.   57          59.   75
      15                41                15                25
      62                84                42                75
      ---               ---               ---               ---

( )  111          ( )  165          ( )  129          ( )   67
( )   33          ( )  224          ( )   39          ( )  217
( )  241          ( )  364          ( )  114          ( )  285
( )   93          ( )  145          ( )  204          ( )  175


45.   33          50.   31          55.   81          60.   35
      50                29                13                75
      56                64                44                18
      ---               ---               ---               ---

( )  139          ( )   63          ( )   33          ( )  288
( )   94          ( )  184          ( )  123          ( )   99
( )  154          ( )  124          ( )  328          ( )  128
( )  209          ( )   93          ( )  138          ( )   39
```

61.	74	66.	36	71.	48	76.	10'
	46		10		64		78
	49		36		60		17
	---		---		---		---

( )	289	( )	82	( )	129	( )	105
( )	125	( )	36	( )	242	( )	38
( )	135	( )	96	( )	189	( )	48
( )	169	( )	122	( )	172	( )	285

62.	53	67.	88	72.	97	77.	62
	18		31		32		69
	78		64		22		75
	---		---		---		---

( )	38	( )	323	( )	64	( )	182
( )	149	( )	286	( )	94	( )	192
( )	289	( )	96	( )	361	( )	206
( )	158	( )	183	( )	151	( )	286

63.	75	68.	36	73.	55	78.	35
	37		21		46		79
	68		21		91		71
	---		---		---		---

( )	187	( )	66	( )	125	( )	96
( )	280	( )	128	( )	192	( )	285
( )	97	( )	76	( )	362	( )	185
( )	180	( )	78	( )	155	( )	216

64.	81	69.	30	74.	56	79.	39
	48		35		58		55
	51		70		99		71
	---		---		---		---

( )	320	( )	135	( )	213	( )	96
( )	124	( )	92	( )	158	( )	285
( )	180	( )	102	( )	168	( )	165
( )	154	( )	295	( )	363	( )	156

65.	80	70.	73	75.	30	80.	51
	78		73		41		64
	80		46		13		10
	---		---		---		---

( )	328	( )	124	( )	84	( )	125
( )	211	( )	282	( )	99	( )	32
( )	238	( )	214	( )	39	( )	245
( )	241	( )	192	( )	164	( )	152

```
1.    74          6.    94          11.   91          16.   90
      32                59                38                95
      25                15                39                84
      ---               ---               ---               ---

( )   62          ( )   39          ( )   99          ( )  248
( )  131          ( )  368          ( )  368          ( )  269
( )   92          ( )  159          ( )  168          ( )  369
( )  281          ( )  168          ( )   96          ( )  278


2.    11          7.    49          12.   83          17.   87
      70                21                46                38
      31                53                17                12
      ---               ---               ---               ---

( )  112          ( )  129          ( )  121          ( )   99
( )   95          ( )   69          ( )  326          ( )  327
( )  282          ( )  203          ( )   31          ( )  137
( )   35          ( )  123          ( )  146          ( )   39


3.    49          8.    17          13.   63          18.   47
      60                71                90                69
      57                27                67                44
      ---               ---               ---               ---

( )  127          ( )  115          ( )  360          ( )  123
( )  246          ( )   38          ( )  183          ( )  133
( )  166          ( )  285          ( )  193          ( )  240
( )  157          ( )   68          ( )  220          ( )  160


4.    36          9.    83          14.   73          19.   28
      69                14                96                16
      82                90                60                52
      ---               ---               ---               ---

( )  327          ( )   36          ( )  229          ( )  206
( )  187          ( )  187          ( )  185          ( )   69
( )   96          ( )  246          ( )  215          ( )   96
( )  186          ( )  367          ( )  369          ( )   39


5.    12          10.   28          15.   99          20.   25
      93                32                65                22
      99                46                10                19
      ---               ---               ---               ---

( )   38          ( )   97          ( )  182          ( )   65
( )  204          ( )  166          ( )   32          ( )   86
( )  364          ( )   67          ( )  174          ( )   66
( )  278          ( )  106          ( )  364          ( )   35
```

```
21.  78          26.  61          31.  18          36.  29
     29               62               24               83
     58               34               30               59
     ---              ---              ---              ---

( )  64          ( )  92          ( )  39          ( ) 153
( ) 154          ( ) 157          ( )  72          ( )  63
( ) 285          ( ) 182          ( ) 122          ( ) 321
( ) 165          ( ) 247          ( )  69          ( ) 171

22.  52          27.  23          32.  66          37.  94
     79               79               42               85
     62               84               97               11
     ---              ---              ---              ---

( ) 150          ( ) 186          ( ) 128          ( )  31
( ) 180          ( )  62          ( ) 205          ( ) 360
( ) 283          ( ) 326          ( ) 188          ( ) 241
( ) 193          ( ) 212          ( ) 365          ( ) 190

23.  25          28.  17          33.  99          38.  73
     30               84               18               40
     67               83               48               66
     ---              ---              ---              ---

( ) 242          ( )  37          ( ) 124          ( ) 289
( )  93          ( ) 184          ( )  34          ( ) 122
( ) 122          ( ) 324          ( ) 365          ( ) 179
( )  63          ( ) 247          ( ) 165          ( ) 182

24.  39          29.  47          34.  99          39.  81
     24               14               41               13
     95               94               84               44
     ---              ---              ---              ---

( )  94          ( )  36          ( ) 165          ( )  33
( ) 158          ( ) 365          ( ) 245          ( ) 138
( )  64          ( ) 155          ( ) 224          ( ) 328
( ) 368          ( ) 126          ( ) 364          ( ) 123

25.  88          30.  36          35.  73          40.  77
     31               21               73               32
     64               21               46               56
     ---              ---              ---              ---

( ) 186          ( )  76          ( ) 124          ( ) 165
( ) 183          ( ) 128          ( ) 214          ( ) 154
( ) 323          ( )  66          ( ) 282          ( ) 285
( )  96          ( )  78          ( ) 192          ( )  94
```

41.	33	46.	91	51.	15	56.	17
	29		84		37		31
	62		59		54		64
	---		---		---		---

```
41.    33          46.    91          51.    15          56.    17
       29                 84                 37                 31
       62                 59                 54                 64
      ---                ---                ---                ---

( )    95          ( ) ·364          ( )    34          ( )    90
( )   124          ( )  243          ( )   206          ( )   112
( )    95          ( )  234          ( )    94          ( )    30
( )   244          ( )  153          ( )   106          ( )   242

42.    63          47.    89          52.    78          57.    49
       81                 26                 38                 44
       40                 61                 59                 33
      ---                ---                ---                ---

( )   121          ( )  184          ( )    91          ( )   126
( )   324          ( )   64          ( )   175          ( )    97
( )   184          ( )  176          ( )   295          ( )   127
( )   181          ( )  326          ( )   151          ( )   166

43.    83          48.    21          53.    97          58.    46
       14                 38                 65                 97
       90                 53                 21                 60
      ---                ---                ---                ---

( )    36          ( )   66          ( )   363          ( )   120
( )   367          ( )  202          ( )   183          ( )   180
( )   197          ( )   96          ( )   181          ( )   203
( )   246          ( )  112          ( )    61          ( )   363

44.    28          49.    26          54.    25          59.    92
       16                 53                 92                 44
       52                 31                 67                 67
      ---                ---                ---                ---

( )    69          ( )  110          ( )   188          ( )   363
( )    96          ( )   67          ( )    68          ( )   126
( )   206          ( )   97          ( )   364          ( )   186
( )    39          ( )  200          ( )   184          ( )   203

45.    96          50.    68          55.    75          60.    10
       91                 13                 37                 89
       96                 13                 11                 45
      ---                ---                ---                ---

( )   276          ( )   31          ( )    32          ( )   122
( )   283          ( )   41          ( )   123          ( )    32
( )   363          ( )  244          ( )    92          ( )   144
( )   286          ( )   94          ( )   283          ( )   324
```

61.   80
     96
     96

( ) 244
( ) 274
( ) 362
( ) 272

62.   73
     60
     99

( ) 362
( ) 214
( ) 184
( ) 232

63.   48
     63
     17

( ) 126
( ) 128
( ) 248
( ) 36

64.   27
     92
     89

( ) 61
( ) 208
( ) 241
( ) 368

65.   31
     29
     64

( ) 124
( ) 63
( ) 184
( ) 93

66.   23
     64
     26

( ) 113
( ) 243
( ) 62
( ) 72

67.   88
     90
     89

( ) 241
( ) 267
( ) 251
( ) 367

68.   36
     28
     70

( ) 92
( ) 284
( ) 134
( ) 62

69.   39
     83
     85

( ) 242
( ) 327
( ) 207
( ) 92

70.   74
     46
     49

( ) 130
( ) 120
( ) 169
( ) 289

71.   52
     79
     62

( ) 150
( ) 193
( ) 283
( ) 180

72.   94
     85
     11

( ) 31
( ) 360
( ) 190
( ) 241

73.   66
     15
     37

( ) 248
( ) 95
( ) 118
( ) 35

74.   34
     15
     62

( ) 93
( ) 33
( ) 241
( ) 111

75.   36
     10
     36

( ) 36
( ) 122
( ) 82
( ) 96

76.   14
     38
     17

( ) 32
( ) 42
( ) 129
( ) 69

77.   44
     77
     25

( ) 121
( ) 61
( ) 146
( ) 236

78.   86
     50
     93

( ) 229
( ) 369
( ) 241
( ) 151

79.   99
     41
     84

( ) 165
( ) 364
( ) 245
( ) 224

80.   74
     90
     71

( ) 235
( ) 365
( ) 217
( ) 227

Appendix B

Questionnaires

Trial 1 Questionnaire

Place a check (✓) next to the appropriate response.

1. Gender?
___Male
___Female

2. Have you ever worked in a full-time job?
___Yes
___No

3. Do you consider yourself to be above average in math skills?
___Yes
___No

4. How satisfied are you with your performance?
___(1) very satisfied
___(2) satisfied
___(3) neither satisfied nor dissatisfied
___(4) dissatisfied
___(5) very dissatisfied

5. How difficult do you think it is to meet the goal?
___(1) very difficulty
___(2) difficult
___(3) moderate
___(4) easy
___(5) very easy

6. How many problems do you think you will be able to answer during the next trial? (enter a number)___

7. How likely do you think it is that you will reach the goal in the next trial?
___(1) very likely (100% probability)
___(2) likely (75% probability)
___(3) neither likely nor unlikely (50% probability)
___(4) unlikely (25% probability)
___(5) very unlikely (0% probability)

8. Did you do your best in the task?
___(1) very much so
___(2) much so
___(3) moderately
___(4) little
___(5) not at all

9. How hard did you work to reach the goal?
___(1) very hard
___(2) hard
___(3) moderately
___(4) not hard
___(5) not hard at all

Trial 2 Questionnaire

Place a check (✓) next to the appropriate response.

1. How satisfied are you with your performance?
___(1) very satisfied
___(2) satisfied
___(3) neither satisfied nor dissatisfied
___(4) dissatisfied
___(5) very dissatisfied

2. How difficult do you think it is to meet the goal?
___(1) very difficulty
___(2) difficult
___(3) moderate
___(4) easy
___(5) very easy

3. How many problems do you think you will be able to answer during the next trial? (enter a number) ___

4. How likely do you think it is that you will reach the goal?
___(1) very likely (100% probability)
___(2) likely (75% probability)
___(3) neither likely nor unlikely (50% probability)
___(4) unlikely (25% probability)
___(5) very unlikely (0% probability)

5. Did you do your best in the task?
___(1) very much so
___(2) much so
___(3) moderately
___(4) little
___(5) not at all

6. How hard did you work to reach the goal?
___(1) very hard
___(2) hard
___(3) moderately
___(4) not hard
___(5) not hard at all

Page 2

10. How likely do you think it is that you will use the coupon if you earn one?
___(1) very likely (100% probability)
___(2) likely (75% probability)
___(3) neither likely nor unlikely (50% probability)
___(4) unlikely (25% probability)
___(5) very unlikely (0% probability)

11. How much would you enjoy eating at ~~Hardee's~~ McDonald's?
___(1) very much
___(2) much
___(3) moderately
___(4) little
___(5) very little

Trial 3 Questionnaire

Place a check (✓) next to the appropriate response.

1. To what degree were you concerned about the speed at which you worked?
___(1) extremely concerned
___(2) very concerned
___(3) concerned
___(4) relatively unconcerned
___(5) totally unconcerned

2. To what degree were you concerned about the amount of work you did?
___(1) extremely concerned
___(2) very concerned
___(3) concerned
___(4) relatively unconcerned
___(5) totally unconcerned

3. How concerned were you about the number of problems you completed?
___(1) extremely concerned
___(2) very concerned
___(3) concerned
___(4) relatively unconcerned
___(5) totally unconcerned

4. How concerned were you about the quality of your answers?
___(1) extremely concerned
___(2) very concerned
___(3) concerned
___(4) relatively unconcerned
___(5) totally unconcerned

5. How difficult do you think it is to meet the goal?
___(1) very difficulty
___(2) difficult
___(3) moderate
___(4) easy
___(5) very easy

6. How concerned were you about answering a problem incorrectly?
___(1) extremely concerned
___(2) very concerned
___(3) concerned
___(4) relatively unconcerned
___(5) totally unconcerned

7. How satisfied are you with your performance?
___(1) very satisfied
___(2) satisfied
___(3) neither satisfied nor dissatisfied
___(4) dissatisfied
___(5) very dissatisfied

8. To what degree were you concerned about the number of errors you made?

___(1) extremely concerned
___(2) very concerned
___(3) concerned
___(4) relatively unconcerned
___(5) totally unconcerned

9. How likely do you think it is that you will receive the coupon if you have met your goal?

___(1) very likely (100% probability)
___(2) likely (75% probability)
___(3) neither likely nor unlikely (50% probability)
___(4) unlikely (25% probability)
___(5) very unlikely (0% probablity)

10. Did you add all three numbers each time?

___Yes
___No

    If not, how did you answer the questions on which you didn't add the three numbers? _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

11. What do you think the purpose of this experiment is?

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Appendix C

Correlations

Correlation Table

	Goal Difficulty	Goal Challenge	Feedback Complexity	Use of Strategy	Quantity of Performance	Quality of Performance	Concern for Quality	Concern for Speed	Satisfaction Rating	Difficulty Rating	Effort
Goal Difficulty	1.00**										
Goal Challenge	.40**	1.00**									
Feedback Complexity	.00	-.12	1.00**								
Use of Strategy	.24*	.10	.11	1.00**							
Quantity of Performance	.07	-.66**	.09	.32**	1.00**						
Quality of Performance	.00	-.08	-.28*	.13	.13	1.00**					
Concern for Quality	.19	.23*	-.30**	-.16	-.24*	-.02	1.00**				
Concern for Speed	.14	-.07	-.13	.10	.20	.24*	.27*	1.00**			
Satisfaction Rating	-.14	-.44**	-.07	-.03	.51**	.00	-.16	.17	1.00**		
Difficulty Rating	.43**	.46**	-.05	.09	-.24*	.02	.20	.09	.04	1.00**	
Effort	.08	-.11	.18	.14	.24*	.13	-.17	.22*	.21	.08	1.00**

*=p<.05 **=p<.01

GOAL SETTING: UNLOCKEING THE RESEARCH

by

Scott H. Isensee

B. S., North Dakota State University, 1980

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Psychology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1983

ABSTRACT

Organizational researchers and practicing managers have long been concerned with discovering methods for improving the effectiveness and efficiency of organizations (Steers and Porter, 1974). Motivation has been used to explain the vigor (effort), direction, and persistence of action (Atkinson, 1964) and recently attention has also been focused on the use of strategies (Locke, Shaw, Saari, and Latham; 1981). Two of the more popular theories of motivation have been goal setting and expectancy theory.

Goal setting theory predicts that more difficult goals cause people to perform at a higher level (Locke, 1968). A number of studies have shown that goals serve to direct performance (Locke et. al., 1981). Goals are seen as operating in conjunction with feedback, since feedback without goals is not effective and goals without feedback are not as effective as goals with feedback. Feedback in the "real world" is frequently complex, that is, it often concerns several dimensions of performance not all of which may be related to established goals. It seems likely that people will assume that the performance dimensions on which feedback is received are the ones which deserve the most attention and effort.

Expectancy theory conceptualizes motivation in terms of the internal attitudes and concerns of the individual. The expectancy model grew out of the Path-Goal theory of Georgopoulos, Mahoney, and Jones (1957). The most recent modification and extension of expectancy theory is the hybrid expectancy model of Campbell, Dunnette, Lawler, and Weick (1970). While goal setting theory

predicts a positive relationship between performance and goal difficulty, expectancy theory seems to predict the opposite (see Landy and Trumbo, 1980, p. 368).

In the present study, appropriate measures were developed to allow a test of both the goal setting and expectancy theories. Feedback was given on both quantity and quality dimensions of performance, but goals were set only on the quantity dimension with the expectation that subjects receiving the quality feedback would perform better on the quality dimension and worse on the quantity dimension than those subjects who received feedback only on quantity of performance. Data on the use of strategies was collected with the expectation that, as the difficulty of the goal increased, subjects would find that it was impossible to meet the goal no matter how hard they worked and they would seek out strategies which would allow them to meet the goal with less effort. Data was also collected on the affective measures of satisfaction, perceived difficulty, concern with speed of performance, and concern with quality of performance to investigate the effect that feedback and the difficulty of the goal had on these variables.

Eighty general psychology students participated in the study for course credit. They added up sets of three two-digit numbers for three five-minute trials and filled out a questionnaire after each trial. The first trial served as a baseline and goals were set for the next two trials. Goals were given in number of problems the subjects were expected to solve and were established as 15%, 30%, 45%, and 60% above the baseline performance of a group of subjects (n=11) in a pretest. Feedback was given only on quantity of performance for half the subjects and on both

quantity and quality of performance for the other half. Subjects were offered coupons redeemable for $2 worth of food at McDonald's if they were able to meet or exceed the goal.

The results showed a strategy by goal challenge interaction with subjects who discovered the strategy increasing their performance slightly as goal challenge increased and subjects who did not discover the strategy showing no differences in performance across goal challenge conditions.

Feedback appeared to direct attention as predicted. Providing feedback on the quality of performance as well as quantity caused subjects to improve the quality of their performance and reduce the quantity.

As the challenge of the goal increased, subjects reported that the goals seemed more difficult and subjects were less satisfied with their performance. Subjects who received feedback on the quality of their performance (errors) reported being less concerned with the quality of their performance, probably because most of them weren't making any errors.

Goal setting, as it has been conceptualized and tested in the past, appears to have a suppressive effect on performance. Subjects are typically asked to do less in goal conditions than they do on a baseline and to stop when they have reached the goal. In this study, a positive relationship between goal difficulty and performance was not found because subjects were asked to try to meet a goal which represented a substantial improvement over the average baseline performance and then continue past the goal if they were able. The effect of this type of instruction was that everyone seemed to work as hard as they could and there was little difference in performance across goal

difficulty conditions.

In field studies, goals seem to operate somewhat differently. Workers often set limits on performance and discourage others from exceeding these limits or "rate busting". Goal setting may serve to raise these performance limits.

Both goals and feedback appear to serve a performance directing function. They may serve as cues to inform workers about which performance dimensions "management" deems important.

Several affective measures were effected by goal difficulty. In implementing a goal setting approach it may be important to take into account the effect goals will have on workers' attitudes as well as their performance. A system which brings short-term increases in performance, but results in widespread dissatisfaction among the workers, may not be viable in the long run.

Motivating people to increase their performance on a task is unquestionably an important issue. Unfortunately, it appears that the manner in which performance is effected by goals has been misunderstood. Goals can be useful in three types of circumstances. First, when goals already exist which are below the ability level of the worker and new goals are established which, if the goals are accepted, cause people to increase their performance. Second, when it is necessary to direct attention toard a specific aspect of performance, goals can stimulate people to increase their performance on that dimension although possibly at the expense of performance on other dimensions. Third, goals may stimulate people to make better use of strategies. It would appear that goal setting still has a place in the industrial psychologist's bag of motivational tools, but

it is a somewhat less useful tool than we have been lead to believe.