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The Ohio State University, Ph.D., 1974
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THE EFFECTS OF KNOWLEDGE OF RESULTS AND SOCIAL
REINFORCEMENT ON GOAL SETTING, PERFORMANCE, AND SATISFACTION

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

David Clark Gilmore, B.A., M.A.

The Ohio State University

1974

Reading Committee:

Dr. Milton D. Hakel

Dr. Richard Klimoski

Dr. Ralph Stogdill

Approved by

Milton D. Hakel

Advisor
Department of Psychology
ACKNOWLEDGEMENTS

The author wishes to express his appreciation to the many individuals whose contributions made this document possible. Professor Milton D. Hakel, my adviser, provided support and guidance not only for the dissertation, but for my entire graduate program. The inputs of the other members of my reading committee, Professors Ralph Stogdill and Richard Klimoski, were most beneficial. Also, the advice of Professor O.C. Behling was most helpful in the early stages of this research.

Vital to the completion of my graduate studies and dissertation was the support and assistance of my family. My wife, Barbara, shared the many trials and tribulations experienced by the author, and I only hope that she has also been able to share my joys. My daughter, Andrea, whom I may have neglected on occasion due to the demands of being a student, hopefully will someday share in the benefits of my labors.

I also wish to express my gratitude to Stephanie Butler who typed the final copy of this document.
VITA

December 25, 1946............. Born - Cincinnati, Ohio

1968............................. B.A., Capital University, Columbus, Ohio

1968-1972...................... Personnel Technician, Municipal Civil Service Commission, Columbus, Ohio

1972............................. M.A., The Ohio State University, Columbus, Ohio

1972-1974...................... Research Associate, The Ohio State University, Columbus, Ohio

FIELDS OF STUDY

Major Field: Industrial-Organizational Psychology

   Studies in Industrial Psychology. Professor Milton D. Hakel

   Studies in Organizational Behavior. Professors Richard J. Klimoski
      and Steven Kerr
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The study of behavior in organizations is often thought of as centered around the concepts of person, process, and product (Campbell, Dunnette, Lawler, & Weick, 1970). The characteristics of the person, such as aptitudes and interests, have been investigated extensively by personnel psychologists. The products of organized effort, such as profit, productivity, and share of the market, have long been recognized as important indicators of organizational health. However, the process by which individual abilities are transformed into organizational results involves many considerations. Campbell, et al., (1970) suggest that behavior, or the process, is a function of ability, opportunity, and motivation. Personnel selection and training have been used to insure the quality of the abilities of organization members, while the "opportunity" variables in the model involve situational influences such as organizational structure, communication patterns, and organizational climate. The other determiner of job behavior is the concept of motivation, and considerable research and theorizing has been directed at understanding how behavior is motivated in organizations (c. f., Vroom, 1964; Porter & Lawler, 1968).

Current theorizing in motivation varies, on one hand, from expectancy theories which maintain that cognitive or conscious thoughts mediate between the stimuli acting on the individual and the behavior he emits, and on the other hand, acognitive theories which emphasize past experiences rather than beliefs about the future (Behling,
Schriesheim, & Tolliver, 1972). When dealing with human behavior, cognitive theories of motivation are intuitively appealing since humans are usually thought of as being able to control their behavior through conscious thought processes. However, these theories have not been substantiated empirically, while acognitive theories which are based on extensive research on lower-order animals (e.g., Skinner, 1969) offer more specific prescriptions for motivating behavior. As a result, few theorists are willing to "hang their hat" on either extreme, and it is generally accepted that human behavior can only be understood by incorporating aspects of both cognitive and acognitive theories of motivation.

**Locke's Cognitive View of Motivation**

A compelling cognitive theory of task motivation has been offered by Locke (1968), which incorporates the relationship between conscious goals and intentions, and task performance. He does not specifically consider the antecedent conditions leading to the particular goals and intentions, but focuses on these intentions, once established, and subsequent behavior. Locke, while indicating that all behavior may not be under the conscious control of an individual, contends that most behavior can be explained with reference to conscious intent.

Locke (1968) hypothesized the following sequence of events involved in task performance:

Environmental — Cognition — Evaluation — Goal Setting — Performance

An environmental event, such as the introduction of an incentive,
knowledge of results, instructions, or competition, leads to a cognition which is evaluated by the individual. Based upon the evaluation, the individual sets a goal, or establishes a behavioral intention. These goals, then, directly influence the kind of performance exhibited by the person. Locke admits to not having investigated the processes of cognition and evaluation, but he has studied the effects of environmental events on goals and performance, and the effects of goals on performance.

Locke's theory is based on a number of laboratory experiments conducted by him and his colleagues (Locke, 1966; Locke & Bryan, 1966; Locke, Bryan, & Kendall, 1968). The results of these experiments indicated that "hard goals" lead to higher performance levels than do easier goals. In these experiments, subjects were typically assigned hard goals, easy goals, or were told "to do your best," and differences in performance between the groups were investigated. The research conducted by Locke and his colleagues has used a variety of tasks including brainstorming, complex computation, addition, and toy construction. The consistency of results in favor of hard goals across various tasks apparently establishes the impact of conscious goals on subsequent behavior in laboratory situations.

In relation to environmental events in Locke's model, the effects of various environmental events on goals and performance have been investigated in a number of situations. Locke, Bryan, and Kendall (1968), using monetary incentives on a brainstorming task, found no significant effect of incentive level independent of goal level on performance. Individuals who had the same goals produced the same amount regardless of the offering of an incentive bonus. This suggests
that the incentives only had an effect in that they caused certain goals
to be set, which then influenced performance.

Other incentives, or environmental events, in Locke's theoretical
view are verbal praise and reproof. Although he has not systematically
investigated the effects of these variables, they are hypothesized to
be a function of what goals individuals set in response to them. Locke
suggests the reason for previous inconsistent results, in relation to
the effects of praise and reproof on performance (Kennedy & Willcutt,
1964), may be due to a failure to control for goal setting by experi-
mental subjects.

In relation to knowledge of results, another environmental event
which influences goals, Locke and Bryan (1966a, 1966b, 1969a, 1969b)
have repeatedly investigated its effects on goals and performance. In
an early study, using a psychomotor task, Locke and Bryan (1966a) gave
knowledge of results and assigned specific, hard goals to one group of
subjects. The control group was given no feedback and was told to
simply "do your best." Those subjects who were given feedback and were
given goals performed significantly better than the subjects who were
told to do their best. However, the effects of knowledge of results
was confounded with the goals which were assigned, such that differences
in performance could not be attributed to either one of the two variables.

In a study in which knowledge of results and goal-setting were
separated, Locke and Bryan (1966b) assigned subjects to one of three
experimental conditions: knowledge of results and hard goals; know-
ledge of results and ambiguous goals; and no knowledge of results and
ambiguous goals. They found no significant effects on performance across conditions, but when subjects were reclassified post hoc according to their reports of whether or not they were pursuing goals, significant differences emerged. Although the post hoc reclassification is a questionable procedure, Locke and Bryan concluded that goal-setting was more potent than knowledge of results.

Also, in a study conducted by Locke (1967), subjects were assigned goals before the experimental trials on a simple addition task. The goals assigned were either difficult and specific, or "do your best." The two levels of goal were crossed experimentally with two types of knowledge of results (KR versus no KR) to yield a 2 x 2 design. Knowledge of results was given in the form of the number of problems they had gotten correct. Locke found a significant effect for the goal variable, but no effect was observed for knowledge of results.

In another study by Locke and Bryan (1968), a questionnaire asking subjects to describe their goals during preceding trials was administered halfway and at the end of the experimental session. Those subjects receiving feedback only did better than subjects receiving no feedback after the introduction of the first goal description questionnaire. Locke and Bryan interpreted this result as indicating that goal-setting, not knowledge of results, caused differences in performance. However, as Locke, Cartledge, and Koeppel (1968) admit, after-the-fact goal descriptions may reflect the subjects' actual performance rather than any true intentions before the experimental trials.

Locke and Bryan (1969) subsequently refined some procedures used in an earlier study (Locke, 1967) in order to more completely separate
goal-setting and knowledge of results. Again, goals were assigned to subjects, either "hard" or "easy," and knowledge of results was either given or withheld. They found hard goals led to higher performance, but, again, no effect for knowledge of results was observed.

In 1969, Locke and Bryan emphatically summarized their position by stating that "knowledge of results by itself does not motivate performance. When knowledge of results does affect performance, it does so indirectly: by affecting the nature of the goals which individuals set on the task [p. 41]."

Locke, Cartledge, and Koeppel (1968) reviewed a number of studies dealing with knowledge of results and found that knowledge of results, or feedback, can cause increases in performance (a) by correcting erroneous responses or providing information concerning the type and extent of errors being committed, and (b) by motivating the individual to try harder. Payne and Hauty (1955) labelled these two types of knowledge of results the "directive" and "incentive" types, respectively.

Locke, et al. (1968), note that knowledge of results of the directing or cuing type can also indirectly affect motivation. However, incentive or motivational feedback rarely serves a cueing or directing function. Therefore, any change in performance caused by motivational knowledge of results cannot be attributed to correction of erroneous performance, but must be attributed to increased effort caused by the knowledge of results. Locke, et al. (1968), maintain that knowledge of results provides the individual with information about his performance, which is then evaluated, and from which the individual sets goals.
For example, if the person evaluates the information received via feedback and feels that his performance is unsatisfactory, Locke, et al., maintain that the person will set a goal to improve performance. If the person evaluates the knowledge of results he receives as indicating satisfactory performance, he may attempt to only maintain his previous level of performance. Thus, the critical distinction is not whether a person receives knowledge of results, but rather how the person evaluates the information and what goals he sets based on that information.

To summarize Locke's theoretical viewpoint it can be said that environmental events, such as monetary incentives, knowledge of results, and verbal praise and reproof affect performance by causing differential goal-setting. These environmental events cause cognitions which are evaluated by the individual, and from which the individual sets goals. The goals that are set, then, have a direct influence on the performance exhibited by an individual.

**Research Related to Locke's Theory of Motivation**

In a laboratory study examining the effects of goal related feedback on variables, such as expectation, instrumentality, and outcome desirability, Schneider (1972) found little change in these cognitive variables due to feedback differences. He also found that success feedback led to the setting of harder goals, and failure feedback led to lower goals. Thus, differences in feedback resulted in different goals, and yet little or no cognitive mediation apparently occurred.
Pritchard and Curts (1973) took issue with some methodological considerations of the research conducted by Locke, Bryan, and Kendall (1968) which indicated that financial incentives have no direct effect on behavior. Pritchard and Curts felt that the financial incentives used by Locke, et al., were too small to override the effects of other rewards available in a laboratory experiment (pleasing the experimenter, etc.). When using larger financial incentives, Pritchard and Curts found that both monetary rewards and goal-setting significantly influenced performance.

In a field study of goal-setting, Ronan, Latham, and Kinne (1973) found that goal-setting was correlated with high productivity only when it was accompanied by supervision. While not refuting Locke's theory, they indicate that goal-setting was not sufficient to insure higher productivity. Apparently, in an industrial situation, effective supervision involves more than getting subordinates to set goals; insuring that subordinates engage in appropriate behavior appears to be as important. As Campbell, et al. (1970), point out:

"Viewed from this angle, setting goals and 'motivating' people are two different activities. There is first the problem of setting optimal goals (a cognitive activity) and then the problem of ensuring commitment to those goals (a motivational activity) [p. 378]."

Thus, the evidence is mixed concerning mediation in the process of goal-setting, and it is also unclear how individuals can be motivated to be committed to goals, once set. Much of the research cited by Locke in support of his theoretical position involved either very strong experimental manipulations of goals (imposing a specific, "hard" goal
upon the subjects) or relied on retrospective reports of goals. Given the strong "demand characteristics" (Orne, 1962) of many psychological experiments, it is not unreasonable to expect such dramatic results demonstrating the efficacy of goal-setting in laboratory situations.

Applications of Locke's Theory of Motivation

In real-life organizational situations, goal-setting usually is a cyclical process involving both the subordinate and his superior in a series of mutual goal-setting situations. Meyer, Key, and French (1965) indicate that their work planning and review system, which is based upon frequent goal-setting, is a far more effective approach for improving performance than an annual performance appraisal system. Their technique uses periodic meetings between the superior and subordinate in which progress on past goals is reviewed, specific solutions are developed for new problems, and new goals are established. Also, as Valentine (1966) suggests, goals or "performance objectives provide the greatest sense of reality when they are developed in an atmosphere of close participation, and a high degree of concurrence, between a superior and his subordinate managers [p. 45]." Therefore, ideal organizational goal-setting involves periodic meetings in which feedback is given on past performance, new problems are discussed, and goals are mutually set by the subordinate and his supervisor. By comparison, most of the laboratory research on goal-setting has usually involved the imposition of goals on the subject by the experimenter, and presenting degrees of feedback.
As Meyer, et al. (1965), indicate, one of the primary purposes of an appraisal program is to give feedback to subordinates concerning their performance. Feedback in a goal-setting situation is the means by which behavior is directed in what the superior feels are appropriate directions. Certainly the facets of feedback in such a situation are varied; it can vary from specific statements of fact to subtle interpersonal cues indicating varying degrees of approval. The specific statements of fact may influence greatly the goals that a subordinate subsequently decides to seek, but what effect do the subtleties of feedback have upon subsequent goals? If the superior's "style" of providing feedback is oriented around pointing out failure, rather than success, will the subordinate choose less difficult goals to avoid future criticism? Will the warmth and support given by a superior influence the extent to which the subordinate is willing to take chances and set difficult goals?

Viewed from this perspective, the goal-setting process involves more than simply setting a specific goal, that is, the type and kind of feedback given are also crucial. Locke (1968) suggests the important feature of feedback "is not merely whether it is given or not given but how a subject interprets and evaluates it, and what goals he sets in response to it. The form in which KS (knowledge of results) is given, of course, can influence its effectiveness [p. 177]."

Even though Locke's theoretical view incorporates the concept of feedback, he feels that its effect is only manifested through its effects on goals which then, in turn, influence behavior. However, alternative theoretical explanations, to be dealt with next, and which
relate more specifically to feedback, appear to be at least as plausible as Locke's cognitive view of task performance.

**Alternative Theoretical Viewpoints Relevant to Goal-Setting**

In contrast to the cognitive theory of task motivation offered by Locke (1968) is the position offered by Nord (1969) and Jablonsky & De Vries (1972) which emphasizes an operant conditioning view of human behavior in organization. Nord views organizational behavior as basically involving an exchange between a subordinate and a superior with the superior supplying organizationally sanctioned rewards to the subordinate for appropriate behavior. Nord (1969) states that:

> the nature of these exchanges involves both economic and social reinforcers. Many of these are given and received without explicit recognition or even awareness on the part of the participants. The operant approach focuses attention on these exchange processes [p. 399].

For Jablonsky and De Vries, an individual's behavior is a function of the reinforcement contingencies applied by various groups in the environment and of the individual's cognitive assessment of the contingencies. Jablonsky and De Vries are critical of Nord's model in that it assumes that individual human behavior is very much a function of external stimuli, and that internal forces have little effect on behavior. Jablonsky and De Vries maintain that the interaction between multiple reinforcement contingencies and the value the individual places on various reinforcers determine the behavior exhibited by an individual in an organization. They suggest that organizations should specify desired behavior in explicit terms and should positively reinforce
desired behavior while ignoring undesirable behavior. One source of positive reinforcement that they suggest is the use of social reinforcement from superiors.

These viewpoints offered by Nord (1969) and Jablonsky and De Vries (1972) are based upon the work of Skinner (1961) and other behaviorists. Skinner prefers to ignore "theories of internal states," and instead concentrates on obtaining data which shows orderly changes in behavior. For Skinner, the reinforcing consequences of behavior act to strengthen the preceding overt responses. That is, any behavior that is rewarded, or reinforced, is more likely to reoccur. In relation to the issue of cognitive mediation in behavior, Skinner (1953) states:

The objection to inner states is not that they do not exist, but that they are not relevant in a functional analysis. We cannot account for behavior of any system while staying wholly inside it; eventually we must turn to forces operating upon the organism from without [p. 35].

Also, Bandura (1969), arguing from a behavioristic viewpoint, notes that

the preoccupation with internal psychic agents and energized traits has been largely responsible for the limited progress in development of empirically sound principles of human behavior. The gap between stimulus inputs and overt response events tends to be filled readily with diverse all-powerful, animistic constructs capable of generating and explaining almost any psychological phenomenon [p. 15].

Bandura claims that the preoccupation with internal states has resulted in a disregard of external variables that have been demonstrated to influence behavior. He claims that an individual who is controlled solely from within and is insensitive to external contingencies will not survive. Bandura (1969) summarizes his view of human behavior by
stating: "Human functioning, in fact, involves interrelated control systems in which behavior is determined by external stimulus events, by internal information-processing systems and regulatory codes, and by reinforcing response-feedback processes [p. 19]."

Thus, depending upon whether behavior is viewed as regulated primarily by external stimulus events or by mediating symbolic events, the process of human behavior in organizations can be conceptualized in either of two different ways. In behavioristic interpretations, behavior is determined predominately by reinforcement contingencies. In contrast, in cognitive terms, the individual plays a far more active role in determining his behavior. Therefore, if a behavioristic view is adopted, the reinforcement contingencies become the crucial determinant of behavior. Specifically, in a goal-setting situation, the type and kind of feedback given to an individual will have tremendous impact on performance.

**Knowledge of Results and Motivation**

Knowledge of results, or feedback, has long been recognized as an important component of task learning and performance (Hilgard & Bower, 1966). Generally, knowledge of results can facilitate performance by either providing information that allows the individual to correct his errors or by motivating the individual to exert more effort. As mentioned earlier, Payne and Hauty (1955) labelled these two forms of feedback the directive and incentive functions, respectively.

In an early experiment, Arps (1920) investigated the effects of knowledge of results on performance on a simple task of lifting a weight.
He found that subjects who received feedback on their performance lifted the weight more often than subjects who were unaware of their previous performance. Since feedback was given in summary form and not during the experimental trial, the cuing or directing function of knowledge of results was discounted. Also, since the task was simple, learning could not be expected to influence performance. Therefore, knowledge of results provided a motivational function; that is, it increased effort expended by the subjects.

Manzer (1935) also found that knowledge of results caused increases in performance on a simple task. Half of his subjects squeezed a hand dynamometer for fifty trials without knowledge of results while the other subjects received no knowledge of results for the first ten trials, received feedback for the next twenty trials, and then no feedback for the last twenty trials. There were no differences between the two groups for the first twenty trials, but the group receiving feedback performed significantly better than the no feedback group for the remaining trials.

Brown (1949) suggested that there were three separate functions of knowledge of results: reward, information, and motivation. That is, like any other reward, knowledge of results could reinforce an already established habit. It could also provide cue information for correcting responses. Finally, knowledge of results could also provide motivational or incentive properties for learning or performance.

Mackworth (1950) provided subjects with visual feedback on their performance on a psychomotor task, and also provided verbal encouragement.
In the control condition, subjects received no feedback, verbal or visual. He found that subjects performed significantly better in the feedback conditions.

Payne and Hauty (1955) note that in order to gain optimal use and understanding of the concept of knowledge of results in controlling behavior, a number of elements of feedback need to be clarified. For example, the content, latency, and specificity of feedback as well as the interaction of feedback with proficiency level, task duration, and cerebral efficiency must be investigated thoroughly. They suggest that tardy, infrequent feedback which merely appraises an individual of substandard performance "without suggesting some specific corrective action, if beneficial to performance, would be so largely because of its incentive properties [p. 344]."

Smode (1958) investigated the effects of achievement information feedback on performance and learning in a tracking task. Achievement information feedback was defined as feedback "which tells (the subject) how the results of his responses conform to some objective reference, and which is believed to be especially effective in increasing motivation [Smode, 1958, p. 297]." Smode cites considerable prior research which substantiates the fact that feedback of this type increases the level of performance in tasks that are highly overlearned, and also increases the frequency of reports that tasks are more interesting and less fatiguing than when feedback is withheld. Smode concluded that high levels of information feedback facilitated performance mainly by increasing the motivation of subjects.
In a review of research on knowledge of results, Bilodeau and Bilodeau (1961) note that "no other independent variable offers the wide range of possibilities for getting man to repeat, or change his responses immediately or slowly, by larger or smaller amounts [p. 250]."

Diggory, Klein, and Cohen (1962) investigated the effects of information about performance on effort expended for a digit symbol task. Subjects were assigned a fixed performance goal which they were encouraged to achieve. Erroneous information indicating failure was given to the subjects with some being told that they were close to the goal but failing, and others being told that they were not close to the goal and were failing. Subjects who were told that they were close to the goal exerted more effort than those who were told that they were far from the goal.

Thus, knowledge of results can influence behavior in at least two ways—either by providing information which can be used to correct errors, or by increasing the motivation of an individual to perform a task. It has also been suggested that the content and specificity of feedback, as well as task proficiency, may influence performance.

Smode's (1956) research suggests that "motivational" feedback may facilitate performance on tasks that are overlearned, and it also seems to make the task more interesting. The work of Diggory, et al. (1962), suggests that ambiguous failure feedback might lead to higher performance than specific feedback. Finally, even though Mackworth (1950) did not find any additional effect for verbal encouragement, the issue of content of feedback has been raised by many. If feedback is provided in
relation to some external standard or is delivered personally rather than by an impersonal method, the possibility of a social comparison situation cannot be discounted.

Social Reinforcement and Motivation

Behavioral engineering, or using the principles of reinforcement to modify behavior in natural situations, has become increasingly popular. Whether designing a culture (Skinner, 1948), controlling deviant behavior (Bandura, 1969), or designing pay systems for organizations (Lawler, 1971), the popularity of capitalizing on reinforcement contingencies is increasing.

In organizational settings, giving feedback to an individual usually is accomplished in a social situation. That is, one individual communicates to another some information which indicates the extent to which some behavior is considered appropriate. In most real-life situations lights do not flash, buzzers do not sound, and food pellets do not appear when behavior is being reinforced. Verbalization or subtle cues are used to reinforce behavior. Even when salary increases are given, the reason for the increase is usually communicated to the individual. Thus, the predominant mode for delivering reinforcement in organizations necessarily involves a social interaction. In reference to the actual day-to-day operation of organizations, Gross (1968) makes the following point: "Daily action is the key channel of operational definition. In supplying cues and suggestions, in voicing praise and blame, in issuing verbal instructions, administrators define or clarify operational goals in real life [p. 406]."
The potential utility of social reinforcers in organizational settings, while great, has not been systematically explored. Raben, Wood, Klimoski, and Hakel (1973) have defined a social reinforcer as any reinforcer whose "reward value is altered by variations in other individuals or groups [p. 11]." This reward value may be determined by the administrator of the reward, i.e., a leader, colleague, friend, etc., or by the context in which the individual "consumes" his reward (consumed with or esteemed by others). Thus, if another individual administers a reward, or the reward is valued by others, the reward is a social reinforcer. Certainly, in organizational settings, providing feedback about work performance should qualify as a social reinforcement situation.

A number of studies in a variety of settings have generally supported the efficacy of social reinforcers. Hollander (1968) found that candy increased the speed of response of school children, while verbal praise increased the accuracy of performance. He also found that older children responded better to verbal praise than did younger children. Crowley (1968) administered praise, blame, or silent feedback to subjects working on an insoluble task. He found that subjects who received praise persisted longest, while those receiving blame remained at the task for the shortest period of time.

D'Ambrosio (1969) investigated the effects of verbal-positive, non-verbal positive, verbal-negative, and non-verbal negative reinforcement on the performance of children on a discrimination task. He found that verbal negative reinforcement produced the greatest number of correct responses and found no difference between the groups that received verbal and non-verbal positive reinforcement.
Moffat and Motiff (1970), using three types of verbal feedback, investigated the performance of children on a discrimination task. They hypothesized that verbal reinforcement delivered for both right and wrong answers would lead to better performance than would knowledge of results for correct answers only. The hypothesis was supported in that feedback indicating right and wrong or wrong answers led to better performance than providing "right" oriented knowledge of results. The authors speculate that the "right" feedback condition led to lower performance since the silence following incorrect answers in this condition was often erroneously interpreted as "correct" feedback. In the other two conditions, subjects were always informed of incorrect answers, which the authors claim provided more information about performance. In this study, feedback indicating failure appeared to be more important than positive reinforcement. However, it is unclear to what extent the feedback provided was needed to correct erroneous responses or to motivate continued performance.

Williams (1970) found that social reinforcers were more effective than monetary reinforcement in increasing persistence on a problem-solving task. He also found that female college students had greater persistence than males. Brown (1971) found that a combination of tangible and social reinforcement was more effective in modifying behavior than either form by itself. Also, Deci (1972) found that verbal reinforcement was more effective than monetary reinforcement for increasing intrinsic motivation to perform a task. After a review of the literature relating to social reinforcers, Raben, et al. (1973), state that "it is
evident from the preceding review that the ability of social reinforcers, at least when compared to nonsocial reinforcers, to significantly modify behavior is fairly well established [p. 97]."

Thus, even though social reinforcers have not been systematically evaluated in organizational settings, the laboratory research results reviewed suggest that similar phenomena operate in superior-subordinate, teacher-pupil, client-therapist, and experimenter-subject relationship.

Knowledge of Results, Social Reinforcement, Goal-Setting, and Theories of Motivation

The preceding discussion suggests the following conclusions:

1. Cognitive theories of motivation, specifically Locke's (1968) theoretical view, suggest that knowledge of results leads to increased performance only through its effects on conscious behavioral intentions (goals).

2. The experimental operationalizations of goal-setting and knowledge of results used by Locke may have influenced the results obtained. That is, imposing goals on subjects may have created "demand characteristics," and ambiguous knowledge of results may have been relatively ineffective in overcoming the demand characteristics created by imposed goals.

3. Contrary to Locke, the behavioristic viewpoint suggests that reinforcement contingencies can have a direct impact on behavior, with or without cognitive mediation.

4. The reinforcement provided in the performance of a task (feedback) can influence behavior by providing information which can be used
to correct errors or by increasing motivation. Also, positive and negative feedback can have differential impact on performance.

5. In many real-life goal-setting situations, feedback is often provided by another individual, or feedback given in relation to other individuals. Thus, social reinforcers, as opposed to tangible or impersonal reinforcers, can play an important function in goal-setting situations.

In light of these conclusions, a number of hypotheses are suggested. First, it is hypothesized, contrary to Locke, that knowledge of results will have a direct effect on performance without concomitant changes in goals.

**Hypothesis I**—Positive knowledge of results will lead to higher levels of performance than negative knowledge of results.

**Hypothesis II**—Knowledge of results will affect performance, and yet have little effect on the goals that an individual sets. That is, positive knowledge of results will lead to higher levels of performance than will negative knowledge of results. Also, in relation to social reinforcers, a differential effect is expected for warm, cold, and impersonal modes of delivering feedback.

**Hypothesis III**—Warm feedback will lead to higher levels of performance. It is also expected that impersonal feedback will cause moderate performance levels. Also, differences in feedback (warm, cold, or impersonal) are not expected to cause any differences in the goals set by subjects.
Knowledge of Results, Goal-Setting, Satisfaction, and Theories of Motivation

It is a common assumption that attitudes bear a significant relationship to performance, and theories of motivation attempt to explain how attitudes sustain performance over a long period of time. Job satisfaction, or the affective orientation toward work (Vroom, 1964), is presumed to be related to job performance to a great extent. However, reviews of the literature on the relationship between job satisfaction and performance (Brayfield & Crockett, 1955; Vroom, 1964; Porter & Lawler, 1968) have yielded equivocal results.

Locke (1970) claims that "the effect of job performance on job satisfaction will be a function of the degree to which performance entails or leads to the attainment of the individual's important job values (without neglecting his other important values) [p. 485]." Locke suggests that there are two basic kinds of values that an individual seeks on a job. First, an individual may seek task-related values which involve task activity, or working at an "interesting task," and task success and achievement. For example, either working at an inherently interesting task or achieving a goal could both lead to increases in job satisfaction. Numerous field studies have found task achievement to be a major source of satisfaction (Freidlander, 1964; Hoppock, 1935; Wernimont, 1966).

The second kind of values that an individual may seek on a job according to Locke are nontask values. Some of the common nontask values are pay raises, promotions, new task responsibilities, praise, and recognition. Locke notes that task-related values are usually under the
control of the individual, while nontask values are largely controlled externally.

In relation to job satisfaction, Locke (1970) maintains that an individual chooses specific goals which he feels will be instrumental in attaining his important values, and then expends sufficient effort to attain those goals. He feels that one reason the relationship between job satisfaction and performance has not been established empirically is that an individual may like his job for a number of different reasons other than his success in performance. For example, Locke notes that an individual may be interested in his work, but may not have the ability to perform well, or he may like the job because he likes his co-workers or supervisor. Thus, satisfaction may be caused by factors other than success on the job in terms of performance.

Locke, Cartledge, and Knerr (1970) conducted a number of laboratory experiments which supported the basic notions of Locke's (1970) view of job satisfaction. They conclude that "satisfaction with performance is a function of the degree to which one's performance achieves one's desired goal...[Locke, et al., 1970, p. 152]."

Considering the task-related and nontask values delineated by Locke (1970), the extent to which a task is interesting, task success, pay raises, promotions, new task responsibilities, praise, and recognition could all lead to satisfaction. However, in a laboratory situation, only the extent to which a task is interesting, task success, and praise are factors that typically could operate.

Therefore,

**Hypothesis IV**—There will be a significant relationship between
reported satisfaction and the extent to which a task is perceived as interesting.

**Hypothesis V**—In a task incorporating goal-setting, there will be a significant relationship between task success (attaining goals) and reported satisfaction.

**Hypothesis VI**—There will be a significant relationship between reported satisfaction and the extent to which individuals receive praise (positive knowledge of results).
METHOD

In order to test the preceding hypotheses in a goal-setting situation, a laboratory experiment was conducted in which the type of knowledge of results (positive versus negative) and the degree of social reinforcement present were manipulated. Three degrees of social reinforcement were introduced: warmth and support, cold evaluation, and impersonal feedback. These three levels of treatment were crossed with the two levels of knowledge of results (positive versus negative) to yield six experimental treatments for a multi-trial goal-setting task.

Independent Variables

Positive knowledge of results in this experiment was operationalized as informing the subject each time he was successful in attaining a goal that he had set for himself. No information was provided if the subject failed to attain his goal. On the other hand, negative knowledge of results was operationalized such that subjects were informed only if they failed to attain their goal and information was not provided if they were successful. Thus, in the positive condition, success was followed by information, and no information was given after a subject's failure to attain a goal. In the negative knowledge of results treatment, subjects were informed when they failed to attain a goal and were given no information when they did attain a goal. All subjects were informed at the beginning of the experiment of the contingencies, i.e., they were told that they would be informed if they did or did not reach their goal, depending upon the treatment condition.
The social reinforcement treatment involved either warm, cold, or impersonal feedback. Warm social reinforcement was operationalized to include providing warmth and support to the subject and encouraging him to do well. For example, verbal statements such as "O.K.—keep it up, you're doing very well," and "Outstanding, you're doing well," were warm social reinforcers to indicate that the subject had attained a goal (positive knowledge of results), while "Nice try but you didn't make your estimate," and "Not that time but keep trying," were warm reinforcers used in the negative knowledge of results treatment.

The "cold" reinforcers were designed to be evaluative verbal statements to indicate the extent to which the subject's performance was in accordance with his goals. In the cold, positive knowledge of results conditions, subjects were told "You made your estimate," "You did well," etc., to indicate they had attained their goal or predicted performance. If they failed to reach their goal, no information was provided. In the negative, cold condition, subjects were given information which indicated emphatically that they were failing if they did not reach their goal on a trial. For example, "You must not be trying," "That was bad," or "You failed again," were typically verbal statements made to subjects after they had not attained one of their goals. When the subject reached a goal in this treatment condition he was given no information.

In the impersonal conditions, both positive and negative, a bell was rung to reinforce the subject's performance. In the positive, impersonal condition a bell was rung to indicate that he had reached his estimate or goal with no information for failing to reach the goal. For the negative condition, the bell indicated a failure to reach the goal,
while no information was given following a successful trial. A complete list of reinforcers used in each of the six experimental conditions is given in Appendix A.

Subjects

Seventy-two male and female undergraduates who were enrolled in an introductory psychology course participated in the experiment as part of a course requirement. The subjects received one hour of experimental credit for participation in this study. Subjects were randomly assigned to one of the six experimental treatments.

Experimental Task

The experimental task was simple arithmetic computation. Each set of numbers was comprised of three two-digit numbers. The subject was asked to add all the numbers "in his head" and then to verbally state the correct answer. Each set of numbers was presented on a "flash card" and the subject viewed each card for five seconds. Three seconds was allowed to exchange flash cards, and the subject could provide an answer during that intervening time. Thus, a new set of numbers appeared every eight seconds. An answer was counted as correct if it was stated before the next set of numbers appeared.

The problems were derived by selecting numbers from a table of random numbers. The only requirement imposed in deriving each set of numbers was that a zero could not appear in the "tens" column, i.e., each number had to be a true two-digit number. A total of seventy-two
problems were derived for use in the experiment. Appendix B contains the problems used in the experiment.

This computational task was chosen since the adding of numbers is not a novel task and has been previously practiced by college students. Hence, any knowledge of results given in relation to performance on the task would not be of a cuing nature since the task has already been over-learned. Smode (1958) has cited considerable support for the notion that performance feedback on an overlearned task has mainly motivational or incentive properties, rather than cue or informational properties.

The rate of presentation of problems was purposely put under the control of the experimenter in order to reduce the potential for the subjects' keeping track of their performance. That is, the feedback given to the subjects would have had little effect if the subjects were able to count the number of problems they were able to solve correctly. By keeping the presentation of a problem to five seconds and total time allowed for solution of a problem to eight seconds, the subjects could usually arrive at a solution, but were sufficiently hurried to insure some uncertainty concerning the correctness of the answer. Since they did not have time to double-check problems and could not control the rate of presentation, they had little idea how many problems they were able to solve correctly in any trial. Therefore, the subjects could not provide themselves with specific internal knowledge of results in relation to the number of correct problems and were dependent upon the feedback provided by the experimenter.
The task was designed to be not inherently interesting so that sustained performance over time could be attributed to motivational effects induced by feedback manipulations, rather than novelties of the task. Solving 160 arithmetic problems under speeded conditions would not likely become more interesting as the task progressed.

Procedure

Upon arrival for the experimental session, the subject was met by the experimenter and led to a small room in which two chairs were arranged on either side of a small partition. The seating arrangement and partition enabled the subject to observe only the side of the experimenter's head and shoulders so the subject could not observe the clock or the scoring method used by the experimenter. Once seated, the experimenter was facing away from the subject and did not have any eye contact with him throughout the experiment.

The subject was then told that the experimenter was trying out the task in this setting before using it in a larger experiment to be conducted at a later date. The experimenter then explained the task: adding up three numbers and stating the correct answer. The subject was told that he would have five seconds to view each problem and that he must indicate the correct answer before the next set of numbers appeared. Any questions were answered at this time by the experimenter.

The subject then had a trial of two minutes' duration in which fifteen problems were presented. At the end of this trial, the experimenter told the subject how many problems he had solved correctly. The
subject was then told that he would have a number of trials of varying lengths, and that he would be asked to predict how many problems he would get correct before each trial. Depending upon the treatment condition to which the subject was assigned, the experimenter told the subject that he would be informed concerning whether he attained or did not attain his prediction. In the warm and cold positive conditions, the subject was told if he got at least as many correct as he had predicted. In the comparable negative conditions, he was told if he did not get at least as many correct as he had predicted. In the impersonal positive and negative conditions, the subject was told that the ringing of a bell would indicate whether he had/had not achieved his goal.

The subject was then told how long the next trial would be relative to the last trial (same length, twice as long, half as long, three times as long, or one third as long). The subject was then asked to set a goal for the coming trial. Once the subject stated his goal, which was recorded by the experimenter, problems were presented to the subject according to the previously discussed time requirements. The instructions given to subjects are contained in Appendix C.

Nine experimental trials followed the initial trial, with three trials of one, two, and three minutes each. Two different orders of trial length were used in all experimental treatments. After each experimental trial the subject was given the appropriate knowledge of results relative to his goal. He was then asked to predict his performance on the next trial after he was told its length relative to the immediately preceding trial. The subject’s goal, actual performance, and whether he was successful on the trial was recorded by the experimenter.
After nine experimental trials had been completed, the subject completed a questionnaire. The questionnaire asked the subject to indicate how interesting he found the task, how much effort he exerted during the experiment, his satisfaction on a number of dimensions, how well he thought he performed relative to other college students, how much the feedback received influenced his predictions, how he perceived the feedback on a warm-cold dimension, and his age and sex. The questionnaire is presented in Appendix D.

After the questionnaire was collected, the subject was debriefed and told the true intent of the experiment. Debriefing involved probing subjects concerning their perceptions of the feedback given, and whether they had indications of their performance independent of the knowledge of results provided.
RESULTS

In order to test the hypotheses delineated earlier, a number of measures were collected during and at the conclusion of the experiment. The collection of multiple dependent variables, some of which were likely to be intercorrelated, across multiple treatment conditions dictated the use of multivariate statistical techniques. For each subject dependent measures such as task performance, goals, satisfaction with various aspects of the situation, how interesting the task was, etc., were collected. A complete explanation of the variables used in the experiment are contained in Appendix E. In order to analyze the effects of the treatment conditions on these dependent measures, multivariate analysis of variance was employed.

Table 1 contains a summary of the multivariate analyses of variance for the data collected. As can be seen in Table 1, none of the multivariate tests using Wilk's Lambda criterion (Cooley & Lohnes, 1962) were significant.

Even though the multivariate tests were not significant, inspection of the univariate effects was considered necessary to answer specific questions and to determine if the multivariate analysis marked any univariate mean differences. Table 2 contains a summary of the univariate F-tests made for each of the dependent variables for the two independent variables (knowledge of results and social reinforcement) and their interaction. As can be seen, four univariate F-tests for the knowledge of results variable are significant at the p < .05 level: a self-report of the
TABLE 1. Multivariate Analysis of Variance of all Dependent Variables

<table>
<thead>
<tr>
<th>Source</th>
<th>F</th>
<th>df</th>
<th>p less than</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of Results (A)</td>
<td>1.275</td>
<td>15, 52</td>
<td>.251</td>
</tr>
<tr>
<td>Social Reinforcement (B)</td>
<td>.655</td>
<td>30, 104</td>
<td>.908</td>
</tr>
<tr>
<td>AxB</td>
<td>.770</td>
<td>30, 104</td>
<td>.792</td>
</tr>
<tr>
<td>Source</td>
<td>Dependent Variable</td>
<td>Mean Square</td>
<td>F</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------</td>
<td>-------------</td>
<td>-----</td>
</tr>
<tr>
<td>A</td>
<td>Practice Performance</td>
<td>13.347</td>
<td>1.240</td>
</tr>
<tr>
<td>(Knowledge of</td>
<td>Goals</td>
<td>1004.965</td>
<td>1.085</td>
</tr>
<tr>
<td>Results)</td>
<td>Performance</td>
<td>931.647</td>
<td>1.490</td>
</tr>
<tr>
<td></td>
<td>Successes</td>
<td>0.056</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>Task Interesting?</td>
<td>.681</td>
<td>0.575</td>
</tr>
<tr>
<td></td>
<td>Feedback</td>
<td>7.347</td>
<td>4.674</td>
</tr>
<tr>
<td></td>
<td>Effort</td>
<td>2.000</td>
<td>2.839</td>
</tr>
<tr>
<td></td>
<td>Satisfaction-Goals</td>
<td>0.347</td>
<td>0.358</td>
</tr>
<tr>
<td></td>
<td>Satisfaction-Performance</td>
<td>3.556</td>
<td>3.290</td>
</tr>
<tr>
<td></td>
<td>Satisfaction-Experimenter</td>
<td>0.500</td>
<td>0.710</td>
</tr>
<tr>
<td></td>
<td>Satisfaction-Feedback</td>
<td>5.014</td>
<td>4.176</td>
</tr>
<tr>
<td></td>
<td>Estimated Performance</td>
<td>0.500</td>
<td>0.499</td>
</tr>
<tr>
<td></td>
<td>Perceived Warmth</td>
<td>6.125</td>
<td>8.349</td>
</tr>
<tr>
<td></td>
<td>Number of Reinforcements</td>
<td>325.123</td>
<td>77.072</td>
</tr>
<tr>
<td>B</td>
<td>Practice Performance</td>
<td>8.167</td>
<td>0.759</td>
</tr>
<tr>
<td>(Social</td>
<td>Goals</td>
<td>1093.593</td>
<td>1.180</td>
</tr>
<tr>
<td>Reinforcement)</td>
<td>Performance</td>
<td>555.556</td>
<td>0.889</td>
</tr>
<tr>
<td></td>
<td>Successes</td>
<td>4.180</td>
<td>1.003</td>
</tr>
<tr>
<td></td>
<td>Task Interesting?</td>
<td>1.389</td>
<td>1.174</td>
</tr>
</tbody>
</table>

*Tests for significance for the knowledge of results variable are listed first, then those for the social requirement variable, and then their interaction.
<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback</td>
<td></td>
<td>0.875</td>
<td>0.557</td>
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</tr>
<tr>
<td>Effort</td>
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<td>0.722</td>
<td>1.025</td>
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<tr>
<td>Satisfaction-Goals</td>
<td></td>
<td>0.167</td>
<td>0.172</td>
<td>N. S.</td>
</tr>
<tr>
<td>Satisfaction-Performance</td>
<td></td>
<td>0.264</td>
<td>0.244</td>
<td>N. S.</td>
</tr>
<tr>
<td>Satisfaction-Experimenter</td>
<td></td>
<td>0.431</td>
<td>0.611</td>
<td>N. S.</td>
</tr>
<tr>
<td>Satisfaction-Feedback</td>
<td></td>
<td>0.097</td>
<td>0.081</td>
<td>N. S.</td>
</tr>
<tr>
<td>Estimated Performance</td>
<td></td>
<td>0.167</td>
<td>0.166</td>
<td>N. S.</td>
</tr>
<tr>
<td>Perceived Warmth</td>
<td></td>
<td>0.389</td>
<td>0.530</td>
<td>N. S.</td>
</tr>
<tr>
<td>Number of Reinforcements</td>
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<td>3.181</td>
<td>0.754</td>
<td>N. S.</td>
</tr>
</tbody>
</table>

**AxB**

<table>
<thead>
<tr>
<th>Source</th>
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<th>Mean Square</th>
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</thead>
<tbody>
<tr>
<td>Practice Performance</td>
<td></td>
<td>14.889</td>
<td>1.383</td>
<td>N. S.</td>
</tr>
<tr>
<td>Goals</td>
<td></td>
<td>195.068</td>
<td>0.211</td>
<td>N. S.</td>
</tr>
<tr>
<td>Performance</td>
<td></td>
<td>1200.456</td>
<td>1.920</td>
<td>N. S.</td>
</tr>
<tr>
<td>Successes</td>
<td></td>
<td>3.597</td>
<td>0.863</td>
<td>N. S.</td>
</tr>
<tr>
<td>Task Interesting?</td>
<td></td>
<td>1.389</td>
<td>1.174</td>
<td>N. S.</td>
</tr>
<tr>
<td>Feedback</td>
<td></td>
<td>1.514</td>
<td>0.963</td>
<td>N. S.</td>
</tr>
<tr>
<td>Effort</td>
<td></td>
<td>0.667</td>
<td>0.946</td>
<td>N. S.</td>
</tr>
<tr>
<td>Satisfaction-Goals</td>
<td></td>
<td>1.056</td>
<td>1.087</td>
<td>N. S.</td>
</tr>
<tr>
<td>Satisfaction-Performance</td>
<td></td>
<td>0.264</td>
<td>0.244</td>
<td>N. S.</td>
</tr>
<tr>
<td>Satisfaction-Experimenter</td>
<td></td>
<td>0.042</td>
<td>0.059</td>
<td>N. S.</td>
</tr>
<tr>
<td>Satisfaction-Feedback</td>
<td></td>
<td>0.264</td>
<td>0.220</td>
<td>N. S.</td>
</tr>
<tr>
<td>Estimated Performance</td>
<td></td>
<td>0.500</td>
<td>0.499</td>
<td>N. S.</td>
</tr>
<tr>
<td>Perceived Warmth</td>
<td></td>
<td>0.667</td>
<td>0.909</td>
<td>N. S.</td>
</tr>
<tr>
<td>Number of Reinforcements</td>
<td></td>
<td>4.042</td>
<td>0.958</td>
<td>N. S.</td>
</tr>
</tbody>
</table>
extent to which knowledge of results influenced goals, how satisfied the subject was with feedback received, the perceived warmth of the feedback received, and the number of reinforcements received. Also, while not within the typical bounds of significance level (p < .05), reported effort and satisfaction with performance both had probability levels less than .10. Admittedly, the evidence is far from conclusive, but there does appear to be some differences in the perceptions of subjects between the two knowledge of results conditions. There were no significant differences in the levels of performance, goals, or number of successes in the two conditions.

In relation to the other independent variable, social reinforcement, there were no significant differences observed across the three levels of the variable (warm, cold, or impersonal). Also, there were no significant interaction differences. It appears that for this sample, receiving positive as opposed to negative knowledge of results, did cause some differences in the perceptions of subjects while the social reinforcement variable had no effect. There were no differences observed between the two knowledge of results conditions for performance or goals.

It was hypothesized (Hypotheses I and II) that positive knowledge of results would lead to higher levels of performance than negative knowledge of results, with no difference expected between the two conditions in the goals set. The data collected in this experiment do not support the contention that there will be a difference in performance with no difference in goals. There was no significant difference across the two conditions in either total performance or total goals set.
Hypothesis III suggested that different types of social reinforcement (warm, cold, and impersonal) would lead to differences in performance, with no difference in goals. There were no significant differences in the goals set by subjects, but there was also no differences in performance across the conditions. Given that the subjects reported significantly (p < .01) different perceptions of "warmth of feedback" for the knowledge of results conditions (positive and negative), rather than for the social reinforcement conditions (warm, cold, and impersonal), it appears that the social reinforcement dimension was not as potent as the type of knowledge of results given. Thus, no matter how nice it is worded, negative knowledge of results (telling a subject he failed rather than when he succeeded) is always perceived as "colder" than positive knowledge of results. That is, positive knowledge of results regardless of the mode of delivery (encouraging verbalization, matter-of-fact statement, or the ringing of a bell) was perceived by subjects to be warmer than negative knowledge of results. Also, subjects reported significantly different satisfaction with the feedback that they received for positive as opposed to negative knowledge of results conditions.

In addition to the dependent variables required to test the hypotheses delineated earlier, other measures were obtained from subjects. For instance, self-reports on the extent to which feedback influenced goals, the amount of effort expended on the experimental task, and estimated performance were collected from each subject at the conclusion of the experiment. These measures were collected so that their relationship to other variables, such as goals, performance, and satisfaction,
would clarify the process by which knowledge of results influences performance and satisfaction, and to serve as checks on the experimental manipulations. The means of all dependent measures collected in the experiment are presented in Table 3.

Another result of this experiment was that subjects reported that the feedback that they received influenced their goals significantly more in the positive knowledge of results conditions than in the negative conditions. The number of reinforcements given to subjects were significantly higher in the positive conditions than in the negative, where reinforcement was any response other than silence (which occurred after failure in the positive conditions and after success in the negative conditions). As can be seen in Table 2, there was a significant treatment affect across the knowledge of results variable (positive-negative) for the dependent variable number of reinforcements.

**Satisfaction Hypotheses**

In relation to the hypotheses dealing with the satisfaction of subjects, inspection of the intercorrelations among various dependent measures offer some interesting findings. As can be seen in Table 4, a number of variables are significantly correlated with the satisfaction measures. Specifically, in relation to Hypothesis IV which suggested that there would be a significant relationship between satisfaction and the extent to which the task was seen as interesting, three satisfaction measures are significantly correlated with the extent to which the task was seen by the subjects as interesting. The correlations between the
TABLE 3. Means for all Dependent Variables Across the Six Experimental Treatment Conditions

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Treatment Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Warm SR#</td>
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<tr>
<td>Practice Performance</td>
<td>7.42</td>
</tr>
<tr>
<td>Total Goals</td>
<td>75.83</td>
</tr>
<tr>
<td>Total Performance</td>
<td>83.58</td>
</tr>
<tr>
<td>Successes</td>
<td>6.33</td>
</tr>
<tr>
<td>Task Interesting?</td>
<td>3.00</td>
</tr>
<tr>
<td>Feedback</td>
<td>3.42</td>
</tr>
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* p < .05
# p < .01
extent to which the task was interesting and the satisfaction with performance, experimenter, and feedback were .28, .32, .31, respectively. All of these correlations were significant at the p < .05 level.

The data did not support Hypothesis V in that there were no statistically significant correlations between task success (attaining a goal) and reported satisfaction.

In relation to Hypothesis VI, Table 2 indicates some support for the contention that receiving praise (positive reinforcement) does cause a difference in reported satisfaction. There was a significant (p < .05) main effect for the knowledge of results variable for reported satisfaction with feedback. Also, while not within typical bounds of statistical significance, satisfaction with performance appeared to be somewhat different (p < .10) across the two knowledge of results conditions. Also, as seen in Table 4, all four satisfaction measures were significantly correlated with the degree of "warmth" reported by the subjects in relation to the feedback received in the experimental sessions. Not surprisingly, the correlation between warmth and satisfaction with the experimenter who delivered the feedback was .46. The correlations between warmth and satisfaction with goals, warmth and satisfaction with performance, and warmth and satisfaction with feedback were .30, .32, and .36, respectively, which were all statistically significant.

**Additional Findings**

The lack of significant multivariate differences and the paucity of univariate differences across the six treatment conditions indicate that
the manipulations produced few demonstratable effects. Therefore, it seems unwise to treat the data in a true experimental sense, but rather an investigation of correlations in the data is necessary to provide insight into the process of goal setting and task motivation.

Inspection of Table 4 reveals some interesting results that were not specifically isolated for investigation in this study. That is, while the hypotheses were not specifically directed at the relationships among these variables, they are nonetheless interesting and provide additional insight into the process of goal-setting and task motivation.

The correlation between practice performance and the goals set, and the correlation between practice performance and overall performance are both so high (.79 and .86, respectively) that the apparent conclusion is that the experimental treatments had little effect on performance and goals. At the end of the practice trial, subjects were told how many problems they were able to solve correctly, and were then told how long the next trial would be and were asked to set a goal. In all subsequent trials, the subjects were only told whether or not they attained their goal and were asked to set a new goal based on that information. The subjects apparently set higher goals if they did well on the practice trial, and set lower goals if they did poorly, with the feedback received during the experiment having relatively little influence on their goals. The specific feedback given at the end of the practice trial apparently influenced markedly all goal-setting regardless of the type and kind of feedback administered later during the experimental trials.
Also, in relation to overall performance, the experimental treatments had little influence: if subjects did well in the practice trial, they also performed well overall, and similarly, if they performed poorly in the practice trial, they continued to perform poorly in the later trials.

The number of successes, or the number of times that a subject attained or did better than his goal, was negatively related to the goals set and not related to any other variable. That is, generally speaking, setting relatively hard goals led to few successes, while lower goals led to more successes.

Not surprisingly, the extent to which subjects found the task interesting was related to a number of other dependent measures. Self-reports of effort expended during the experiment and actual total performance were significantly related to the extent of interest in the task. Subjects who found the task interesting apparently exerted effort and actually did perform well. However, there was no significant relationship between the goals set by subjects and the extent to which the task was perceived as interesting, and yet there was a significant relationship between effort and the goals set. Thus, while cause-effect relationships are difficult to determine from correlational data, it appears that high interest in the task led to effort, which in turn led to high goals and high performance.

The reported task interest was also related to three satisfaction measures and the degree of warmth perceived in the feedback given to subjects. Thus, feelings of warmth and satisfaction with various aspects of the experiment were related to the extent to which subjects found the task interesting.
The fact that the subjects' reports of the extent to which feedback influenced their goals were not significantly related to the actual goals suggests that the subjects did not view the information obtained after each trial as meaningful, and it did not influence any of their other perceptions or actual behavior. However, the significant difference between positive and negative knowledge of results on the feedback variable and the differences on the "warmth" variable suggest that subjects did perceive differences in the feedback received, but it did not influence their performance or goals.

Self-reported effort expended during the experimental trials was significantly related to practice trial performance, total performance on all nine experimental trials, total goals, satisfaction with performance, estimated performance, warmth, and age. It is not surprising that effort was related to those variables dealing with performance, and the relationship between warmth and effort, as previously discussed, is also easily explained. The one unusual finding was that the age of subjects was significantly related to the reported effort of subjects. Age was not related to any other dependent variable, and its relationship to effort is particularly difficult to interpret. Possibly, subjects who were older and further removed from school situations involving arithmetic computation did have to expend more effort to solve the problems presented in the experimental task. The lack of significant correlations with other variables makes this explanation the most plausible.

In relation to the satisfaction measures collected at the conclusion of the experiment, there are a number of significant relationships.
First, satisfaction with goals was significantly related to satisfaction with performance and to perceived warmth. Subjects who were satisfied with the goals that they set for themselves tended to also be satisfied with their performance on the experimental task, and being satisfied with goals also tended to be associated with high reports of warmth. The fact that warmth was also related to all satisfaction measures suggests that satisfaction, in general, was a function of the warmth perceived by subjects. Considering that satisfaction with goals was not related to the actual goals set by subjects or to the number of times that they were successful indicates that the social interaction during the experiment contributed to the reported satisfaction. That is, high perceived warmth led to high reports of satisfaction, and yet success and total goals had no apparent effect on satisfaction. Performance was the only objective task-oriented variable related to satisfaction, and it only related to satisfaction with performance. For the three other satisfaction measures (satisfaction with goals, satisfaction with the experimenter, and satisfaction with feedback) objective indicators such as performance, goals, and successes were not correlated significantly, while self-report variables such as warmth, the extent to which the task was interesting, and reported effort were related to satisfaction measures.

It is also interesting to note that of all the possible intercorrelations of the four satisfaction measures, only the correlation between satisfaction with performance and satisfaction with goals ($r = .41$) and the correlation between satisfaction with feedback and satisfaction with the experimenter ($r = .31$) were statistically significant. Subjects in
this experiment were able, at least to a certain extent, to distinguish between the different satisfaction measures and did not let a general overall feeling unduly influence their ratings.

Satisfaction with performance was correlated with a number of variables including actual performance, total goals set, task interest, effort, satisfaction with goals, estimated performance, and warmth. It is not surprising that satisfaction with performance was related to such variables as actual performance, effort, and estimated performance; subjects in an experiment can be expected to know, to some extent, how well they are doing in relation to performance. However, the fact that satisfaction with performance was not related to attaining goals (number of successes) again suggests that subjects did not see attaining goals as particularly important in this experiment. The setting of goals and seeking to attain them seemed to be of relatively little importance in determining satisfaction with performance. Subjects seemed to know when they were performing well in an absolute sense, which influenced their satisfaction even though feedback given in the experiment was contingent upon how well they performed in relation to goals. Though the data are not that conclusive, it does appear that goal setting in this experiment was seen by subjects as unrelated to performance. Also, since such affective measures as perceived warmth and the extent to which the task was interesting were related to satisfaction with performance and attaining goals was not, non-performance factors apparently influenced the ratings of satisfaction with performance.
Reported satisfaction with the experimenter was significantly correlated with perceived warmth, satisfaction with feedback, and the extent to which the task was seen as interesting. Thus, the subjects who reported high degrees of warmth, were satisfied with the feedback, and found the task interesting, also were highly satisfied with the experimenter. Satisfaction with feedback received was also significantly correlated with warmth and task interest. Thus, subjects who generally perceived warmth and found the task interesting were satisfied with both the experimenter and the feedback received; that is, they could not completely separate the feedback received from the person who delivered the feedback (experimenter).

When subjects were asked to estimate their performance on the task relative to other college students at the conclusion of the experiment they reported estimates that correlated significantly with practice performance, total goals, actual performance, effort, and satisfaction with performance. Subjects who estimated their performance as better tended to report high levels of effort expended and high levels of satisfaction with performance, and in fact did actually perform well and set higher goals. Obviously, the subjects had somewhat accurate perceptions of their actual performance independent of the feedback they received since being successful was not correlated with performance measures. That is, feedback given by the experimenter was contingent upon reaching a goal rather than any particular level of performance so that if subjects relied solely upon the experimenter for knowledge of results, being successful would be expected to directly influence perceptions of performance.
The sex of the subject was not related to any of the other variables suggesting that there were no sex differences in the experimental task. The age of the subjects was related to only one variable, self-reported effort. As mentioned earlier, it is possible that older subjects did have to exert more effort in order to perform as well as younger subjects.

**Correlational Differences Between Positive and Negative Knowledge of Results**

The differences observed across the positive and negative knowledge of results conditions in the analyses of variance suggest that the observed correlations across all conditions may not reveal all significant relationships. Tables 5 and 6 contain the intercorrelations of the dependent variables for those subjects in the positive and negative knowledge of results conditions, respectively. The most notable differences between the correlations in the two knowledge of results conditions involve the relationships among total performance, total goals, satisfaction measures, successes and self-reports of the extent to which feedback influenced goals.

The correlation between total performance and satisfaction with performance was .29 in the positive conditions and .60 in the negative conditions. Satisfaction with goals and the actual total goals set were correlated .36 in the negative knowledge of results conditions and -.22 in the positive conditions. Setting high goals was related to being highly satisfied with goals for those subjects who only were reinforced for failure, while those subjects who received positive knowledge of results tended to report lower satisfaction with goals when their goals
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were high. Apparently avoiding failure led to higher satisfaction scores than did being reinforced for being successful.

The other notable difference in the intercorrelations of dependent variables for subjects in the two knowledge of results conditions involved the correlation between the number of successes and the subjects' self reports of the extent to which feedback influenced their goals. For subjects in the negative knowledge of results conditions success and the influence of feedback were correlated -.41, which suggests that subjects who had high success rates were influenced little by the feedback received. This conclusion is not too startling since only failing trials were followed by specific feedback in the negative conditions. In the positive knowledge of results conditions, the relationship between successes and reported influence of feedback was .18 which was a non-significant correlation. Apparently, feedback had only a weak influence on goals set in the positive conditions. Thus, negative reinforcement again had a more significant impact on the subjects than did positive reinforcement.

Thus, while the multivariate and univariate analyses of variance yielded little useful information, inspection of the correlations among a number of variables indicate some relationships that may increase understanding of the goal-setting process. Since there were significant relationships among performance, goals, and being successful, investigation of trial-by-trial performance and goal-setting appears to be a potentially fruitful avenue of exploration. The data reported to this point have only been for total performances and total goals for all nine trials of the experiment. However, investigation of these variables across all nine trials may shed additional information.
Results of Trial-by-Trial Analysis

In order to uncover some of the dynamics involved in the goal-setting process which were not readily discerned in the earlier analysis, trial-by-trial analyses were made. That is, previously discussed results were based on overall performance, goals, and success for all nine experimental trials. The trial-by-trial analyses were undertaken to see if there were any differences on the dependent variables from earlier to later trials, for trials of different lengths, to see if the goals set were dependent upon previous performance, and what effects specific types of feedback had on goals and performance.

The mean performance and mean goals, both adjusted to a common unit of time, and the total number of successes and reinforcements for each experimental trial are shown in Table 7. The performance measure and goals are adjusted for a unit of time since the experimental trials varied in length from one to three minutes duration. Only by converting the goals set and actual performance in each trial to a common unit (one minute) could comparisons be made across trials. Successes are the number of times that actual performance was as high or higher than the goals for that trial, and number of reinforcements is the number of times that a definitive piece of information was given to a subject concerning his performance. That is, only those instances in which a subject reached his goal in the positive conditions and those instances in which a subject did not reach his goal in the negative conditions were counted as reinforcements since only silence followed the other instances.
TABLE 7. Trial-by-Trial Analyses of Goals, Performance, Successes, and Number of Reinforcements*.

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<td>Goals</td>
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<td>4.64</td>
<td>4.46</td>
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<td>Actual Performance</td>
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<td>Number of Reinforcements</td>
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* Reported mean goals and mean performance scores are adjusted to a common unit of time for comparison.
Figure 1 displays graphically the actual performance of and goals set by subjects across all nine experimental trials. Not surprisingly, mean actual performance was always greater than mean goals set across all trials. It is interesting to note that after trial 4, performance generally began to increase while goals declined.

Figure 2 displays the percentage of subjects who were successful on each trial for the positive and negative knowledge of results conditions. After trial 4, seventy per cent or better of the subjects in both conditions were successful which suggests that most subjects learned how to insure success in later trials of the experiment.

In order to minimize the effect of internal feedback relative to performance on the experimental task, and therefore make subjects more dependent upon the feedback delivered by the experimenter, the length of experimental trials was varied throughout the experiment. The trials were one, two, and three minutes long. However, the subjects were only told how long a trial would be relative to the immediately preceding trial. Thus, without an absolute standard to rely upon, keeping track of performance would be somewhat difficult for subjects. By presenting arithmetic problems in rapid sequence, and varying the length of trial, it would be difficult for the subjects to know how well they were doing except for the feedback given by the experimenter.

A basic question which must be asked is what effect did trials of different lengths have upon performance and goals? That is, did the subject behave differently when faced with a relatively long trial rather than a short one? To answer these questions, comparisons were made between trials of lengths one, two, and three minutes. In order or make comparisons it was again necessary to reduce the variables to be considered
FIGURE 1. Mean Performance and Goals Across Experimental Trials
FIGURE 2. Percentage of Successes* Across Experimental Trials for Positive and Negative Knowledge of Results Conditions

* Attaining or surpassing a goal
to a common unit of time, namely one minute. By calculating the goals set per minute and actual performance per minute, it was possible to make comparisons across trials of different lengths. Table 8 shows the mean goals, performance, and successes across the three trials. Successes were coded either 1 (failure to attain a goal) or 2 (attained a goal) such that the means reported necessarily fall between one and two.

As can be seen in Table 8, there was a significant difference across the three trials in the goals set by subjects and the number of successes they experienced. Mean performance scores across the three trials were not statistically different. Inspection of the means indicate that subjects set higher goals in shorter trials, and set lower goals in longer trials, and yet performance was very similar across trials (Figure 3). Also, mean successes were higher in the longer trials, for which goals were lower than for the shorter trials. Since performance was relatively constant across different lengths of trials, and goals were high in the one-minute trials and low in the three minute trials, success rate would obviously be expected to be higher in the longer trials.

Another question to be asked is what effect did the different types of reinforcement have upon subsequent goals? In the positive knowledge of results conditions, subjects received either positive reinforcement for attaining a goal or silence for failing to attain a goal. Similarly, in the negative conditions, subjects received either negative reinforcement for failing to attain a goal, or silence for attaining a goal. Did positive reinforcement cause subjects to set higher goals than reinforcement indicating failure? In order to answer these questions, the average goals per unit of time following each kind of reinforcement were
TABLE 8. Mean Goals, Performance, and Success for Trials of Varying Lengths*

<table>
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<th>Trial Length</th>
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<tr>
<td>Goals</td>
<td>5.56</td>
<td>4.56</td>
<td>4.18</td>
<td>F=27.90, p .01</td>
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<td>Actual</td>
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<tr>
<td>Performance</td>
<td>4.88</td>
<td>4.94</td>
<td>5.06</td>
<td>F=.34, N.S.</td>
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<td>Successes</td>
<td>1.69</td>
<td>1.68</td>
<td>1.81</td>
<td>F=5.94, p .01</td>
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</table>

* All scores reported are adjusted to a common unit of time for comparison.
FIGURE 3. Mean Goals and Performance for Trials of Varying Lengths
calculated. The results of these calculations are shown in Table 9. In relation to the percentage of each kind of reinforcement, it is apparent that reinforcement with positive connotations was certainly more prevalent than reinforcement connating failure (negative and punishment). Since subjects had control both over the goals that they sought and their performance, it is safe to conclude that they generally structured the situation to insure succeeding.

In relation to the mean goals set after each kind of reinforcement, the situation is perplexing. The mean goals presented in Table 8 are significantly different (F=7.84, p < .01), and yet are ordered in opposite direction of what would be expected. One would expect that subjects would set harder goals after trials on which they had been successful, and yet the subjects in this experiment set harder goals after a failure. After receiving positive reinforcement or not receiving negative reinforcement, both of which signified success, subjects set mean goals of 4.76 and 4.32, respectively. After a trial in which negative reinforcement was received or not positive reinforcement was received, both of which indicated failure, subjects set mean goals of 5.26 and 5.51, respectively. After a failure subjects were apparently more risky and set goals that were even more difficult than the subjects who had attained a goal.

When considering the effect of being successful on a trial and the goal that is subsequently set, one would expect that success would cause subjects to set a somewhat higher goal. However, the correlations between success on a trial and the goal set on the next trial were all negative except one suggesting that subjects set lower goals after a success and
<table>
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<th>Positive KR Conditions</th>
<th>Negative KR Conditions</th>
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<td></td>
<td>Positive Reinforcement</td>
<td>Negative Reinforcement</td>
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<td>Number of Trials</td>
<td>238</td>
<td>86</td>
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<tr>
<td>Percentage of Trials</td>
<td>74%</td>
<td>26%</td>
</tr>
<tr>
<td>Mean Goal Following RE</td>
<td>4.76</td>
<td>5.51</td>
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</table>

|                        | Punishment | Positive Reinforcement | Total |
| Number of Trials       | 240        | 84                     | 324   |
| Percentage of Trials   | 25%        | 75%                    | 100%  |
| Mean Goal Following RE | 5.26       | 4.32                   | 5.02  |
higher goals after a failure. The correlations were -.18, -.04, -.24, -.13, -.06, -.09, +.11, and -.21. While not substantial correlations, the consistent negative relationship could suggest that success caused subjects to actually set lower goals than did failure.

Thus, the trial-by-trial analyses do provide some definitive results, but at the same time create additional perplexing problems that may require further study.
DISCUSSION

The only well substantiated experimental differences appearing in the data involved the perceptions of subjects in relation to affective dimensions. Positive, as opposed to negative, feedback did cause differences across the feedback conditions for the objective variables such as performance, goals, or successes. The social reinforcement variable apparently had no effect on either affective or objective measures, and it apparently was confounded perceptually with the positive versus negative feedback conditions.

One perplexing finding of this experiment involved subjects in the positive knowledge of results of conditions. They experienced significantly more instances of reinforcement than did subjects in the negative conditions, and also reported that feedback influenced their goals more than did subjects receiving negative feedback. However, there were no differences overall in the goals actually set by the two groups. Apparently, the subjects in the positive knowledge of results conditions were more cognizant of the feedback that they received but other factors had a more significant impact on their goals. The fact that practice trial performance was correlated with total performance .86 and total goals .79 suggests that both goals and performance were consistent with pre-experimental performance. That is, subjects who performed well in the practice trial tended to continue to perform well later on and also continued to set goals that were consistent with their performance. Likewise, subjects who performed poorly on the practice trial tended to
perform less well on later trials and also set goals consistent with their performance.

In relation to Locke's (1968) theory of task motivation which maintains that knowledge of results leads to the setting of goals which then influences performance, the evidence is not conclusive. Overall performance and overall goals were correlated .84, but the fact that practice performance was also correlated highly with both goals and performance suggests that goals may have either caused or have been caused by performance. The trial-by-trial analysis of the data revealed that after the fourth trial, performance increased gradually while goals decreased. Apparently, subjects manipulated the variables under their control (goals set and their performance) to insure success in later trials.

Since feedback was contingent upon success, and successes increased in later trials, subjects apparently manipulated the situation to insure success but did not change their performance to any great extent. Since the trial-by-trial analysis revealed that differing kinds of feedback had no effect on performance and that it did effect the goals set, it appears that performance was somewhat independent of the goals set. Goals and performance were certainly intercorrelated highly, but changes in goals caused by feedback were not associated with changes in performance. The feedback given caused changes in goals but no changes in performance, which suggests that goals and performance were two independent variables that usually varied in the same direction.

In relation to the experiment itself, it appears that after the first four trials the subjects became aware of the contingencies and behaved in accordance with them. That is, subjects were rewarded, or
given feedback, based upon how well they performed in relation to the
goal that they had set for that trial. After the first four trials,
subjects generally set lower goals, performed somewhat better, and increased
considerably the instances that they were successful. Thus, since there
was no reward for setting higher goals, and since they only had to reach
their goal to be successful, subjects increased their chances of success
by setting lower goals. Once the reward contingencies became apparent,
most of the subjects manipulated the situation to insure that they would
be rewarded. Since successes were negatively correlated (-.41) with
goals across all trials, it is apparent that setting lower goals led to
higher success rates and setting high goals led to lower success rates.

In relation to the reported satisfaction of the subjects in this
experiment, being successful (attaining a goal) had no relationship with
satisfaction, contrary to one of the hypotheses. Also, subjects who
experienced praised and perceived high degrees of warmth and found the task
interesting, reported significantly higher degrees of satisfaction. Since
the experiment was of short duration it is impossible to determine what
effect these affective orientations might have on performance over a
longer period of time.

The contradictions between Locke's cognitive theory of task motiva-
tion and the S-R theoretical viewpoint, which were discussed earlier,
cannot be conclusively resolved by this experiment. The equivocality of
the experimental data prohibit any widespread generalizations aimed at
resolving the conflict. However, the correlational and trial-by-trial
analyses do not generally support Locke's theory of task motivation.
While it is true that goals and performance were highly correlated, further investigation suggests that they were somewhat independent variables. That is, while highly correlated overall, changes in goals across trials were not associated with changes in performance. Thus, Locke's contention that goals directly influence performance was not supported. Also, even though different types of feedback had no effect on goals or performance, the feedback did cause differences in self-reports on a number of affective dimensions.

If Locke's model is valid, then environmental events such as feedback do cause cognitions which are evaluated, and which then lead to goals which subsequently influence performance. Of course, it cannot be assumed that this experiment controlled all potentially salient environmental events, but there is some evidence to indicate that feedback did not affect performance in the manner that Locke has suggested.

When viewing the results from an S-R perspective, there appears to be some support for the notion that the contingencies of reinforcement present in the experiment did influence behavior. For example, trial-by-trial analysis indicated that subjects did set significantly different goals depending upon whether they had received positive or negative reinforcement on the previous trial. However, the lack of differences in performance suggest that other variables may have been more potent than the experimental treatments. Also, when performance and goals were investigated across the nine experimental trials, it was apparent that after the first four trials subjects set goals to increase the probability of receiving positive reinforcement.
Implications

Locke's theory of task motivation, particularly the setting of goals, has been applied in a number of real-life situations. Management by objectives and related techniques are based upon the setting of specific goals or objectives, and their subsequent review in relation to the objectives attained. Most of the evidence supporting Locke's theory was derived from laboratory experiments in which hard, specific goals were imposed upon subjects. However, in most real-life situations in which objectives are set, the individual usually does not have those objectives imposed. In this experiment subjects had freedom in choosing the goals which they would seek, and it was found that goals did not necessarily influence performance.

In most real-life settings the goals that are set are mutually agreed upon by a superior and subordinate which implies that goals are likely to be moderate to moderately difficult. Locke's research is predominately based upon difficult goals, while this experiment allowed subjects to set their own goals which may have resulted in relatively easier goals. Thus, perhaps the difficulty of goals set in management by objectives are somewhat easier than the "hard" goals of Locke's research. Therefore, the implications of the research reported here may be viewed "correcting" for the somewhat extreme position of Locke relative to the real-life practices. That is, if Locke's research technique is too extreme in the difficult direction to allow inference to real life situations, this research can be seen as more realistic. Thus, there are a number of implications of this research for practice.
First, giving positive rather than negative reinforcement does cause differences in a number of affective dimensions. Even though the relationship between satisfaction and performance is elusive, satisfaction has been shown to be related to turnover and absences (Vroom, 1964). Therefore, if positive reinforcement does lead to increases in satisfaction, it could also reduce turnover and absences.

Second, if individuals are given freedom in setting their own goals, this research suggests that goals will be made easy enough to insure success. If individuals are reinforced only for attaining goals, they will set lower goals to insure reinforcement. Thus, additional pressures must be applied to insure that goals will be sufficiently difficult to insure efficiency and the fulfillment of organizational goals.

Finally, in relation to the social reinforcement variable in conjunction with the positive-negative reinforcement variable, it is apparent that negative reinforcement, no matter how warmly presented, is perceived as negative. That is, in this experiment presenting negative information in a warm manner was still perceived as cold and negative, while positive feedback, no matter how presented, was seen as "warm." Given that negative feedback was related to low satisfaction scores, it appears that providing feedback in a negative manner will have negative consequences. On the other hand, giving positive information led to high satisfaction scores which are purportedly desired on organizational life. Thus, except in extreme cases, it would be advisable to concentrate upon giving positively oriented feedback to subordinates to insure their long-term commitment to the organization.
Conclusion and Recommendation

It is always difficult to conclusively resolve questions investigated in just one research study. This experiment was not unusual in that definitive conclusions cannot be drawn with any degree of certainty. It is apparent from this research that positive as opposed to negative knowledge of results does cause differences in some dependent variables. On the other hand, social reinforcement as operationalized in this experiment apparently had little effect when it was crossed experimentally with positive and negative knowledge of results.

This experiment also found little support for Locke's (1968) cognitive theory of task motivation in that changes in goals, or behavioral intentions, were not generally associated with changes in actual performance. On the other hand, the evidence for stimulus-response interpretations of goal-setting and task performance was somewhat more positive, but still did not provide a definitive answer.

One finding that is inescapable is that when given the freedom to set their own goals, subjects will set goals to insure that they will avoid failure. If there is no payoff for setting difficult goals, subjects will set goals so that there is little chance of failure. Subjects in psychology experiments theoretically behave much like people do in real life: they typically behave in a manner that will likely be positively reinforced!

It seems appropriate at this time to pay homage to the "god of further research." Research studies, no matter how poorly or how well designed, only provide approximations to truth, and considerable additional research is needed in the area of task motivation if we are to
fully understand the process. Characteristics of the experimental task such as complexity, decision verifiability, path-goal multiplicity, and duration were not investigated in this experiment, and may have influenced the results. Also, even though this experiment involved seventy-two subjects, it is possible that individual differences caused or obliterated differences in the dependent variables.

Additional variables which are suggested whenever investigating the effects the knowledge of results on behavior are the specificity of knowledge of results, schedules of reinforcement, and the absence of knowledge of results. These additional variables could all affect the goal setting process to a considerable extent. Finally, the extent to which individuals have control over the goals set and whether they are reinforced in any fashion for setting difficult goals are both potentially salient variables which have direct applications to real life goal setting situations. Once these variables have been investigated in relation to goal setting and task performance, perhaps more definitive statements can be made about the determinants of task motivation.
APPENDIX A

Feedback Used for the Experimental Condition
Positive-Warm Feedback

First successful trial: Very good—you made your prediction.
Second successful trial: O.K., keep it up, you’re doing very well.
Third successful trial: Fine, keep up the good work, you’ve made your prediction again.
Fourth successful trial: Outstanding! You’re doing very well.
Fifth successful trial: Great! You’ve made your prediction again.
Sixth successful trial: Very good—you’re doing fine.
Seventh successful trial: Tremendous! You must do well in math classes.
Eighth successful trial: Excellent! Keep it up.
Ninth successful trial: You did very well on that trial!

Negative-Warm Feedback

First failing trial: You didn’t make your estimate but keep trying.
Second failing trial: No—but try again.
Third failing trial: Nice try, but you didn’t make your prediction.
Fourth failing trial: No, try a little harder.
Fifth failing trial: Not that time, but keep trying.
Sixth failing trial: That wasn’t up to your prediction—try again.
Seventh failing trial: No—keep going.
Eighth failing trial: You weren’t able to make your prediction—try again.
Ninth failing trial: Not that time.

Positive-Cold Feedback

First successful trial: You made your prediction.
Second successful trial: You attained your prediction.
Third successful trial: Good.
Fourth successful trial: You did well.
Fifth successful trial: That was up to your prediction.
Sixth successful trial: You made your prediction.
Seventh successful trial: You're doing well.
Eighth successful trial: Fine.
Ninth successful trial: Good.

**Negative-Cold Feedback**

First failing trial: You failed to make your prediction.
Second failing trial: You must not be trying.
Third failing trial: That was bad.
Fourth failing trial: Wow! You'd better try harder.
Fifth failing trial: You failed again
Sixth failing trial: Are you really trying?
Seventh failing trial: Terrible!
Eighth failing trial: You failed again.
Ninth failing trial: That was bad!

**Positive-Impersonal Feedback**

All successful trials: a bell was rung.

**Negative-Impersonal Feedback**

All failing trials: a bell was rung.
APPENDIX B

Problems Used in the Experimental Task
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APPENDIX C

Instructions Given to Subjects
**Introduction to Experiment**

I am trying out this task so that I can use it in the future in a larger experiment. The task involves adding a series of numbers and determining the correct answer. Each number will be two digits, and you will have to add three two-digit numbers. For example,

18
19
22

You will add them up in your head, and then tell me what you think is the correct answer. (Pause)

I will hold up one set of numbers for five seconds. You must call out an answer before the next set of numbers appears. When another set of numbers appears, you will have to add them, and so on.

Do you have any questions?

**Instructions for the Nine Experimental Trials**

You were able to get ___ correct answers during that trial. You will now have a number of trials of varying lengths. After I tell you how long each trial will be, I would like you to predict how many problems you think you will get correct. After each trial, I will tell you if you

a. got at least as many correct as you predicted.
b. did not get at least as many correct as you predicted.
c. got at least as many correct as you predicted by ringing the bell.
d. did not get at least as many correct as you predicted by ringing this bell.
APPENDIX D

Post-Experimentation Questionnaire
Subject ____________________________

Please circle the appropriate number:

1. How interesting did you find this task:
   1 2 3 4 5
   Not interesting                            Very interesting

2. How much did the information provided by the experimenter influence your predictions before each trial?
   1 2 3 4 5
   Didn't influence predictions               Influenced very much

3. How would you describe your efforts during the experiment?
   1 2 3 4 5
   Didn't try at all                          Tried very hard on all trials

4. How satisfied were you with the predictions that you made before each trial?
   1 2 3 4 5
   Not satisfied                             Very satisfied

5. How satisfied were you with your performance on this task?
   1 2 3 4 5
   Not satisfied                             Very satisfied

6. How satisfied were you with the experimenter?
   1 2 3 4 5
   Not satisfied                             Very satisfied
7. How satisfied were you with the information provided about your performance?  

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<td>Not satisfied</td>
<td>Very satisfied</td>
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8. In relation to other college students, how well do you think that you performed on the task?  

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<td>Lowest 20%</td>
<td>Top 20%</td>
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9. How would you describe the information provided by the experimenter concerning your performance?  

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<td>Very warm</td>
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10. How old were you on your last birthday?  

11. What sex are you? M F
APPENDIX E

Variables Used in This Experiment
Knowledge of Results

1. Positive
2. Negative

Social Reinforcement

1. Warm
2. Cold
3. Impersonal

Time Order (length in minutes of each trial)

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Practice Performance

Number of problems solved correctly in the two-minute practice trial.

Total Goals

Total number of goals set for all nine experimental trials.

Total Performance

Total number of problems solved correctly for all nine experimental trials.

Successes

The number of trials for which the subject attained his goal
(solved as many or more problems than his goal).
Task Interesting

How interesting did you find this task?

1—Not interesting
2—
3—
4—
5—Very interesting

Feedback

How much did the information provided by the experimenter influence your predictions before each trial?

1—Didn't influence predictions
2—
3—
4—
5—Influenced very much

Effort

How would you describe your efforts during the experiment?

1—Didn't try at all
2—
3—
4—
5—Tried very hard on all trials
Satisfaction with Goals

How satisfied were you with the predictions that you made before each trial?

1—Not satisfied
2--
3--
4--
5--Very satisfied

Satisfaction with Performance

How satisfied were you with your performance on this task?

1—Not satisfied
2--
3--
4--
5--Very satisfied

Satisfaction with Experimenter

How satisfied were you with the experimenter?

1—Not satisfied
2--
3--
4--
5--Very satisfied
Satisfaction with Feedback

How satisfied were you with the information provided about your performance?
1—Not satisfied
2—
3—
4—
5—Very satisfied

Estimated Performance

In relation to other college students, how well do you think that you performed on the task?
1—Lowest 20%
2—
3—
4—
5—Top 20%

Perceived Warmth

How would you describe the information provided by the experimenter concerning your performance?
1—Very cold
2—
3—
4—
5—Very warm
Age

How old were you on your last birthday?

Sex

What sex are you?
1. Male
2. Female

Number of Reinforcements

The number of instances across the nine trials when the subject received some feedback other than silence.
BIBLIOGRAPHY

Arps, G.F. "Work With Knowledge of Results Versus Work Without Knowledge of Results." Psychological Monographs (whole No. 125) 28, 3, 1920.


