

LEVEL OF ASPIRATION AND LEARNING  
ON A TWO DIMENSIONAL TASK

by

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## INTRODUCTION

In 1930 Hoppe published the first empirical study concerning the concept of level of aspiration. An individual's level of aspiration is that person's expectations, goals, or claims on his own future achievement in a given task (Hoppe, 1930). Since Hoppe's initial study the concept of level of aspiration has been investigated by a number of psychologists. In recent years it has become an area of interest for managers because of its implications for training and performance appraisal programs. Since these areas have been traditionally delegated to the industrial engineer, it would seem beneficial for him to have a basic understanding of the research in this area.

The experimental level of aspiration situation was first developed by Frank in 1935. It consisted of first, having the subject perform a given task and second, informing him of his performance and asking him to state his performance goal for the next trial. This two-step process was then repeated until the desired number of trials had been completed (Frank 1935a).

Typically, research on level of aspiration can be classified into two major categories. The first concerns the factors which make up and influence an individual's level of aspiration. The second category includes the studies relating level of aspiration to skill learning, task performance and job satisfaction.

### Factors Influencing Level of Aspiration

Frank was the first to study the underlying needs influencing an individual's level of aspiration. He concluded that level of aspiration

is based on the relative strength of three needs: (1) the need to keep the level of aspiration high regardless of the performance; (2) the need to make the level of aspiration approximate the future performance level; and (3) the need to avoid failure (Frank 1935a). These conclusions were supported nine years later by Lewin, Dembo, and Sears (1944).

After studying the underlying human needs, Frank turned his attention to other external factors influencing the level of aspiration. Frank (1935b) reported that self-competition and social pressure influence an individual's level of aspiration. They did so normally by strengthening the need to keep the level of aspiration high, but sometimes instead strengthened the need to avoid failure. From his earlier study and this study he later concluded that the level of aspiration represents an estimate of future performance levels and a means of protecting ego-level when it becomes involved through self-competition and social pressure in the task (1935c). The influence of self-competition and social pressure on level of aspiration was later verified by Hertzman and Festinger (1940) who found that the level of aspiration can be varied considerably by altering the specific features of a task situation namely through the involvement of the ego level through self-competition and social pressure.

Preston and Bayton (1942) discovered that there were two types of level of aspiration. The individual has an ultimate level of aspiration or goal and an actual level of aspiration which he attempts to achieve during a given trial. Because the actual and ultimate levels were found to be highly positively correlated, they concluded that the actual level of aspiration was a subgoal which, if attained, would assist in the accomplishment of the ultimate goal. Further, it was

determined that the ultimate and actual goals were influenced by the need to keep the level of aspiration high and the need for level of aspiration to approximate actual performance while the minimal acceptable performance level was influenced by the need to avoid failure.

Lewin in 1944 contended that success and failure directly influence level of aspiration (Lewin, Dembo, and Sears, 1944). Many studies have supported this contention finding that success raised the level of aspiration (Gardner, 1940; Klugman, 1948; Child and Whitney, 1949). The major disagreement in this area is over the definitions of success and failure. The usual definitions are Frank's definitions of success as the attainment of ones goals and failure as not reaching ones goals (Frank 1935a). However, Gould claims that success and failure cannot be defined in terms of an absolute or relative achievement score. Each individual defines success and failure in his own way. Usually it depends upon whether the individual perceives his goal as being difficult or easy. Achievement of an easy goal is not necessarily a success (Gould, 1939). These findings were later verified by Kausler and Trapp (1958).

Two more recent studies have dealt with the goal-setting process itself. Locke (1965) found that the closer performance is to the level of aspiration, the higher the satisfaction of the individual. Later Locke, Cartledge, and Knerr (1970) generalized that dissatisfaction with prior performance generates the desire to change ones performance and satisfaction with performance generates the desire to maintain or improve subsequent performance in hopes of attaining even greater satisfaction.

### Level of Aspiration and Performance, Learning, and Job Satisfaction

Frank (1935b) and Kausler (1959) both recognized that the level of aspiration and performance were related. Frank discovered that performance influenced subsequent levels of aspiration while Kausler found that level of aspiration influenced performance. Both results are consistent with the goal setting model developed by Locke, Cartledge and Knerr (1970). However, these findings led to a debate which is still unresolved.

The level of aspiration experiment usually consists of the individual performing a task, being informed of his performance, and then, being asked to state his level of aspiration for the next trial (Frank, 1935a). The question raised is whether or not it is the knowledge of results or the statement of the level of aspiration which causes the increase in performance. Many people feel that knowledge of results itself has a great impact on performance (Hundal, 1969). Three studies indicate that knowledge of results does not have such an impact. Fryer (1964) found that the expression of a level of aspiration enhanced performance beyond the mere knowledge of results. The other two studies found that knowledge of results did not influence performance independently of the individual's level of aspiration. In fact, they concluded that knowledge of results is important only through its influence on an individual's goals (Locke and Bryan, 1966b; Locke, 1967). To the author's knowledge, no one has successfully challenged these generalizations.

Locke and Bryan (1966a) found that performance goals enhance performance regardless of the task being performed. They further discovered that once a goal is set, the performance level will be



regulated by it (Bryan and Locke, 1967b). For example, a worker who has almost reached his production quota by midafternoon will slow down. From these findings Locke contended that the effects of performance goals on performance is dependent upon the level at which the goals are set, the higher the goal the higher the performance (Locke, 1966b). Subsequent studies by Locke supported this contention (Locke, 1966a, 1968). Locke, however, seems to indicate from his studies that there is no upper limit to the difficulty of the goals. This was not borne out, however, by a study conducted by Dey and Kaur, (1965). They found that performance increased with an increase in goal level up to a certain optimal limit above which performance was impaired. This level was found at an 80% improvement over previous performance.

In addition to his findings concerning goal difficulty, Locke made another significant finding. That was concerning specific versus "do your best" goals. He found that performance was enhanced when performance goals were quantified (Locke, 1968). That is, a goal of a 5% productivity increase will have more effect on productivity than will a goal of increased productivity. From this conclusion and the one concerning goal difficulty came the fundamental generalization concerning the effects of goals on performance. Specific, hard (difficult) goals induce a higher level of performance than do goals of "do your best" (Locke and Bryan, 1966b, 1967).

Specific performance goals have additional effects beyond increasing performance. Locke and Bryan found that the expression of a level of aspiration influences the intensity of effort and prolongs the effort during the work period (Locke and Bryan, 1966a). In a subsequent study, they found that task interest was enhanced by the expression of a level

of aspiration (Locke and Bryan, 1967). Finally, Bryan and Locke found that specific performance goals can serve to raise the motivation of individuals who are low in initial task motivation.

Perhaps the most significant study concerning the additional effects of level of aspiration was done by Fryer (1964). He hypothesized that the expression of a level of aspiration would enhance the learning of a task and thus serve as an important training technique. To test his theory he chose the learning of selected Morse Code letters. His experiment consisted of two independent groups, one of which was asked to express a level of aspiration following each trial and the other which was only given their performance after each trial. His results verified his hypothesis that the level of aspiration would have a positive influence on learning. To date, Fryer's study stands alone in examining the effects of level of aspiration on learning.

### Applications

There have been three direct applications of the concept of level of aspiration to industrial situations. The first occurred in 1940 when sewing machine operators in a garment factory were allowed to set their own productivity (French, 1940). The second application was reported in 1965. In this application, workers were asked to set specific goals on certain performance items. The results showed significant improvement in 65% of the items upon which specific goals were set while only 27% of those items not translated into goals showed significant improvement (Meyer, Key, and French, 1965). The third and most widespread application is found in the management by objectives program. The program is being used by industry to evaluate managerial performance.

Simply stated the manager establishes goals for himself in each area of his job responsibility. His performance is then evaluated in terms of those goals (MacGregor, 1960; Hughes, 1965).

While these three cases are the only published applications, it would seem reasonable to assume that other applications of this concept have been tried with favorable results. Certainly, the favorable results of these three published studies and the results of Fryer's code-learning study indicate that this is a fruitful area of research both in terms of increased productivity and improved training techniques.

#### Multiple and Conflicting Performance Criteria

If there is one shortcoming in the studies cited to this point, it is that they only considered one criterion for measuring performance, usually the number done or the number correct. Most jobs require that attention be paid to more than one performance criteria such as speed and accuracy. To the authors knowledge only three studies have examined multiple performance criteria. Howell and Kriedler (1963) examined the effects of maximizing speed and accuracy on a psychomotor task. They found that the individual usually adopts a high accuracy criterion (>90%) and the speed is then adjusted to or near the highest level at which the desired accuracy can be obtained. They also found that there is a minimum speed below which the individual will not drop. When faced with dropping below this level, he will instead lower his accuracy criterion. Further, they discovered instructions which placed equal emphasis on speed and accuracy yielded a higher performance than did speed emphasis or accuracy emphasis instructions. Later Howell and Kriedler (1964) using a more complex task duplicated these findings with one notable exception. With the more complex task, speed emphasis

instructions yielded better overall performance. This was probably due to the fact that the adoption of a high accuracy criterion caused speed to be driven below the individual's minimal acceptable speed. The third and most recent study was conducted by Locke and Bryan (1969). They found that in a multi-dimensional task goal-setting in one area enhanced performance in that area, but hindered performance in the others. This supports the earlier findings of Howell and Kriedler (1963) in which accuracy emphasis increased accuracy, but slowed the speed while speed emphasis increased speed, but lowered accuracy.

## PROBLEM

Both Fryer (1964) and Locke (1969) suggested that a study examining the influence of the expression of the level of aspiration on more than one aspect of performance would prove fruitful. Both researchers felt that the expression of the level of aspiration on more than one aspect of performance would enhance an individual's performance and learning. To this author's knowledge, no such study had ever been conducted. This study was an attempt to fill that void.

The purpose of this study was to examine the influence that the expression of the level of aspiration on two aspects of performance has over performance and learning. Specifically, it was designed to test the following two hypotheses:

1. The expression of level of aspiration on both aspects of a two dimensional task would enhance performance and learning above mere knowledge of results.
2. The expression of level of aspiration on both aspects of a two dimensional task would enhance performance and learning more than the expression of level of aspiration on only one of the two performance aspects.

## METHOD

### Task

The task chosen for this study was a letter cancellation task. The subject was instructed to scan a series of letters and eliminate the consonants D, H, L, M, R, and Y by marking an X through them. In one trial, the subject classified 360 letters, typed one space apart, and displayed as a block of 18 rows of 20 letters each. The block was centered on a sheet of 8½ x 11 inch typing paper. The percentage of the letters to be canceled was held constant at .20 in each trial. This meant that 72 letters in the cancellation set appeared in each trial. Furthermore, each letter within the cancellation was equally probable. This implied that each letter in the set occurred 12 times.

The blocks of letters were determined by first drawing the positions of the 72 letters to be canceled. The remaining positions were then filled by a random draw of the remaining 20 letters. This draw was done without replacement to insure that no letter would appear more than 15 times and each letter would appear at least three times within each block. Ten blocks were drawn in this manner; a sample block is shown in Figure 1.

This task was found to have several advantages. First, the subject's performance could easily be scored in terms of two performance criteria. These were the time taken to complete a trial (time) and the number of letters found in a trial (accuracy). Second, in a pilot study (Reid, 1972), it was found that few people could achieve and maintain perfection on the task. This made improvement on both

P P K W G E H A F B R K N Y X A A P F B  
 D V X R Z U T B W X A P H C J X L F L U  
 Q D U U P H O C Y O A P X S X Q H Z N B  
 A C Z O T E O Z P J R F Q H W E B I F A  
 P G Q N M I T U I B S L F P P N B N G V  
 D S V P A J F Q H L G C E L P R J A G R  
 C V O I A D K B O K J L U A F U Q B X E  
 M Q W V W Z M S K Z Q Y M Y U Z X S Z O  
 G E B B V C D T O S W C T X Z E E E V M  
 C T R Q N J V H H N W G V N Y N V W X K  
 E N W Q W F H Y T I W X K S J L J M Q J  
 W J L K L Z U C K V I L Y F N D K I J Y  
 R L Y W F T I Y H D V S F Y R O I E G M  
 D U F D W G R A L J E S M I N E O M I I  
 B O Q R F X T S Z S S N Z Q M K G R A N  
 X B G A J K I U Q T E Z H F V X R O X I  
 C E O I D G W P U P T D Y J O Z H D G A  
 T F J V B Z M M K K T G C U S C T N I Q

Figure 1. A Sample Training Trial

performance aspects nearly always possible. Third, the task could be easily and quickly scored on both performance aspects which made knowledge of results readily available and facilitated the goal-setting process. Finally, the task was found to simulate a complex inspection task (Shepherd, 1964), thus making it a meaningful task to study.

### Experimental Design

The study used an independent groups design. Four experimental groups of 15 subjects, 5 male and 10 female, were used. The first group was given only knowledge of their performance. The second group was asked to set time goals. The third group was asked to set accuracy goals. The fourth group was asked to set both time and accuracy goals. This design allowed the direct determination of the main effect of the dimensions in which goals were set.

### Dependent Variables

The dependent variables selected were the two performance dimensions, time and accuracy. Time was defined as the time it took a subject to complete one trial. It was recorded by a stop watch. Accuracy was defined as the number of letters correctly canceled. Seventy-two was a perfect score for accuracy. Differences in the mean levels of time and accuracy of the groups for each trial were analyzed, as well as the overall means for time and accuracy for each group.

### Subjects

Sixty subjects, ages 17-23, were selected from the student body of Kansas State University. Forty subjects were female and twenty were male. Thirty of the female subjects were members of the Gamma



Phi Beta sorority pledge class. The remaining ten females and all of the males were recruited by placing an ad in the University daily newspaper. The subjects were randomly assigned to one of the four experimental groups. Each subject was run individually. Each subject received \$1.75 for his participation.

### Procedure

The study consisted of one, 60 minute experimental session. The session was composed of a training procedure and 10 experimental trials.

The training procedure was the same in all four experimental groups. The study was explained as an analysis of the training process. The subject was then required to memorize the cancellation set letters. To facilitate the memorization process, he wrote each letter 10 consecutive times. The subject was then asked to repeat the letters in the cancellation set aloud to the experimenter. This process was repeated until the subject could recite the six letters without error.

At the completion of the training procedure the subject was told that the first training trial would begin. The task was also explained at this time. The subject was instructed to scan the block once and look for all six letters simultaneously. The subject was told that he would be scored on the basis of the time and accuracy criteria and that both criteria were equally important. At this point, the instructions varied. Those in the "knowledge of results" group were told only that they would be informed of their score. Those in the three "goal-setting" groups were informed that after the first trial they would be required to state their expected goal on one or both of the performance aspects depending upon which group they were in.

Further, they were told that the goals were of interest only to see how closely they were able to predict their own performance and not for any scoring purposes; the instructions for the four groups are shown in Figures 2-5.

After the completion of each trial, the trial was scored by the experimenter. During this time the subject was allowed to rest. The subject was then informed of his performance. If the subject was in a "goal-setting" group he was asked to state his expectations for those particular performance aspects. These goals were recorded by the experimenter and then the subject proceeded to the next trial. If the subject was in the "knowledge of results" group, he proceeded with the next trial immediately after he was informed of his performance.

In order to insure that differences in performance and learning among groups were not due to differences in the difficulty of the trials, the trials were presented in the same order to every subject.

### Task Instructions

1. This experiment will consist of 10 trials and will require about 50 minutes.
2. Each trial consists of a page of 360 letters.
3. You will be searching for the letters D, H, L, M, R, and Y.
4. Search the page for all six letters simultaneously. Look at each letter once and only once.
5. If you realize you have missed a letter, DO NOT go back to it.
6. When you find a letter, mark an X through it. Example: A B C X
7. When you finish a trial, STOP. Do not go on to the next trial until told to do so.
8. Your performance will be scored on the basis of how long it takes you to complete a trial and the number of letters found. Both of these aspects are equally important.
9. After each trial you will be informed of your performance.
10. Do you have any questions?

Figure 2. Instructions for Knowledge of Results Group

### Task Instructions

1. This experiment will consist of 10 trials and will require about 50 minutes.
2. Each trial consists of a page of 360 letters.
3. You will be searching for the letters D, H, L, M, R, and Y.
4. Search the page for all six letters simultaneously. Look at each letter once and only once.
5. If you realize you have missed a letter, DO NOT go back to it.
6. When you find a letter, mark an X through it. Example: A B C ~~X~~
7. When you finish a trial, STOP. Do not go on to the next trial until told to do so.
8. Your performance will be scored on the basis of how long it takes you to complete a trial and the number of letters found. Both of these aspects are equally important.
9. After each trial you will be informed of your performance. You will then be asked to state how long you expect to take on the next trial. (Example: five minutes) This goal will be used only to see how closely you are able to predict your performance.
10. Do you have any questions?

Figure 3. Instructions for Time Group

### Task Instructions

1. This experiment will consist of 10 trials and will require about 50 minutes.
2. Each trial consists of a page of 360 letters.
3. You will be searching for the letters D, H, L, M, R, and Y.
4. Search the page for all six letters simultaneously. Look at each letter once and only once.
5. If you realize you have missed a letter, DO NOT go back to it.
6. When you find a letter, mark an X through it. Example: A B C ~~X~~
7. When you finish a trial, STOP. Do not go on to the next trial until told to do so.
8. Your performance will be scored on the basis of how long it takes you to complete a trial and the number of letters found. Both of these aspects are equally important.
9. After each trial you will be informed of your performance. You will then be asked to state how many letters you expect to find on the next trial. (Example: 70) Seventy-two letters is a perfect score. This goal will be used only to see how closely you are able to predict your performance.
10. Do you have any questions?

Figure 4. Instructions for Accuracy Group

### Task Instructions

1. This experiment will consist of 10 trials and will require about 50 minutes.
2. Each trial consists of a page of 360 letters.
3. You will be searching for the letters D, H, L, M, R, and Y.
4. Search the page for all six letters simultaneously. Look at each letter once and only once.
5. If you realize you have missed a letter, DO NOT go back to it.
6. When you find a letter, mark an X through it. Example: A B C X
7. When you finish a trial, STOP. Do not go on to the next trial until told to do so.
8. Your performance will be scored on the basis of how long it takes you to complete a trial and the number of letters found. Both of these aspects are equally important.
9. After each trial you will be informed of your performance. You will then be asked to state how long you expect to take on the next trial. (Example: five minutes) and how many letters you expect to find on the next trial (Example: 70). Seventy-two letters is a perfect score.
10. Do you have any questions?

Figure 5. Instructions to Time-Accuracy Group

## RESULTS

The raw data of the study are given in Appendix A. The data are presented for each of the four experimental groups with trial-by-trial scores for individual trainees and, in addition, the performance goals set by the individual trainee in the three goal setting groups. Trial and means of the time criterion for each group are shown in Table 1. The overall mean time was 2.80 minutes. Trial and means of the accuracy criterion are shown in Table 2. The mean accuracy was 66.6 letters out of 72. The overall mean performance for the knowledge of results group was 2.87 minutes with 66.8 out of 72 letters. For the accuracy group the mean performance was 3.03 minutes with 65.6 out of 72 letters. For the time group, the mean performance was 2.66 minutes with 66.9 out of 72 letters. For the time-accuracy group the mean performance was 2.63 minutes with 67.2 out of 72 letters.

The statistical procedure of analysis of covariance was used to analyze the data of this study. The rationale for using this procedure will be discussed. A detailed description of the analysis of covariance may be found in Winer (1971). The chosen significance level for the study was .05.

### Analysis of Covariance

The reason for using the analysis of covariance was to take into account the initial performance level for the individual trainees. If this was not done, any group differences might well have been due to the initial performance level rather than due to differences in

TABLE 1

Trial and Means of Time Scores (in Minutes) for the Experimental Groups

<u>Trial</u>	<u>Knowledge of Results</u>	<u>Accuracy</u>	<u>Time</u>	<u>Time- Accuracy</u>
1	3.42	3.01	2.94	2.76
2	3.26	3.21	2.94	2.87
3	3.02	3.12	2.91	2.85
4	2.85	3.18	2.67	2.69
5	2.74	3.06	2.77	2.68
6	2.68	3.12	2.63	2.55
7	2.64	3.02	2.55	2.60
8	2.78	2.94	2.42	2.59
9	2.62	2.89	2.42	2.40
<u>10</u>	<u>2.68</u>	<u>2.80</u>	<u>2.37</u>	<u>2.33</u>
Overall	2.87	3.03	2.66	2.63



TABLE 2

Trial and Means of Accuracy Scores (in Number Correct) for the  
Experimental Groups

<u>Trial</u>	<u>Knowledge of Results</u>	<u>Accuracy</u>	<u>Time</u>	<u>Time- Accuracy</u>
1	60.7	53.1	56.7	55.8
2	61.5	59.6	61.1	63.9
3	65.7	64.2	66.9	68.2
4	67.4	66.7	67.3	67.4
5	68.1	66.7	67.8	69.1
6	67.5	68.0	68.5	69.4
7	68.1	68.5	70.1	68.5
8	69.2	69.9	69.5	69.9
9	69.1	70.2	70.1	69.8
<u>10</u>	<u>70.3</u>	<u>69.3</u>	<u>70.6</u>	<u>70.0</u>
Overall	66.8	65.6	66.9	67.2

the kind and number of goals set. The covariance procedure is a statistical technique for adjusting criterion scores with respect to some control variable. In this study, the time on the initial trial for each trainee was used as the control variable for all time criterion analyses while the accuracy on the initial trial for each trainee was used as the control variable for all accuracy criterion analyses.

To determine if any advantage was gained by the use of analysis of covariance, the correlation coefficient between the control variable and the performance scores on trials two through nine were calculated for both criteria. For the time criterion, the correlation coefficient was .58 while the correlation coefficient for the accuracy criterion was .44. Both coefficients are significant at the .05 level thus suggesting that an advantage was derived from the use of the covariance procedure. The advantage of the covariance procedure was more clearly shown by the reduction of the subject-within-treatment sum of squares in the analysis of the two criteria. The reduction amounted to 45% in the time analysis and 53% in the accuracy analysis indicating an advantage in using the analysis of covariance approach.

### Analysis of Results

Results of the analysis of covariance for the accuracy criterion are shown in Table 3. The results of the analysis of covariance for the time criterion are shown in Table 4. These analyses indicate that no significant differences appeared among the mean times or accuracies for the treatments. Thus, the hypotheses concerning performance and learning facilitation through goal setting appeared not to be substantiated.

TABLE 3

Analysis of Covariance for Accuracy Criterion

<u>Source</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>Critical F.05 value</u>
Treatment	3	53.10	1.11	2.78
Subject within Treatment <sup>1</sup>	56	38.60	4.46*	1.32
Trial	8	419.43	48.52*	1.94
Treatment-Trial Interaction	24	10.48	1.21	1.52
Error	447	8.64	---	

<sup>1</sup>Error mean square for treatment effect

\*Significant at .05 level

TABLE 4

## Analysis of Covariance for Time Criterion

<u>Source</u>	<u>DF</u>	<u>MS</u>	<u>F</u>	<u>Critical F.05 value</u>
Treatment	3	4.42	2.57	2.78
Subject within Treatment <sup>1</sup>	56	1.72	21.40*	1.32
Trial	8	1.78	22.19*	1.94
Treatment-Trial	24	.13	1.63*	1.52
Error	447	.08	---	----

<sup>1</sup>Error mean square for treatment effect

\*Significant at .05 level

This analysis did indicate that a significant effect due to the trials existed and that a significant subject-within-treatment effect was present for both criteria. Further, there was a significant treatment-trial interaction present in the time criterion. To determine where these differences occurred, Duncan's Multiple Range tests were run on the trial, and time treatment-trial interaction means. The results of the tests run on the trial means for time and accuracy are given in Tables 5 and 6 respectively. The trial analysis indicated that the mean scores for both criteria improved as the experimental session progressed. The results of the time treatment-trial interaction analysis is shown in Table 7. The time treatment-trial interaction analysis showed that on most trials the mean time of the accuracy group was longer than the mean time of any of the other three groups.

TABLE 5

Duncan's Multiple Range Tests on Trial Means of Time Criterion

<u>Trial</u>	<u>Mean</u>	<u>Non-Significant Groupings Connected by Columns of Asteriks</u>
2	3.07	*
3	2.98	*
4	2.85	*
5	2.81	**
6	2.75	***
7	2.71	**
8	2.69	*
9	2.58	*
10	2.54	*

TABLE 6

Duncan's Multiple Range Tests on Trial Means of Accuracy Criterion

<u>Trial</u>	<u>Mean</u>	<u>Non-Significant Groupings Connected by Columns of Asteriks</u>
2	61.52	
3	66.25	*
4	67.20	**
5	67.90	**
6	68.35	*
7	68.80	**
8	69.63	**
9	69.80	**
10	70.05	*

TABLE 7

Duncan's Multiple Range Tests on Treatment-Trial Interaction for Time  
Criterion

<u>Treatment</u>	<u>Trial</u>	<u>Mean</u>	<u>Non-Significant Groupings Connects by Column of Asteriks</u>
KR	2	3.26	*
A	2	3.21	*
A	4	3.18	*
A	6	3.12	**
A	3	3.12	**
A	5	3.06	***
A	7	3.02	****
KR	3	3.02	****
A	8	2.94	****
T	2	2.94	****
T	3	2.91	*****
A	9	2.89	*****
TA	2	2.87	*****
TA	3	2.85	*****
KR	4	2.85	*****
A	10	2.80	*****
KR	8	2.78	*****
T	5	2.77	*****
KR	5	2.74	*****
TA	4	2.69	****
TA	5	2.68	****
KR	6	2.68	****
KR	10	2.68	****
T	4	2.67	****
KR	7	2.64	****
T	6	2.63	****
KR	9	2.62	****
TA	7	2.60	****
TA	8	2.59	****
T	7	2.55	*****
TA	6	2.55	*****
T	8	2.42	****
T	9	2.42	****
TA	9	2.40	***
T	10	2.37	**
TA	10	2.33	*



## DISCUSSION

### Learning

The significant trial effect shown by the analysis of covariance indicates that learning did occur during the experimental session. The Duncan's Multiple Range tests showed that both time and accuracy improved throughout the session. The overall improvement in the time scores was 16.2% while accuracy scores improved by 24.4%.

In addition to the overall experimental learning effect, each experimental group exhibited its own learning effect on performance. The improvement in each criterion for each group is shown in Table 8. These results indicate that substantial learning took place in all groups on both criteria with the exception of the time scores of the accuracy group. Despite this exception it seems likely that if compared to a no feedback control group each of the experimental treatments would be shown to significantly enhance the learning process, as has been done in other studies in this area (Hundal, 1969).

### Subject Effects

The significant subject effects found by the analysis of covariance indicate that individual differences were present in the study. These effects were expected and appear in nearly all studies involving human performance.

### Overall Analysis

The analysis did not indicate any significant differences in performance scores due to goal-setting for either criterion. This result

TABLE 8

Improvement in Time and Accuracy for Each Experimental Group

<u>Group</u>	<u>% Time Improve</u>	<u>% Accuracy Improve</u>
Knowledge of Results	21.6%	15.8%
Accuracy	7%	30.4%
Time	19.8%	24.6%
Time-Accuracy	15.6%	25.5%

is inconsistent with all of the previous research which indicates that goal setting is superior to knowledge of results (Fryer, 1964; Locke and Bryan, 1966a; 1966b, 1967).

For the accuracy criterion, task difficulty appears to be the most likely cause of the lack of goal-setting effects. Fryer (1964) found that task difficulty was an important mediator of the effects of level of aspiration. For easy tasks, level of aspiration has little value over knowledge of results. In this study the accuracy scores indicate that for the accuracy criterion the task was extremely easy. The overall mean for the study was 66.6 letters out of 72 or 93.5%. In fact, out of 600 total trials only 145 accuracy scores were below 90%. When this performance is compared to the 50% to 60% accuracy average on an actual inspection task (Harris and Chaney, 1969) it appears the task chosen for the study was very easy.

Figure 6 shows the accuracy learning curves generated by the four experimental groups. Three points should be made about the curves. First they are quite similar. This indicates that no goal-setting effect is apparent. Second, each curve shows a marked learning effect. This point emphasizes that learning did occur in each group. Third, the learning curves never quite reach a plateau. They suggest that they are about to level off, but they never do during the experiment. This fact indicates that the learning process never reached completion. Although completion was not reached, it appears likely that the plateau would have occurred at approximately the same point for all four groups.

The reason for the lack of significance due to goal setting in the time scores becomes apparent in Figure 7. Figure 7 shows the learning curves for the four experimental treatments. As in the case of the

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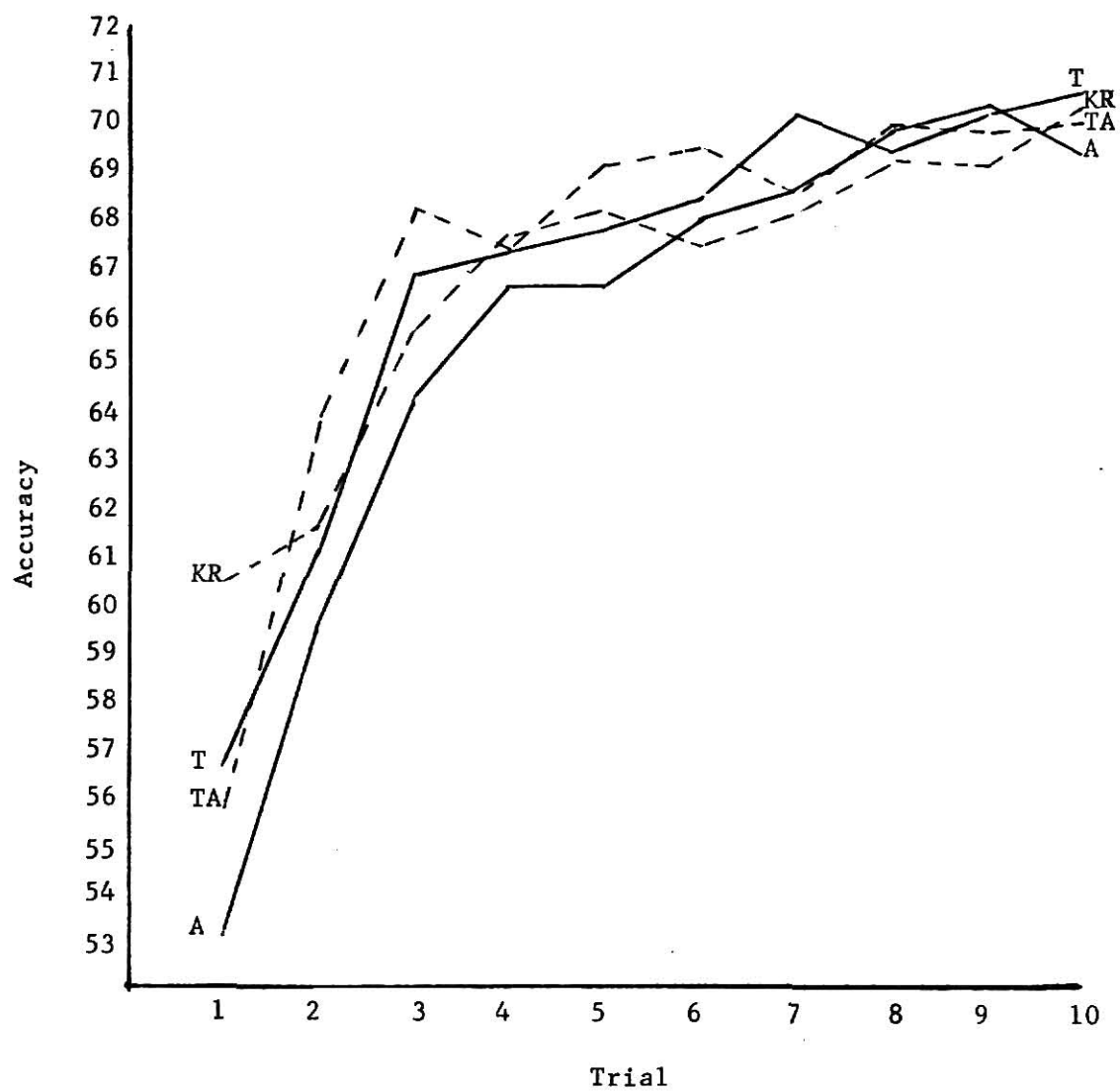


Figure 6. Accuracy Learning Curves

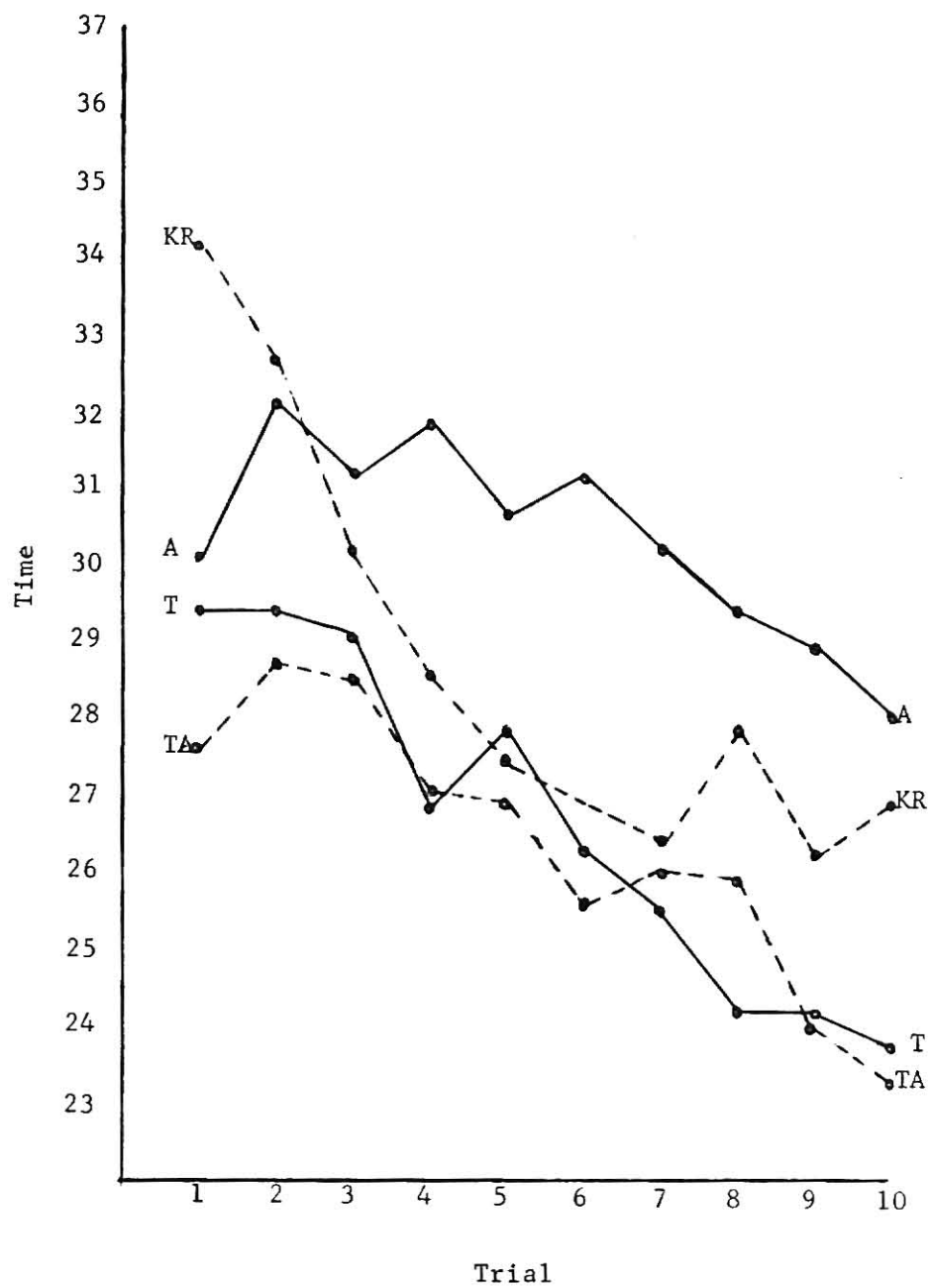


Figure 7. Time Learning Curves

accuracy criterion, Figure 7 suggests that the learning process did not reach completion, particularly in the three goal-setting groups. The knowledge of results group did appear to have leveled off after the trial 5, but more trials were necessary to ascertain if that was indeed the case. Two facts indicate that the failure of the learning processes to reach completion was the primary reason for the lack of overall significance due to goal-setting the time scores. The first is the lack of similarity between the learning curves shown in Figure 7. The curves of the time and time-accuracy group are quite similar. They both indicate a relatively steady improvement in time throughout the 10 trials. The curve of the knowledge of results group shows a rapid improvement in time in trials one through five, but little if any improvement in trials six through ten. The accuracy group generated still a different curve. They demonstrated very little improvement in the time criterion during the first six trials, but showed rapid improvement thereafter. It is interesting to note that the improvement in the time criterion scores coincides with the leveling off of the accuracy criterion scores for the accuracy group. The graph further suggests that the learning plateau would be different for the knowledge of results, accuracy, and the time and the time-accuracy groups. The differences suggested by the graphs are supported by the significance of the treatment-trial interaction for the time criterion. The results of this analysis shown in Table 7 and summarized in Table 9 indicate that the accuracy group learning curve is significantly different from the other three curves. They also indicate that in the later trials differences between the knowledge of results group and the time and the time-accuracy groups occur.

TABLE 9

Summary of Treatment-Trial Interaction of Time Criterion Scores

<u>Trial</u>	<u>Differences Noted</u>
2	A, KR > T, TA
3	A > TA
4	A > KR, T, TA
5	A > KR, T, TA
6	A > KR, T, TA
7	A > KR, T, TA
8	A > T, TA; KR > T
9	A > KR, T, TA
10	A > T, TA; KR > T, TA



### Knowledge of Results vs. Goal Setting

One of the two significant learning trends pointed out by the treatment-trial interaction analysis was the difference in the time criterion trend due to knowledge of results and the trend due time or time-accuracy goals. This difference was apparent in the graph of the time data shown in Figure 7. The knowledge of results group improved rapidly through trials one through five, but not much improvement occurred in the time criterion for the knowledge of results group in trials six through ten. As can also be seen from Figure 7, the time and time-accuracy groups were still showing improvement in the time criterion at the end of all ten trials and gave no indication that the learning process was nearing completion. Indications were therefore that the time and the time-accuracy groups would have leveled off at a significantly lower value than the knowledge of results group. This explanation was also supported by the treatment-trial interaction analysis which detected significant differences in the mean of the knowledge of results group and the time and the time-accuracy groups in trials eight and ten. The difference between the knowledge of results learning trend and the learning trend of the time and the time-accuracy groups was expected. It was supported by every researcher in the goal-setting area (Fryer, 1964; Locke & Bryan, 1966a, 1967).

The failure of the learning process to reach completion in the accuracy group served as the explanation for the failure to find any significant difference between the knowledge of results time trend and the accuracy trend. This explanation was also supported by the treatment trial interaction analysis which indicated significant difference between the knowledge of results group mean and the accuracy group

mean in the later trials. Had the learning process been completed, significant differences probably would have been found between the knowledge of results group and the three goal-setting groups.

### Differing Goal Setting Effects

The second and perhaps more interesting significant difference shown by the treatment-trial interaction was the disadvantage of the accuracy goal setting as compared to the time and time-accuracy goal setting.

This difference is apparent in the graph of the time criterion scores. The graph shows that the time and time-accuracy time criterion scores improved at a much more rapid rate than did the accuracy time criterion scores. Further evidence was shown by the 7% improvement in time scores for the accuracy group as compared to 19.8% and 15.6% improvement in the time scores for the time and time-accuracy groups respectively. The final evidence came from the treatment-trial interaction analysis of time scores which indicated a consistent difference between the accuracy group scores and the time and time-accuracy group scores.

Support from the literature on the disadvantage of accuracy emphasis came from Howell and Kriedler (1963; 1964). They found that accuracy emphasis instructions resulted in poorer performance than did time emphasis on time-accuracy emphasis instructions. Apparently accuracy goals also result in poorer performance than do time goals or time-accuracy goals.

The fact that the treatment-trial interaction analysis did not indicate any significance between the time and time-accuracy groups was

also partially explained by Howell and Kriedler (1963; 1964). They found that for an easy task, time-accuracy emphasis instructions yielded better results than time emphasis instructions. However, for complex tasks they found that time emphasis instructions yielded better results than time-accuracy instructions. It would seem safe to conclude then, that the advantage of time goals versus time-accuracy goals depends on the difficulty of the task involved and that for certain tasks both may be equally effective. This was evidently the case with this task.

### Future Research

Perhaps the most obvious point that the results of this study emphasized was the importance of ensuring that the learning process reaches completion in all experimental groups in a learning study. Only then can one be sure that overall treatment effects will become apparent. The most straight-forward way to do this in this particular experiment would have been to increase the number of trials. Had it been practical to do this, it would seem likely that significant differences would have been found between the knowledge of results group and the time and the time-accuracy groups and between the accuracy group and the time and the time-accuracy groups.

Another point emphasized was the need for a no feedback control group in a learning study. If such a group is used then one can measure the relative efficiency of the learning treatments used. In this study, it seems likely that all four treatments would have been shown to enhance the learning process to a great degree.

The most important point to be made from the results of this study is the importance of the type of task and its difficulty in determining

the efficiency to be derived from goal setting. Fryer (1964) emphasized that goal setting becomes more effective as the task becomes more difficult. Further, the type of task and its difficulty are important in determining the task of goal-setting to be implemented. Howell and Kriedler (1963; 1964) emphasized that the time-accuracy instructions were more beneficial for easy tasks while time emphasis instructions were more beneficial on more difficult tasks. Two directions of research are suggested by this. One direction is to verify the findings of Fryer and Howell and Kriedler. The other and more important direction is to study different types of tasks with varying degrees of difficulty to determine which means of goal setting is most effective on these tasks. It would be beneficial if actual industrial tasks could be used instead of simulated tasks. The actual tasks would probably be more difficult as well as more realistic than the simulated tasks, thus making the results more readily applicable to the industrial setting.

#### Practical Implications

Because of the amount of research that still needs to be done in this field, few practical implications can be made. One finding of this study does suggest potential applications in the area of industrial training. That finding is the influence of the type of instruction or goal being set has on performance. In this study accuracy goals did not influence performance as much as time goals or both time and accuracy goals. Howell and Kriedler (1963; 1964) found similar results concerning accuracy emphasis instructions. Therefore, attention must be given to instructions given during training periods particularly

for tasks involving more than one performance dimension. It is quite likely that, after all the necessary research is done, a strategy emphasizing one dimension at the beginning of the training period and then others at various stages of the training period would prove to be optimal. Certainly one would expect any goal-setting or feedback training program to be more beneficial than the practice of putting a trainee on the assembly line and telling him to do his best.

## CONCLUSIONS

1. All four experimental groups, knowledge of results, accuracy, time, and time-accuracy demonstrated a significant improvement. This suggests that all four goal-setting techniques possess motivational advantages in a learning situations.
2. Although no significant differences due to goal-setting were noted for either performance criterion, the analysis did indicate a significant treatment-trial interaction for the time criterion. The significance was due mainly to the disadvantage of accuracy goals on the time criterion.
3. The importance of the learning process reaching completion became apparent in the time criterion analysis. If the learning processes had reached completion, significant effects due to goal setting would have probably occurred in the time analysis.
4. The disadvantage of the accuracy goal instructions suggests that the type of goal set has a significant influence on performance. This result has important implications particularly in the area of training.
5. The results also suggest the necessity of investigating the effects of the type of task and its difficulty on the advantages of goal setting. Performance on more difficult tasks appear to be influenced more by goal-setting. Further, it would seem reasonable to expect that performance on different types of tasks would be influenced more from certain types of goal setting strategies. Future research may bear this out.

6. Finally, this study suggests that the relationship between goal-setting and performance is a complex, but an important relationship. Certainly it is a research area from which much practical benefit can be derived.

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## APPENDIX A

### Raw Data

KNOWLEDGE OF RESULTS GROUP

	<u>Trial 1</u>	<u>Trial 2</u>	<u>Trial 3</u>	<u>Trial 4</u>	<u>Trial 5</u>	<u>Trial 6</u>	<u>Trial 7</u>	<u>Trial 8</u>	<u>Trial 9</u>	<u>Trial 10</u>
Time	1.95	1.98	2.39	2.34	2.21	2.29	2.26	2.45	2.36	2.12
Accuracy	42.00	48.00	61.00	61.00	59.00	59.00	61.00	67.00	68.00	65.00
Time	2.89	2.87	2.92	2.83	2.65	2.75	2.64	2.74	2.57	2.70
Accuracy	67.00	64.00	69.00	68.00	69.00	70.00	70.00	68.00	72.00	70.00
Time	3.87	3.69	3.21	2.87	2.75	2.75	2.34	2.43	2.37	2.41
Accuracy	67.00	70.00	69.00	70.00	71.00	72.00	72.00	71.00	72.00	71.00
Time	2.52	2.51	2.58	2.41	2.54	2.92	3.00	3.41	2.74	2.88
Accuracy	61.00	55.00	68.00	70.00	71.00	68.00	72.00	71.00	70.00	72.00
Time	3.30	3.06	2.80	2.45	2.42	2.36	2.41	2.34	2.34	2.32
Accuracy	69.00	70.00	69.00	67.00	71.00	70.00	72.00	72.00	69.00	71.00
Time	2.74	2.83	2.76	2.59	2.73	2.70	2.63	2.83	2.66	3.15
Accuracy	69.00	72.00	69.00	70.00	71.00	71.00	70.00	70.00	70.00	72.00
Time	3.32	2.91	2.68	2.92	2.87	2.45	2.79	2.96	2.77	3.02
Accuracy	64.00	62.00	65.00	64.00	71.00	66.00	69.00	66.00	71.00	69.00
Time	6.01	4.39	3.26	3.19	2.65	2.63	2.73	2.46	2.54	2.41
Accuracy	69.00	68.00	66.00	71.00	69.00	68.00	67.00	70.00	69.00	70.00
Time	2.91	2.39	2.23	2.10	2.04	1.93	2.14	2.13	2.23	2.20
Accuracy	72.00	70.00	72.00	71.00	72.00	68.00	70.00	71.00	71.00	72.00

Knowledge of Results Group, cont'd.

Time	4.60	5.23	3.86	3.63	3.56	3.09	3.06	2.76	2.73	2.70
Accuracy	70.00	68.00	70.00	72.00	71.00	72.00	72.00	69.00	72.00	71.00
Time	2.61	2.47	2.46	2.68	2.97	2.58	2.59	3.10	2.94	3.08
Accuracy	40.00	42.00	52.00	57.00	60.00	53.00	60.00	64.00	61.00	68.00
Time	2.64	3.00	3.11	3.13	2.79	2.67	2.95	3.18	3.10	2.90
Accuracy	53.00	57.00	63.00	66.00	65.00	69.00	67.00	70.00	63.00	69.00
Time	3.91	3.45	3.55	3.41	3.25	3.38	2.82	3.47	3.13	3.57
Accuracy	46.00	58.00	64.00	66.00	63.00	67.00	65.00	69.00	71.00	71.00
Time	1.99	2.15	1.96	1.95	2.19	2.13	2.04	2.16	2.19	2.00
Accuracy	51.00	54.00	59.00	67.00	68.00	69.00	64.00	70.00	67.00	71.00
Time	6.01	5.95	5.56	4.23	3.44	3.55	3.25	3.34	2.63	2.68
Accuracy	70.00	65.00	70.00	71.00	70.00	70.00	71.00	70.00	70.00	72.00

ACCURACY GROUP

	<u>Trial 1</u>	<u>Trial 2</u>	<u>Trial 3</u>	<u>Trial 4</u>	<u>Trial 5</u>	<u>Trial 6</u>	<u>Trial 7</u>	<u>Trial 8</u>	<u>Trial 9</u>	<u>Trial 10</u>
Time	2.05	2.21	2.47	2.10	2.02	2.11	2.02	1.98	2.00	1.81
Accuracy Goal	-----	65.00	72.00	70.00	72.00	70.00	72.00	70.00	70.00	70.00
Accuracy	49.00	65.00	56.00	66.00	67.00	70.00	67.00	71.00	70.00	67.00
Time	5.20	4.61	3.78	4.83	4.20	4.15	4.40	4.50	4.10	4.27
Accuracy Goal	-----	65.00	70.00	71.00	70.00	70.00	70.00	71.00	71.00	72.00
Accuracy	61.00	69.00	70.00	70.00	71.00	71.00	71.00	71.00	71.00	71.00
Time	2.78	3.03	2.95	3.70	3.46	3.84	3.50	3.25	3.20	3.22
Accuracy Goal	-----	60.00	65.00	65.00	70.00	71.00	71.00	71.00	71.00	71.00
Accuracy	50.00	64.00	63.00	72.00	69.00	71.00	70.00	70.00	70.00	71.00
Time	3.94	4.12	3.76	4.21	3.40	3.97	3.03	3.36	3.09	3.05
Accuracy Goal	-----	57.00	52.00	50.00	62.00	59.00	63.00	69.00	65.00	67.00
Accuracy	47.00	47.00	46.00	55.00	56.00	59.00	65.00	65.00	65.00	66.00
Time	2.51	2.60	2.92	2.58	2.38	2.52	2.47	2.31	2.56	2.14
Accuracy Goal	-----	62.00	55.00	68.00	68.00	68.00	68.00	70.00	72.00	72.00
Accuracy	48.00	52.00	68.00	68.00	63.00	66.00	72.00	71.00	72.00	67.00
Time	2.08	2.23	2.23	2.06	2.12	2.12	2.30	2.52	2.21	2.23
Accuracy Goal	-----	54.00	61.00	66.00	65.00	65.00	65.00	66.00	67.00	69.00
Accuracy	49.00	59.00	66.00	63.00	62.00	66.00	66.00	72.00	69.00	70.00
Time	2.86	3.14	3.02	3.32	2.84	2.70	2.54	2.47	2.65	2.31
Accuracy Goal	-----	53.00	53.00	65.00	65.00	60.00	66.00	68.00	68.00	69.00
Accuracy	49.00	46.00	69.00	64.00	65.00	68.00	69.00	69.00	71.00	70.00



Accuracy Group, cont'd.

Time	2.54	2.30	2.32	2.24	2.33	2.24	2.39	2.04	2.22	2.24
Accuracy Goal	-----	65.00	70.00	70.00	71.00	72.00	72.00	72.00	72.00	72.00
Accuracy	63.00	69.00	69.00	70.00	72.00	72.00	72.00	72.00	70.00	72.00
Time	3.43	4.10	4.33	3.41	3.97	3.94	3.89	3.88	3.83	3.70
Accuracy Goal	-----	55.00	62.00	72.00	70.00	72.00	70.00	71.00	72.00	72.00
Accuracy	48.00	60.00	69.00	69.00	72.00	69.00	72.00	72.00	72.00	72.00
Time	2.74	3.10	2.76	2.57	2.58	2.50	2.65	2.57	2.31	2.34
Accuracy Goal	-----	60.00	68.00	69.00	69.00	68.00	68.00	67.00	68.00	69.00
Accuracy	63.00	69.00	70.00	68.00	67.00	66.00	66.00	69.00	71.00	71.00
Time	3.27	3.72	3.68	3.86	4.07	4.00	3.96	3.77	3.88	3.51
Accuracy Goal	-----	60.00	55.00	60.00	70.00	68.00	68.00	68.00	70.00	71.00
Accuracy	46.00	53.00	57.00	65.00	64.00	65.00	62.00	71.00	70.00	70.00
Time	3.25	2.98	2.84	3.26	3.27	3.26	2.99	2.87	2.80	2.69
Accuracy Goal	-----	67.00	70.00	70.00	72.00	72.00	70.00	72.00	71.00	72.00
Accuracy	62.00	66.00	67.00	71.00	72.00	68.00	72.00	68.00	72.00	72.00
Time	2.77	3.11	2.84	2.87	2.65	2.75	2.62	2.32	2.24	2.24
Accuracy Goal	-----	65.00	64.00	70.00	70.00	71.00	72.00	72.00	72.00	72.00
Accuracy	62.00	63.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00	71.00
Time	3.56	4.33	4.20	4.21	4.10	3.99	3.97	3.87	3.82	3.88
Accuracy Goal	-----	60.00	60.00	65.00	65.00	65.00	65.00	70.00	70.00	71.00
Accuracy	52.00	61.00	63.00	64.00	64.00	69.00	70.00	71.00	71.00	64.00
Time	2.14	2.55	2.64	2.49	2.56	2.66	2.64	2.45	2.37	2.38
Accuracy Goal	-----	52.00	54.00	59.00	65.00	65.00	69.00	65.00	66.00	68.00
Accuracy	48.00	52.00	58.00	64.00	64.00	68.00	61.00	65.00	67.00	66.00

TIME GROUP

	<u>Trial 1</u>	<u>Trial 2</u>	<u>Trial 3</u>	<u>Trial 4</u>	<u>Trial 5</u>	<u>Trial 6</u>	<u>Trial 7</u>	<u>Trial 8</u>	<u>Trial 9</u>	<u>Trial 10</u>
Time Goal	-----	3.80	3.55	3.75	3.50	3.40	3.30	3.20	3.00	2.90
Time	3.95	3.58	3.85	3.18	3.38	2.90	2.90	2.86	2.74	2.71
Accuracy	59.00	58.00	70.00	67.00	70.00	69.00	69.00	69.00	70.00	68.00
Time Goal	-----	3.00	3.00	2.85	2.80	2.75	2.70	2.55	2.53	2.55
Time	2.33	2.81	2.83	2.74	2.70	2.52	2.51	2.55	2.50	2.40
Accuracy	61.00	66.00	70.00	69.00	69.00	71.00	70.00	70.00	72.00	71.00
Time Goal	-----	3.00	3.30	3.30	3.00	2.90	2.80	2.75	2.45	2.35
Time	2.12	3.48	3.64	2.93	2.90	2.90	2.77	2.38	2.31	2.50
Accuracy	54.00	68.00	70.00	69.00	72.00	71.00	71.00	70.00	70.00	72.00
Time Goal	-----	3.00	2.75	2.30	2.00	2.20	2.20	2.20	2.00	1.90
Time	2.64	2.41	2.28	1.93	2.00	2.11	1.98	2.02	1.91	1.79
Accuracy	63.00	67.00	72.00	69.00	68.00	68.00	69.00	70.00	72.00	69.00
Time Goal	-----	4.00	3.00	2.00	2.90	2.98	2.98	2.98	2.98	2.98
Time	4.04	3.18	2.90	3.68	2.98	2.95	2.75	2.53	2.42	2.47
Accuracy	70.00	68.00	70.00	67.00	71.00	72.00	72.00	71.00	71.00	71.00
Time Goal	-----	3.50	3.50	3.30	3.10	3.00	3.00	2.98	2.50	2.50
Time	1.93	2.14	3.60	2.33	2.89	3.11	2.79	2.28	2.70	2.60
Accuracy	45.00	38.00	58.00	64.00	63.00	64.00	68.00	67.00	62.00	72.00
Time Goal	-----	3.15	2.45	2.45	2.60	2.60	2.45	2.60	2.30	2.36
Time	3.29	3.00	2.80	2.72	2.62	2.52	2.77	2.36	2.47	2.36
Accuracy	61.00	59.00	69.00	66.00	71.00	67.00	68.00	71.00	71.00	72.00

Time Group, cont'd.

Time Goal	-----	2.50	2.40	2.40	2.00	2.00	1.95	1.85	1.85	1.89
Time	2.79	2.43	2.11	2.20	2.02	1.97	1.86	1.89	1.89	1.70
Accuracy	61.00	66.00	67.00	70.00	69.00	68.00	69.00	67.00	71.00	70.00
Time Goal	-----	4.00	3.50	3.50	3.50	3.45	3.30	3.30	3.20	3.10
Time	3.35	3.06	3.25	3.56	3.41	3.22	3.39	2.97	2.90	2.90
Accuracy	63.00	63.00	69.00	71.00	69.00	69.00	71.00	71.00	72.00	71.00
Time Goal	-----	2.30	2.20	2.20	2.18	2.20	2.18	2.10	2.10	2.15
Time	2.40	2.26	2.34	2.20	2.33	1.99	2.13	2.20	2.17	2.00
Accuracy	36.00	53.00	62.00	66.00	69.00	71.00	71.00	71.00	71.00	68.00
Time Goal	-----	2.45	3.00	3.00	3.30	3.50	3.00	2.80	2.75	2.50
Time	3.40	3.72	3.43	3.55	3.83	3.10	2.92	2.82	2.69	2.99
Accuracy	51.00	61.00	57.00	65.00	63.00	67.00	67.00	68.00	72.00	69.00
Time Goal	-----	3.75	3.75	3.50	3.50	3.55	3.55	3.20	3.30	3.40
Time	4.03	3.93	3.60	3.61	3.57	3.57	3.22	3.32	3.53	3.41
Accuracy	52.00	61.00	64.00	67.00	66.00	66.00	71.00	70.00	69.00	71.00
Time Goal	-----	3.20	3.20	2.95	2.80	2.70	2.50	2.30	2.30	2.30
Time	3.20	3.48	2.95	2.68	2.97	2.52	2.51	2.40	2.42	2.13
Accuracy	54.00	59.00	71.00	67.00	71.00	69.00	72.00	70.00	72.00	72.00
Time Goal	-----	2.00	2.00	1.80	1.60	1.65	1.50	1.50	1.50	1.50
Time	2.01	1.89	1.90	1.78	1.79	1.94	1.62	1.64	1.55	1.60
Accuracy	68.00	65.00	69.00	69.00	65.00	70.00	72.00	69.00	70.00	72.00
Time Goal	-----	2.30	2.50	2.18	2.10	2.10	2.05	2.10	2.05	2.05
Time	2.56	2.70	2.18	2.01	2.10	2.18	2.20	2.06	2.04	2.04
Accuracy	52.00	64.00	65.00	63.00	61.00	67.00	71.00	69.00	67.00	71.00

TIME-ACCURACY GROUP

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10
Time Goal	-----	3.40	3.40	3.40	4.00	4.00	3.55	3.70	3.80	3.50
Time	3.50	3.29	4.03	4.11	3.65	3.55	3.78	3.82	3.48	3.95
Accuracy Goal	-----	60.00	61.00	62.00	65.00	68.00	68.00	66.00	68.00	68.00
Accuracy	58.00	59.00	62.00	69.00	71.00	69.00	64.00	71.00	69.00	71.00
Time Goal	-----	2.25	2.50	2.30	2.40	2.00	2.00	2.00	2.00	2.00
Time	1.76	2.45	2.56	2.28	2.22	2.12	2.47	2.11	2.03	1.99
Accuracy Goal	-----	60.00	68.00	65.00	65.00	62.00	68.00	68.00	66.00	68.00
Accuracy	46.00	65.00	68.00	68.00	64.00	67.00	68.00	67.00	68.00	70.00
Time Goal	-----	3.20	3.50	3.50	3.70	3.70	3.70	3.85	3.75	3.00
Time	3.05	3.80	3.68	3.64	3.93	3.63	3.94	3.67	3.24	2.82
Accuracy Goal	-----	65.00	68.00	68.00	69.00	70.00	72.00	72.00	72.00	70.00
Accuracy	58.00	66.00	65.00	68.00	72.00	72.00	72.00	71.00	71.00	72.00
Time Goal	-----	2.75	2.70	2.60	2.55	2.45	2.40	2.35	2.35	2.30
Time	2.86	2.17	2.62	2.57	2.47	2.42	2.35	2.38	2.25	2.23
Accuracy Goal	-----	63.00	55.00	65.00	68.00	70.00	71.00	68.00	70.00	70.00
Accuracy	61.00	50.00	66.00	68.00	69.00	71.00	65.00	71.00	69.00	69.00
Time Goal	-----	3.30	3.10	2.40	2.45	2.50	2.25	2.05	1.90	1.80
Time	3.47	3.15	2.50	2.58	2.50	2.18	2.05	1.92	1.85	1.83
Accuracy Goal	-----	70.00	70.00	70.00	70.00	70.00	70.00	70.00	70.00	70.00
Accuracy	70.00	69.00	72.00	70.00	70.00	69.00	72.00	70.00	71.00	69.00
Time Goal	-----	2.50	2.50	2.40	2.40	2.50	2.50	2.50	2.40	2.20
Time	2.50	2.46	2.31	2.34	2.54	2.50	2.57	2.46	2.26	2.06
Accuracy Goal	-----	69.00	69.00	71.00	71.00	71.00	71.00	71.00	71.00	71.00
Accuracy	66.00	66.00	69.00	65.00	70.00	69.00	69.00	71.00	72.00	72.00

## Time-Accuracy Group, cont'd.

Time Goal	-----	2.50	2.60	2.45	2.00	1.95	1.80	1.65	1.65	1.50
Time	2.50	2.73	2.47	2.16	2.02	1.82	1.71	1.84	1.53	1.52
Accuracy Goal	-----	65.00	67.00	69.00	71.00	71.00	72.00	70.00	70.00	70.00
Accuracy	62.00	68.00	70.00	72.00	72.00	71.00	69.00	70.00	69.00	68.00
Time Goal	-----	4.00	3.50	3.00	3.00	2.90	3.00	3.00	2.80	3.00
Time	3.25	2.95	2.80	2.68	2.72	2.37	2.55	2.67	2.53	2.49
Accuracy Goal	-----	67.00	70.00	70.00	70.00	70.00	72.00	72.00	70.00	72.00
Accuracy	63.00	70.00	69.00	71.00	71.00	71.00	71.00	71.00	72.00	71.00
Time Goal	-----	2.00	2.50	2.00	2.00	2.00	2.00	1.80	1.80	1.80
Time	1.18	1.57	1.59	1.54	1.52	1.70	1.73	1.85	1.73	1.90
Accuracy Goal	-----	50.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00
Accuracy	37.00	59.00	70.00	60.00	65.00	66.00	67.00	68.00	69.00	70.00
Time Goal	-----	2.85	2.50	2.40	2.40	2.35	2.30	2.30	2.40	2.30
Time	2.85	2.44	2.36	2.36	2.29	2.26	2.49	2.52	2.24	2.20
Accuracy Goal	-----	60.00	62.00	70.00	68.00	68.00	68.00	66.00	66.00	68.00
Accuracy	61.00	64.00	69.00	68.00	66.00	66.00	64.00	66.00	68.00	70.00
Time Goal	-----	4.00	3.50	3.15	3.15	3.15	3.10	2.87	2.90	2.75
Time	4.28	4.02	3.29	3.27	3.22	3.13	2.94	2.99	2.83	2.65
Accuracy Goal	-----	68.00	70.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00
Accuracy	64.00	68.00	72.00	71.00	71.00	71.00	72.00	71.00	72.00	72.00
Time Goal	-----	3.00	3.50	3.50	3.00	2.75	2.75	2.50	2.63	2.50
Time	3.22	3.26	3.68	3.05	2.87	2.88	2.72	2.72	2.58	2.53
Accuracy Goal	-----	68.00	71.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00
Accuracy	62.00	71.00	72.00	72.00	71.00	71.00	72.00	72.00	72.00	72.00

## Time-Accuracy Group, cont'd.

Time Goal	-----	2.60	2.80	2.80	2.70	2.70	2.60	2.52	2.40	2.30
Time	2.59	2.92	2.86	2.64	2.72	2.43	2.47	2.30	2.28	2.36
Accuracy Goal	-----	60.00	68.00	68.00	68.00	69.00	69.00	70.00	71.00	71.00
Accuracy	45.00	66.00	69.00	68.00	71.00	70.00	72.00	72.00	71.00	69.00
Time Goal	-----	2.20	3.20	3.50	3.20	3.70	3.38	3.10	3.50	3.14
Time	2.14	3.51	3.88	3.14	3.72	3.38	3.05	3.52	3.14	2.62
Accuracy Goal	-----	47.00	55.00	65.00	63.00	67.00	65.00	65.00	68.00	65.00
Accuracy	41.00	61.00	68.00	60.00	67.00	68.00	62.00	68.00	64.00	65.00
Time Goal	-----	2.50	2.00	2.25	2.00	1.50	2.00	2.00	2.50	1.50
Time	2.29	2.14	2.18	2.05	1.83	1.95	2.15	2.14	2.03	1.79
Accuracy Goal	-----	50.00	56.00	65.00	55.00	66.00	72.00	72.00	72.00	65.00
Accuracy	43.00	56.00	62.00	61.00	66.00	70.00	69.00	69.00	70.00	70.00

LEVEL OF ASPIRATION AND LEARNING  
ON A TWO DIMENSIONAL TASK

by

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B. S., Kansas State University, 1971

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AN ABSTRACT OF A MASTER'S THESIS

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## ABSTRACT

Sixty subjects, forty females and twenty males, between the ages of 17 and 23, performed a letter cancellation task to investigate the effects of goal-setting on two performance criteria, time and accuracy. The task consisted of a training task and ten training trials. Four experimental groups were formed: a knowledge of results (KR) group which was informed only of its performance, but was not asked to set goals; an accuracy (A) group which was informed of its performance and set accuracy goals; a time (T) group which was informed of its performance and set time goals; and a time-accuracy (TA) group which was informed of its performance and set both time and accuracy goals. Although no overall significant differences were found among the four groups, significant differences in the learning trends in the time criterion associated with the A group and the learning trends of the T group and TA group. In addition, significant differences in the time criterion appeared between the KR group and the T, and TA groups in later trials. The results indicated that had the experiment consisted of more trials, more statistically significant goal setting effects probably would have been found in the time criterion. The disadvantage of the accuracy goals showed the influence of instructions and goal emphasis on task performance. The results also suggested that the type of task and its difficulty are significant mediators of the effects of goal setting on performance.