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GOAL SETTING AND PERFORMANCE ON AN ENDURANCE TASK

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled GOAL SETTING AND PERFORMANCE ON AN ENDURANCE TASK submitted by Calvin B. Botterill in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

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ABSTRACT

The main purpose of the study was to test the effects of different goal setting procedures on performance. The manipulated goal setting features included goal explicitness and goal source, and goal difficulty was yoked in treatments for purposes of comparison.

Seventy-five boys (age 11-14) were pre-tested on a hand grip exercise endurance task, and post-tested on the same task following 1 of 5 treatments involving various combinations of the manipulated goal setting features.

A pre-test-post-test control group design was utilized and subjects were "blocked" on the basis of strength. Although task workload was proportional to maximum strength, results revealed a great deal of variance on performance scores.

An analysis of covariance revealed a significant treatment main effect. The goal setting treatment characterized by difficult, explicit, group-set goals produced the most significant performance improvement. Although goal setting features of explicitness, source, and difficulty all appeared to influence performance on the endurance task, combinations of these features were often necessary to produce statistically significant differences.

Therefore, although it appears dependent on certain features (or combinations of features), goal setting can have a significant effect on the performance of a physical endurance task.

Post-hoc questionnaire data revealed some information about the nature of the group and also some item responses which were significantly correlated with performance on the endurance task.

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CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

This author's observations and field experiences as a coach and teacher suggest a possible relationship between goal setting techniques and behavioural performance. In particular, the manner in which behavioural objectives are identified and specified appears to influence performance. When identifying and specifying goals and objectives with people the "perceived source" and "explicitness" of the goal seem to affect the degree of goal acceptance and the responsibility for eventual behaviour.

Although there are numerous theories about how and why there is an effect on performance, a review of related literature suggests that manipulations of (a) the conditions under which people identify and specify goals and intentions, and (b) the nature of the goals and intentions themselves, could influence future behaviour.

This study is an attempt to test the relative effectiveness of five different goal setting techniques (which involve manipulations of goal source and explicitness) in a more controlled laboratory setting.

Statement of the Problem

Can behavioural performance be improved through goal setting techniques?

Purpose of the Study

The main purpose of the study is to test the effects of different goal setting procedures on the performance of a physical endurance task. In addition the particular effects of differences in goal explicitness, goal source, and goal difficulty will be assessed.

Specifically, the following hypotheses (stated in null form) will be tested:

1. Performance on the endurance task will not be significantly different in groups utilizing different goal setting procedures.
   $\bar{X}_A = \bar{X}_B = \bar{X}_C = \bar{X}_D = \bar{X}_E$
2. Performance on the endurance task will not be significantly different in groups which utilize explicit as opposed to general goals (goal source controlled).
   $\bar{X}_C, \bar{X}_D = \bar{X}_E$
3. Performance on the endurance task will not be significantly different in groups which utilize group-set as opposed to experimenter-set goals (goal nature and difficulty controlled)
   $\bar{X}_A = \bar{X}_C$
4. Performance on an endurance task will not be significantly different in groups which utilize subject-set as opposed to experimenter-set goals (goal nature and difficulty controlled).
   $\bar{X}_B = \bar{X}_D$
5. Performance on the endurance task will not be significantly different in groups setting explicit goals of moderately different difficulty (goal source controlled).
   $\bar{X}_C = \bar{X}_D$

Justification of the Study

The possibility of discovering goal setting leadership techniques which result in improved behavioural performance is the major justification for the study.

Although the review of literature reveals that considerable theorizing and some research has been done in areas related to goal setting, it is expected that this study will make a significant contribution to knowledge in the field.

A review by Steers and Porter (1974) suggests that although there is considerable evidence to suggest that goal specificity is related to increased effort and better performance, the findings regarding participation in goal setting have not been particularly conclusive. The particular manipulations of goal source and explicitness in this study are expected to provide new information about the effects of collaborative goal setting on performance.

The physical endurance task to be utilized as the dependent variable or measure of performance in this study is most certainly new to this area of research. As well as being an appropriate test of the implications of research findings in goal setting for sport and education, this task could become a useful performance test for research on motivation, self-control, psychological contracting, commitment, etc. Kanfer (1976:35) cities endurance of physical stress in sports as a good example of the kind of complex choice situation in which tolerance of a noxious event is required for the sake of an ultimate favourable outcome.

Certainly the integration of knowledge and research findings in the areas related to goal setting would seem valuable and it is

suggested that some integration will occur as a result of the review of literature and the explanation of findings in this investigation.

In summary, the author suggests the study is justified in that it could conceivably reveal new knowledge, serve to integrate existing knowledge, identify implications for sport and education, and result in a valuable new performance test for psychology.

Delimitations

1. The sampling of subjects was limited to seventy-five boys (age 11-14) who attended the University of Alberta summer hockey camp in 1976.
2. The study was limited to the manipulation of only three variables (explicitness, source, and difficulty of goal) which might influence commitment and have implications for leadership.

Limitations

1. Although some precautions were taken, the study was limited in the degree of control over intersubject communication throughout the testing period.
2. Since the post-test questionnaire is an exploratory instrument developed to gather additional subjective data on this experiment its data has limitations in terms of validity and reliability.

Definition of Terms

Attribution Theory - an area of psychology concerned with the implications of perceived causes of experienced or observed events. Motivation is seen as largely dependent on the causal factors to which an individual attributes events and behaviour.

Cognitive Dissonance - the psychological stress produced as a result of incompatible or incongruent perceptions, events and behaviours.

Commitment - the pledging or binding of the individual to behavioural acts.

Contingency - an event or occurrence which depends on or is incidental to another.

Contract - an agreement to do something.

Decisional Self-Control - the ability of an individual to utilize self-generated cues and reinforcers in making decisions where conflicts between behavioural choices exist.

Experimenter-Set Goal - a goal presented to a subject that has been determined entirely by the experimenter.

Explicit Goal - a goal which is both specific and written on paper.

General Goal - a goal which is general and stated only orally.

Goal Difficulty - the amount which a goal is different from a previous best performance.

Group Decision - the process of actively involving group members in discussion and decision regarding information and behaviour of significance to the group.

Group-Set Goal - a goal which is specified and determined entirely by a group of subjects.

Incentive - something which stimulates or motivates one to take action, work harder, or behave in a certain way.

Intention - a determination to do a specified thing or act in a specified manner.

Protracted Self-Control - the ability of an individual to utilize self-generated cues and reinforcers to maintain behaviour with conflicting consequences.

Reinforcement - consequences of an event or behaviour that make it more likely to occur again.

Subject-Set Goal - a goal which is specified and determined entirely by a subject.

Volition - conscious or deliberate decision or choice with perceived freedom.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

The crystallization of the hypotheses being tested in this study resulted from the review of literature in a number of different but related areas of psychology and sociology. The research and theorizing in these areas often takes quite different forms but the common thread of concern is the relationship between intention and later behaviour.

A discussion of theorizing and findings on the intention-behaviour relationship, commitment, group decision, goal setting, and self-control should reveal the rationale behind the hypotheses being tested in this investigation.

Intention-Behaviour Relationship

In his 1966 article entitled "Words and Deeds", sociologist Irwin Deutscher drew attention to the many problems in social sciences related to the disparities between talk and action. He suggested that research investigate the kinds of conditions that influence the intention - behaviour relationship.

> Under what conditions will people behave as they talk? Under what conditions is there no relationship? And under what conditions do they say one thing and behave exactly the opposite? In spite of the fact that all of these combinations have been empirically observed and reported, few efforts have been made to order such observations (1966:243).

Ryan (1970) suggests that the systematic study of intention as a potent controlling factor in behaviour has been neglected. Differences

in the relationship between people's intentions and their behaviour might often be due to differences in the nature of their intentions and the circumstances under which they were determined.

Martin Fishbein and Icek Ajzen are among those who have investigated the conditions which influence intentions and the intention - behaviour relationship. Fishbein has developed a theory for the prediction of intentions and behaviour which gives careful consideration to the features of the intention and the conditions under which it is made.

> The theory assumes that most behaviour of interest to social psychology is under volitional control and that in a given situation, a person holds or forms a specific intention that influences his subsequent overt behaviour... symbolically the central equation of the theory can be presented as follows:
> $B \sim BI = [A\ act]\ w_0 + [NB\ (Mc)]\ w_1$
>
> In this equation, B = overt behaviour; BI = behavioural intention; A act = attitude toward the act; NB = normative belief; Mc = motivation to comply with the normative belief; and w_0 and w_1 are empirically determined weights (Ajzen and Fishbein, 1973:42).

These researchers report that under a co-operative motivational orientation intentions were primarily determined by the normative component while the individual attitudinal component was more important under a competitive orientation (Fishbein and Ajzen, 1972:516). These findings would seem to suggest that a leader should create a co-operative motivational climate for group goal setting if he/she wants to develop normative goals or intentions.

In discussing the actual intention - behaviour relationship, Ajzen and Fishbein (1974:3) suggest that the specificity of an intention is an important factor. Similarly Weigel, Vernon, and Tognacci (1974) found behavioural commitment higher as a result of specific measures of attitude and intention. Wicker (1969:71-72)

also states that specificity is one of several situational factors or conditions that can influence attitude - behaviour relationships. Research in this area suggests that increased specificity of an intention can improve the correlation between intention and eventual behaviour. The hypothesis that specificity of intention might result in increased commitment to a behavioural task (better performance) is intuitively inviting and seems worthy of experimental investigation.

More recently Fishbein and Ajzen (1975:368-383) suggest there are three major factors influencing the intention - behaviour relationship:

1. Correspondence in levels of specificity between intention and actual behaviour.
2. Stability of the intention - vulnerability to other factors over time.
3. Volitional Control - the degree to which the behaviour is perceived to be under a subject's control.

The manipulations on goal source and explicitness to be tested in this investigation would appear closely related to the factors of specificity and volitional control identified by Fishbein and Ajzen.

Commitment

Kiesler (1971) is one of the few people to address commitment as a separate and significant construct in psychology. He suggests (1971:26) that despite the popularity of the term, very little experimental work has been done on commitment. Kiesler's definition of commitment suggests an intuitive link with the intention - behaviour relationship:

> Commitment shall be taken to mean the pledging or binding of the individual to behavioural acts... commitment is a continuous variable, rather than a dichotomous one. That is, people are referred to as more or less committed to some behaviour, rather than being simply committed or not (1971:30).

He goes on to hypothesize that one can increase the degree of commitment by the increasing one or more of the following:

1. The explicitness of the act.
2. The importance of the act for the subject.
3. The degree of irrevocability of the act.
4. The number of acts performed by the subject.
5. The degree of volition perceived by the person in performing the act (1971:33).

When "the act" is one of goal setting this hypothesis (particularly part 1 and 5) provides a rationale for investigating the effects of manipulations of goal source and explicitness on behavioural performance.

Kiesler (1971:16) suggests that public behaviour is particularly "freezing" in its effect (i.e. it tends to bind one to later consistent behaviour). Therefore, the conditions under which one identifies and specifics an intention may well affect commitment and future behaviour. This theorizing is consistent with Festinger's (1957) theory of cognitive dissonance. Once an intention has been identified and stated it is more likely that one will follow up with appropriate behaviour to maintain cognitive consistency and avoid feelings of dissonance. In light of this conceptualization, the public declaration of specific intentions which can occur as a result of the goal setting process could substantially influence later behaviour.

Kiesler also points out that "one's perception that he has freely elected to act in some way should certainly contribute to the degree to which he feels committed to the act" (1971:159). He goes

on to add the following:

> Participating in making decisions which affect him gives one the perception that he is responsible for his own behaviour. In this way the group leader can commit the members to certain behaviours consistent with the goals of the leader (1971:165).

Kiesler suggests that attribution theory (Kelley, 1967) can be helpful in explaining some commitment effects. "Perhaps commitment could be seen as one's perception that he is responsible for his own behaviour" (Kiesler, 1971:168). Allocation of responsibility for an outcome to oneself could signify a shift in behavioural attribution or perceived locus of control from external (environmental) causes to internal (personal) factors. There is little doubt that such a shift would influence achievement, motivation and behaviour. Weiner states:

> There is strong evidence that individuals differing in their level of achievement needs have disparate causal attributions for achievement performance. Persons high in achievement needs perceive Effort X Outcome covariation, that is, they believe that success is due to hard work while failure results from lack of effort. Persons low in achievement needs apparently do not believe in the efficacy of effort expenditure (1974:184).

This theorizing suggests that causal attribution is related to perceived responsibility or commitment which in turn is reflected in behavioural effort. Although commitment is really a hypothetical construct, the related theory could be extremely useful in explaining differences in behavioural performance attributed to goal setting procedures.

Group Decision

Kurt Lewin (1947) reported three studies which suggested that a process he called "Group Decision" was particularly effective in producing behaviour change. Involving subjects in a decision to change

behaviour seemed to produce more commitment to the new behaviour than lecturing or simply telling the subjects what to do.

In a follow-up study Bennett (1955:252) broke down the concept of "Group Decision" into four components which she tested in an attempt to identify the most significant aspects of the process. These components were:

1. Group Discussion as a means of conveying information.
2. Decision to perform a specified action.
3. Commitment - focus upon the degree of publicness or privacy with which the decision is indicated.
4. Degree of consensus by the group in reaching the requested decision (1955:252).

In Bennett's testing, decision and consensus were the two factors which appeared to have the most significant effect on eventual behaviour. She suggests "group decision" be defined as "decision about individual goals in a setting of shared norms regarding such goals" (1955:272). Regardless of the definition, there appears to be something in the process which increases commitment to future behaviour.

Goal Setting

Kolb and Boyatzis (1970:454) have identified collaborative goal setting as a significant feature of successful self-directed behaviour change programmes. Evidence would seem to suggest that collaborative goal setting increases goal awareness as well as commitment to future behaviour. Kolb, Winter and Berlew hypothesize:

> Commitment to a goal leads to changes in behaviour because this commitment (a) increases motivation to change by emphasizing in consciousness the discrepancy between current behaviour and ideal behaviour and (b) increases the probability that the behaviour rather than the goal will be changed since conscious commitment to a goal reinforces the value and stability of that goal (1968:457).

They go on to demonstrate that by alteration of goal setting

conditions, one can increase commitment to a goal and thereby increase subsequent behaviour change. The results of a related study by Kolb, Winter and Griffith (1968) suggest that successful self-directed change is motivated by awareness of the cognitive dissonance created when an individual commits himself to a valued goal that he sees as different from his present behaviour.

Locke, Cartledge, and Koeppel (1968) suggest that the motivational effects of knowledge of results are likely a result of goal setting. They state that "when goal setting is partialled out, there was no significant relationship of knowledge of results to performance" (1968:481). In addition:

> It is argued that knowledge of results should be effective in motivating performance to the extent that: (a) specific goal setting is facilitated, and (b) the goals set are hard or difficult goals (1968:483).

They suggest that the process of evaluation and goal setting (including the formation of behavioural intentions) could be the key in explaining the effects of most incentives (1968:483). An earlier study by Locke and Bryan (1966) demonstrated that subjects with specific goals performed better than those told to "do their best". Locke and Bryan also found a strong relationship between level of the performance goal and level of actual performance. They point out that these findings are of theoretical interest in that they emphasize the effects of cognitive (intentional) aspects of motivation (1966:291). Locke concludes that "any adequate theory of task motivation must take account of the individual's conscious goals and intentions" (1968:157).

Studies by Tomekovic (1962), Lawler and Hackman (1969), and Scheflen, Lawler, and Hackman (1971) suggest that participation in goal setting can result in considerable increase in commitment and motivation. Vroom (1964) found evidence that performance improved as individuals were given an increasing voice in decisions affecting their jobs. He suggests that the improvement might be accounted for by the increased degree of ego-involvement that results from participation. Sherif and Cantril (1947) have also discussed the behavioural effects of increased ego-involvement.

French, Kay and Meyer (1966) however, found that participation in goal setting was strongly and positively related to performance only when subjects perceived a low level of threat and when they had a past history of high participation.

Risley (1976) found group moralizing and goal setting particularly effective in establishing entire classes of positive behaviour in children. Subjects seemed more committed and able to generalize to related situations as a result of participation in the rational group process.

In a case study in sport, Amdur (1971) describes the effectiveness of coach George Davis' democratic approach to football. Participation in decision making and goal setting appeared to result in improved self-discipline, commitment, and performance. Neill (1966) illustrates that democracy as a leadership technique can work extremely well even with young children as long as the freedom does not involve "license" to infringe on the rights of others.

Group goal setting requires a consensus of opinion. This normative data is likely to influence perceived social demands and

expectations which could influence commitment and performance. Steers and Porter (1974) suggest the degree of goal acceptance could be an important factor in the goal-performance relation. A goal is more likely to be intrinsically accepted as a result of group discussion and consensus. This acceptance of group goals is likely to result in increased task commitment.

The collaborative group goal setting process might result in additional normative information, higher standards, and increased social demands. Locke (1968) has suggested that individuals tend to strive harder to improve task performance when a norm of high achievement exists within the group. Argyle (1957) points out that social pressure can be felt in private as well as public situations.

Group goal setting may also contribute to the "publicness" of goals. Wankel and McEwan (1976) found that making goals more public resulted in better performance. They suggest that results were likely due to an increase in commitment, and "greater commitment would be expected to lead to greater effort and better performance" (1976:9).

Self-Control

Certainly there is a wide range in the degree to which people can maintain behaviour which is consistent with a specified goal. Although there are many environmental factors in addition to the physical and cognitive ones that contribute to discrepancies between behavioural actions and stated intentions, those individuals able to maintain goal-consistent behaviour despite adversity are described as highly committed or said to possess great self-control.

After an extensive review of literature in the area, considerable research, and an attempt to re-evaluate the self-control construct

Kanfer, Cox, Greiner, and Karoly have suggested:

> The phenomena covered by this term can be better understood as the result of the joint action of situational (alpha) variables and of self-generated internal (beta) variables.... This reconceptualization suggests the importance of studying the contributions of environmental determinants to the self-control process rather than attributing this process solely to the operation of personality variables that exclude consideration of the momentarily acting environmental influences. In addition Kanfer and Karoly (1972) have suggested that more attention be given to a stage prior to execution of self-control, in which promises, intentions, or performance criteria are developed, since these events may determine later execution of self-control . . . . The early influences that lead a person to make an intention statement, commitment, or contract (with himself or others) may be heavily social or external (alpha variables). Once made, however, the contract may serve as self-generated ("internalized") determinant (beta variable) of the later execution of the behaviour required for fulfillment of the commitment (1974:605-606).

The relationship of this theorizing to Kiesler's (1971) concept of commitment is fairly evident and Kanfer et al. (1974:607) go on to point out the compatability of the respective theoretical approaches. Commitment to a goal may well be what produces improved performance on a self-control task.

Kanfer suggests a widely accepted definition of self-control is:

> The psychological processes that involve behavioural shifts in which external influences (alpha variables) are supplemented by self-generated cues and reinforcers (beta variables) in cases where conflicts between possible behavioural choices exists (1976:23).

Kanfer (1976) identifies two stages of self-control. The first stage termed <u>decisional</u> self-control is characterized by the requirement for a clear and momentary decision to choose among alternatives. Often however, the choice consists of a commitment or contract for future performance. In this case the individual is in a situation requiring <u>protracted</u> self-control. Until the contract requirements are reached,

self-generated techniques for maintaining the new behaviour may be required. This description of protracted self-control appears highly congruent with Kiesler's definition of commitment.

Tests of protracted self-control have usually fallen into one of two categories: (1) resistence to temptation or (2) tolerance of noxious stimulation. Both approaches involve the delay of a positive reinforcer and the tolerance of an aversive situation. The cold-pressor task which measures an individual's tolerance of ice-cold water has been utilized most frequently by Kanfer et al.as a test of protracted self-control.

Kanfer et al. (1974) have demonstrated that the conditions under which an individual makes a psychological contract (states an intention or goal) can influence performance on a self-control task. Kanfer (1976:41-42) suggests that a contract can serve two important functions: (a) it can provide a clear definition of objectives to be achieved and (b) depending on the circumstances, it can motivate the individual considerably.

Cox (1972) found that tolerance of ice water was significantly longer when an explicit written contract was signed by subjects than when the same information was communicated by oral instructions. Furthermore Cox found that when a person believes that he has failed to meet contract requirements, his subsequent behaviour is affected by the source to which he attributes the failure.

Also using the cold pressor task as a dependent variable, Greiner (1972) found that it is important to make contract reinforcement contingent on performance rather than just a statement of intention. As might be anticipated, he also found that goal setting circumstances

(which influence a subject's expectations about the task) differentially effected the magnitude of commitments or goals.

Spates and Kanfer (1976) tested the relative contributions of self-monitoring, criterion (or goal) setting, self-evaluation, and self-reinforcement in the learning of a simple arithmetic task by first graders. Kanfer points out that:

> The inclusion of criterion-setting in training was the most significant feature... These results suggest that the establishment of a criterion against which a person can test his current performance is a critical element in the effectiveness of self-regulation for improved performance (1976:15).

In a study related to self-control and commitment Lovitt and Curtiss (1969) found academic response rate higher with <u>self-imposed</u> reinforcement contingencies as opposed to teacher-imposed contingencies. Involving subjects in setting performance contingencies resulted in significantly better performance than imposing teacher specified contingencies. The source of the contingency rather than the reinforcement magnitude accounted for the subject's gain in performance.

Although Bandura and Perloff (1967) found no significant performance differences as a result of <u>self-monitored</u> and externally imposed reinforcement systems, they found that given the choice many children imposed highly unfavourable schedules of reinforcement upon themselves which involved high effort costs at minimum self-reward! This suggests that involving subjects in setting up performance contingencies need not result in mediocre standards. Contrary to the expectations of many, self-imposed standards could conceivably be much higher.

It would seem that having more choice in making a decision can make an individual more committed to the decision. Freedman and

Steinbruner (1964) found that high choice in initial decision increased resistence to influence by counter communication Kiesler suggests that:

> One's perception of freely choosing to behave in a certain way (and its concomitant, one's feeling of self-responsibility for the behaviour) would undoubtedly be an important input for any theory of commitment (1971:160).

Whether or not an individual has much actual freedom in a choice, it is likely his "perceived freedom" which influences his commitment (Steiner, 1970). It may be, as B.F. Skinner would suggest, that the combination of our previous learning history and the impact of contemporaneous events compels us to behave in certain ways. However, even Skinner suggests that "we must consider the possibility that the individual may control his own behaviour" (1953:228). Whether or not it is an illusion, "perceived freedom" would seem to have implications for commitment and self-control.

> While both protagonists and critics of the behavioural model have stressed the organism's dependence on the environment, behaviourists like Skinner have also called attention to the reciprocal relationship. A person is the product of his environment. His behaviour, in turn, also shapes the environment and thus can modify the conditions under which he lives (Kanfer, 1976:5).

The theme of the 8th Banff International Conference on Behaviour Modification was self-management and self-control and therapists were reporting more consistently and permanently effective behaviour change programmes when clients actively participate in goal setting and modification. Kanfer (1976) points out that the cl[illegible] analysis of the subject or client as an <u>active participant</u> in treatment and behaviour change has stimulated new and significant research directions. He suggests that the motivational effects of <u>self-attribution</u> have been described in numerous studies:

> It has been shown that even in such purely chance tasks as selecting a lottery ticket, persons have a higher expectation of success when they had some part in selecting the ticket, giving an illusion of control (Langer, 1975). Tolerance of noxious stimulation (Averill, 1973), effects of self-attributed behaviour changes in insomnia (Davison, Tsujimoto, and Galros, 1973) and other behaviours seem to be strongly influenced by the person's belief about the source of control (1976:54).

Thoreson and Mahoney (1974:5) suggest that self-control may indeed possess motivating or reinforcing properties. The opportunity to choose among response options, reinforcement conditions, or types of reward may increase commitment. The active participation of people in setting and defining their own goals and evaluating their progress would seem to have implications for anyone concerned with motivation and performance.

CHAPTER III

METHODS AND PROCEDURE

The Task

The dependent variable in this investigation was performance on an exercise endurance task. The subject was tested on the number of dynamic contractions that could be made on the hand grip dynamometer apparatus at 25% of his maximum workload (See Figure 1). Pilot testing revealed that a workload of 25% of maximum generally provided a meaningful challenge within a manageable time frame.

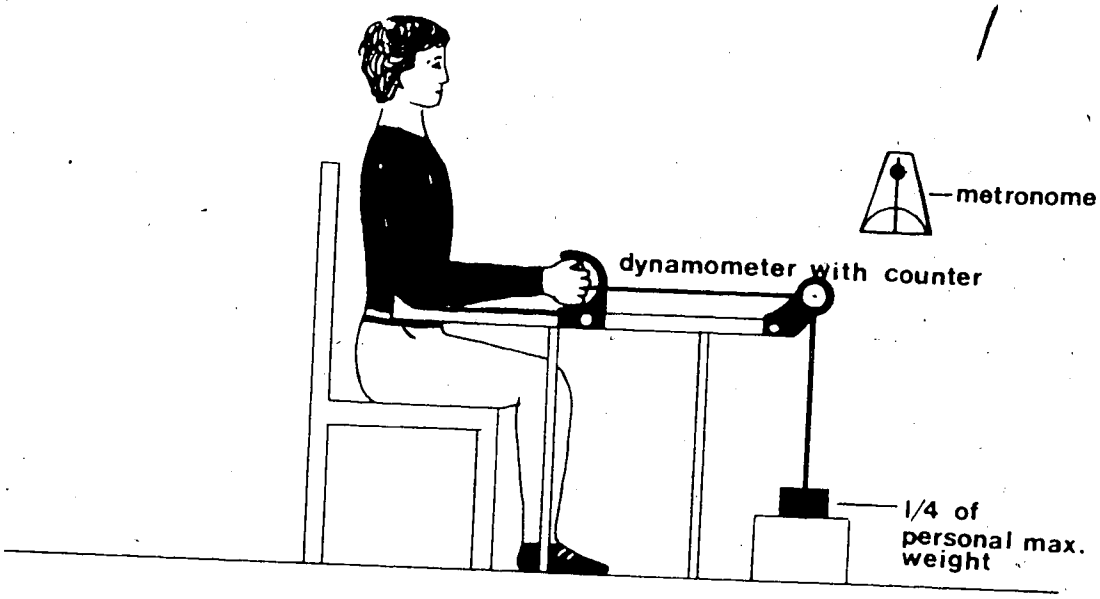

Figure 1: Apparatus

Maximum workload had been determined on a strength pretest. The subject's best performance of three trials on a standard hand grip

dynamometer was taken as his maximum workload. The task and workload were standardized for subjects in the following ways:

1. A standard range of motion was required on each contraction. The apparatus contained an audible counter which informed the subject when his contraction had produced a sufficient range in motion. Subjects were informed that only complete contractions would be recorded.
2. A standard pace of contractions was required. A pacesetter or metronome provided the cue for one contraction per second. Subjects were timed by the experimenter as a check against the counter for pace, and monitored to ensure a standard pace.
3. The elbow was immobilized in a bracket to help isolate the same muscle group for all subjects. The basic body position and location of the free hand were also standardized.
4. The dominant hand was always used in testing procedures. Subjects were simply asked if they were left or right handed. If there was any doubt both hands were tested and the stronger one used.
5. Feedback was standardized. Subjects were given no reinforcement or encouragement during the testing period. The counter was visible to all subjects during the post-test and to none on the pre-test.
6. A standard 5-10 second pre-test trial was taken by all subjects to familiarize them with the task.
7. Audience was standardized - only the subject and the experimenter were present in the room during testing.

The exercise tolerance task utilized in this study meets the criteria of a self-control task in that the performance behaviour has immediate aversive but long range positive consequences (Kanfer et al., 1974). In exercise tolerance, pain becomes the aversive consequence while the positive effect to the subject would be derived from fulfilling the social and personal demands for a good performance. Like the cold pressor task utilized by Kanfer et al. (1974), the situation is viewed as a challenge and long tolerance is self-rewarded while termination of the behaviour brings relief from the pain stimuli.

The exercise tolerance test, however, may have some features which make it a more suitable test of self-control than the cold pressor task utilized by Kanfer et al. The proposed exercise tolerance task appears to have a gradually increasing pain level over time, while Wolff and Hardy (1941) suggest the cold pressor task involves "adaptation" after a fairly early peaking of pain level. When amount of tolerance or self-control is measured by the length of time one continues an aversive task, it would seem important to have a reasonably consistent and linear relationship between pain level and length of tolerance.

The Subjects

The 75 subjects involved in this study were randomly selected from an experimentally accessible population of 11 to 14 year old boys attending the University of Alberta summer sports school hockey camp in 1976. There were 15 boys assigned to each of the treatment conditions and all were individually tested in a private research laboratory at the University of Alberta.

Subjects of one sex and sport were selected to control for sex and sport differences effects. Subjects of a relatively young age were selected because of their comparative naivité in testing procedures and the possibility of more genuine and observable motivation on a simple endurance task.

In addition field work with subjects in this age range had produced some indication that goal setting leadership procedures might be effective.

Experimental Design

In order to test the effects of goal setting procedures on performance a pre-test post-test control group design was used (see Figure 2). Campbell and Stanley (1963:13) describe it as one of three true experimental designs.

Random Assignment → Pre-test → Treatment A → Post-test

Random Assignment → Pre-test → Treatment B → Post-test

Random Assignment → Pre-test → Treatment C → Post-test

Random Assignment → Pre-test → Treatment D → Post-test

Random Assignment → Pre-test → Control → Post-test

Figure 2: Pre-test Post-test Control Group Design.

The only modification made on this fundamental design was the addition of a blocking variable. Because of the possibility that strength would have a significant effect on performance of the endurance task, strength was made a blocking variable. Subjects were all pre-tested for hand grip strength and assigned to one of three blocks (high, medium, or low). Random assignments to treatments within blocks then took place prior to the pre-test on the dependent variable. The design procedure of blocking permits the "partialling

out" of strength effects in analyzing the results.

The Procedure

All subjects were pre-tested for strength on a standard hand grip dynamometer. The elbow was immobilized and body position was standardized in order to isolate the same muscle group for all subjects. The best performance out of three trials with the dominant hand was assumed to be the subject's maximum strength or workload.

Based on the results of the strength test, the 75 subjects were divided into three strength blocks (high, medium or low). Subjects were then randomly assigned to five treatment groups within strength blocks prior to the pre-test on the endurance task. A minimum of one day elapsed between the strength test and endurance pre-test for each subject to insure that fatigue was not a factor. In addition all testing was done immediately after on-ice instruction periods to try to standardize the environment for all subjects prior to testing. Any subjects awaiting testing were provided with recreational activity by the experimenter's assistant. Upon completion of testing the subject was finished activity at the sports school for the day.

Following assignment to treatment groups all subjects were individually pre-tested on the endurance task under control group conditions. Subjects were shown the task, given a five to ten second practice trial, and then were asked to simply continue the task as long as they could. In order not to encourage independent goal setting in the pre-test, the counter was not visible. Also in order not to encourage competition between individuals, subjects were told that different resistances or workloads were used for different subjects. In addition performance feedback was not provided following

the pre-test - subjects were simply informed that their results would be made available in individual reports after all testing had been completed.

In order to minimize any fatigue effects a minimum of two days took place between a subject's pre-test and his post-test. Subjects were then exposed to one of the five treatment procedures immediately prior to being individually tested on the post-test. Because feedback was now appropriate, the contraction counter was made visible to all subjects during the post-test (including those in the control group).

In order to avoid blisters or serious injury to highly motivated subjects on the post-test, a maximum allowable performance of 12 minutes (720 contractions) was established. The six subjects who had exceeded this limit on the pre-test were eliminated from the sample and randomly replaced by alternative subjects from the same strength block.

Following the post-test subjects completed a questionnaire which was designed as an exploratory instrument to gather subjective data which might be helpful in explaining the results (see Appendix D). In order to try to reduce the effects of subjects competing with one another, subjects were asked not to divulge their performance results to others until all testing was completed and reports were distributed.

When all testing was completed subjects were provided with individual reports which compared their performances to the average performances of subjects of the same age (see Appendix B).

The Treatments

The five treatments utilized in the study involved manipulations of two independent variables - the source and the explicitness of a

goal. In addition, precaution was taken to control goal difficulty in two treatments for purposes of comparison (i.e. treatment C was yoked to treatment A and treatment D was yoked to treatment B as illustrated in Figure 3). It was assumed that random assignment controlled for any other factors that might contribute to performance. Figure 3 illustrates how the treatments differed.

Goal Setting Feature	TREATMENT				
	A	B	C	D	E
Nature of Goal	Explicit	Explicit	Explicit	Explicit	General
Source of Goal	Group	Subject	Experimenter	Experimenter	Experimenter
Goal Difficulty	Set by the group	Set by the subject	Same as Treatment A	Same as Treatment B	—

Figure 3: Treatment Characteristics

Key to Figure 3:

Explicit Goal - Specific and written

Eg. I plan to do at least 145 contractions.

Signed: John Doe (See Appendix A)

General goal - General and oral

Eg. Do as well as you can.

Group-set goal - The result of group discussion and consensus by subjects.

Subject-set goal - The result of the subject's decision.

Experimenter-set goal - The result of the experimenter's decision.

Goal Difficulty (Treatment C)- The average increase of goal over pretest performance in treatment A.

Goal Difficulty (treatment D) - The average increase of goal over pre-test performance in treatment B.

Treatment A

1. A group of five subjects was comfortably seated in a private room for the purpose of producing an explicit, difficult, group-set goal.
2. Subjects were informed by the experimenter about their performances on the initial test (i.e. the number of contractions each of them managed to complete).
3. Subjects were also informed that although they had different maximum strengths (as measured on the hand grip dynamometer), the workload for each individual on the endurance task equalled 25% of his maximum strength.
4. Subjects were then asked to discuss the task as a group and decide upon a difficult, explicit goal (number of repetitions) that they could strive for on the retest. The experimenter at no time made any suggestion or gave any indication as to what the goal should be, and if asked simply reminded the group that it was up to them to decide. The only thing the experimenter requested was that there be a consensus (general agreement) among group members about what the goal should be.
5. Subjects were then asked to sign a written exercise agreement (see Appendix A) on which they specified their goal for the retest prior to being individually and privately retested.

Treatment B

1. Each individual subject was comfortably seated in a private room for the purpose of producing an explicit, difficult, subject-set goal.

2. The subject was informed by the experimenter about his performance on the initial test (i.e. the number of contractions he had managed to complete).
3. The subject was informed that like all others the workload on his endurance task had equalled 25% of his maximum strength.
4. The subject was then asked to think about the task and decide upon a difficult, explicit goal (number of repetitions) that he could strive for on the retest. The experimenter at no time made any suggestion or gave any indication as to what the goal should be, and if asked simply reminded the subject that it was up to him to decide.
5. The subject was then asked to sign a written exercise agreement on which he specified his goal for the retest prior to being retested.

Treatment C

1. Each individual subject was comfortably seated in a private room for the purpose of communicating an explicit, difficult, experimenter-set goal.
2. The subject was informed by the experimenter about his performance on the initial test (i.e. the number of contractions he had managed to complete).
3. The subject was informed that like all others the workload on his endurance task had equalled 25% of his maximum strength.
4. The experimenter then informed the subject about the difficult, explicit goal (number of repetitions) that he wanted him to strive for on the retest. The goal difficulty was based on the average increase strived for in Treatment A.

5. The subject was then asked to sign a written exercise agreement on which the experimenter had specified the goal for the retest prior to being retested.

Treatment D

Treatment D is identical to Treatment C with the exception that the goal difficulty was based on the average increase strived for in Treatment B.

Treatment E (Control)

1. Each individual subject was comfortably seated in a private room for the purpose of communicating a general, experimenter-set goal (as in the pretest).
2. The subject was informed by the experimenter about his performance on the initial test (i.e. the number of contractions he had managed to complete).
3. The subject was informed that like all others the workload on his endurance task had equalled 25% of his maximum strength.
4. The experimenter then repeated the pre-test instructions where the experimenter simply asked the subject to "do as well as you can" on the retest.
5. The subject was then retested.

Data Analysis

The major objective in analyzing the data was to assess and interpret performance differences between groups. In order that consideration be given to (a) individual differences on the endurance pretest and (b) the possible influence of the blocking variable of strength, a two-way analysis of covariance was utilized. Maguire (1975) points out that analysis of covariance is an effective method of increasing

the precision of true experiments. Unfortunately, random assignment does not insure equal means on the pre-test measure and an analysis of covariance considers such differences in the calculation of main effects and interactions.

When significant main effects were identified, Scheffé multiple comparisons were carried out to identify the significance of differences between group performances. A simple table of average performance improvement per group between pre-test and post-test was also utilized in analysis.

Response frequency tables were calculated for the questionnaire data (see Appendix E) to help determine whether or not this information helped in explaining overall performance or group differences in performance. In addition questionnaire responses were recorded on a scale from one to four, and one-way analyses of variance were calculated in an attempt to help identify significant treatment differences in responses. Simple chi-square analysis of differences between observed and expected frequencies was also performed.

Finally Pearson Product Moment correlations were calculated between performance, strength, goal difficulty, and questionnaire item responses.

CHAPTER IV

RESULTS AND DISCUSSION

Results

Although endurance workloads were proportional to strength, there was a great deal of range and variance in scores (see Appendix C). All explicit post-test goals were higher than pre-test performances (see Appendix C), and all groups improved their performances on the post-test (see Table 1).

Table 1

Mean Number of Contractions by Treatment Groups

Treatment Group	Pre-test		Mean Goal Difficulty	Post-test		Mean Increase
	Mean	S.D.		Mean	S.D.	
A	203.1	116.9	+79	582.1	214.9	379.0
B	194.5	148.2	+54	340.4	233.	145.9
C	182.3	118.6	+79	429.3	222.9	247.0
D	174.3	161.0	+54	282.2	178.2	107.9
E*	161.2	140.5	-	201.7	168.6	40.5

* = control group mean goal difficulty = average increase of goal over pre-test performance.

S.D. = standard deviation

A bar graph (Figure 4) perhaps best illustrates the increase in treatment group mean performances.

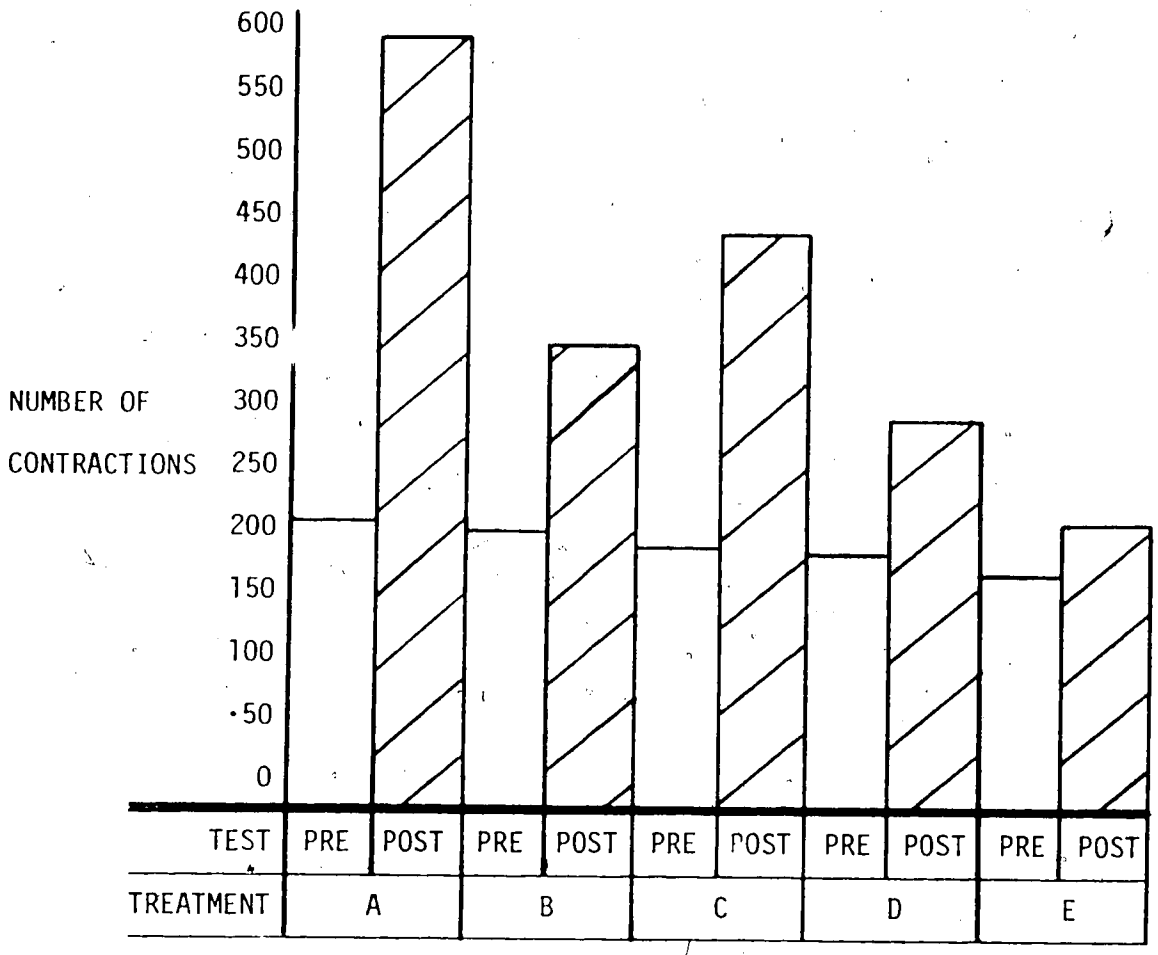

Figure 4: Graphic Illustration of Increases in Treatment Group Mean Performances.

A two-way analysis of covariance (see Table 2) yielded a significant treatment effect thereby suggesting that in general the goal setting procedures had a significant effect on performance. The blocking variable of strength failed to have a significant effect on results, as did the treatment x strength interaction. The covariate of pre-test performance on the endurance task was significant as can be expected when the covariate is a measure of the dependent variable.

Table 2

Analysis of Covariance

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F-RATIO	PROBABILITY
STRENGTH (BLOCKS)	25845	2	12923	.585	.56
TREATMENT	1001702	4	250425	11.343*	<.01
STRENGTH X TREATMENT	65360	8	8170	.370	.93
TIME (COVARIATE)	1530344	1	1530344	69.318*	<.01
ERROR	1302548	59	22077		

* = Significant P <.01

The implementation of a maximum allowable performance results in minor violations of assumptions about homogeneity of variance and normality of distribution which are inherent in parametric statistical analysis. Winer (1971:210), however, suggests that these violations are often not critical and there is some evidence that tests for homogeneity of variance are oversensitive to departures from normality of the distributions of basic observations.

The "ceiling effect" which results from a maximum allowable performance would simply appear to make parametric statistics a slightly more conservative test of treatment effects. In order to make a simple comparison, a Kruskal-Wallis test on performance improvement scores (the non-parametric analogue of the one-way anova) and the corresponding post-hoc tests on group mean differences were performed (see Appendix F). The results were virtually identical to those of the analysis of

covariance and Scheffé tests.

Scheffé multiple comparisons were made (see table 3) to determine which group mean performances were significantly different from one another. Treatment A was the most effective treatment in improving performance scores and Scheffé comparisons revealled a significantly greater performance by this group than by groups B, D, and E. Treatment C produced a significantly better performance than the control procedure.

Table 3

Scheffé Multiple Comparisons of Mean Group Performances

	TREATMENT GROUP							
	A		B		C		D	
TREATMENT	F	P	F	P	F	P	F	P
B	4.55*	<.01						
C	1.40	.25	.90	.47				
D	5.99*	<.01	.10	.98	1.61	.18		
E	9.22*	<.01	.84	.51	3.49*	.01	.36	.83

* = Significant P < .05

F = F-Ratio

P = Probability

Since there was a maximum allowable performance and a possible "ceiling effect" (especially in Group A) the number of subjects in each group who reached the maximum performance becomes a dependent variable of interest (see table 4).

Table 4

Number of Subjects per Treatment Group to Reach the Maximum Performance on the Post-test

TREATMENT				
A	B	C	D	E
9	2	4	1	1

A simple chi-square analysis comparing observed versus expected frequencies produced a significant result ($\chi^2 = 13.29$ $p < .01$) thereby reinforcing the suggestion that group A performed significantly better than other groups. This result, however, must be assessed cautiously because small expected frequencies can produce a slightly inflated chi-square (Morehouse and Stull, 1975:320).

Questionnaire response frequency tables were calculated (see Appendix E) but one-way analyses of variance on questionnaire items and chi-square analyses of observed versus expected response frequencies did not reveal any significant differences between treatment groups on any of the items.

In an attempt to identify questionnaire item responses that might be related to performance on the endurance task, Pearson Product moment correlations were calculated (see Table 5). Since questionnaire responses for items #2 thru # 10 form a type of continuum, they were coded on a scale of 1 to 4 and correlated with performance on the endurance task over all subjects. T-values associated with the correlations are specified in Table 5 along with their probability (T-values are calculated to test the hypothesis that the correlation = 0).

Table 5

Correlations Between Questionnaire Item Responses and Performance on the Endurance Task

QUESTION #	CORRELATION	T-VALUE	PROBABILITY
2	-.32	-2.91*	< .01
3	.05	.45	.65
4	-.09	- .77	.44
5	.29	2.55*	.01
6	-.12	-1.01	.31
7	.05	.44	.66
8	.28	2.48*	.01
9	.12	1.04	.30
10	.19	1.68*	.10

* P < .10

The negative correlation of question 2 with performance suggests that subjects who performed best tended to find the task most enjoyable (least painful). Similarly the correlation of question 5 with performance suggests that subjects who performed best reported more satisfaction with their performance.

The correlation of question 8 with performance suggests that those subjects who performed best reported an environment of more democratic adults. The correlation of question 10 to performance suggests that those subjects who performed best tended to credit their performance to their own desire as opposed to environmental factors.

Correlations were also calculated between the responses to the

different questionnaire items. In general these correlations were extremely low which might indicate that questions were reasonably independent and tended to measure different things. The only correlations to exceed .2 are listed in table 6 along with associated t-values and probabilities.

Table 6

Correlations Between Questionnaire Item Responses

QUESTION #'s	CORRELATION	T-VALUES	PROBABILITY
4 and 6	.36	3.34*	<.01
2 and 8	-.23	-2.02*	.05
5 and 7	.22	1.96*	.05
5 and 10	.20	1.70*	.09

* P <.10

The correlation between questions 4 and 6 confirms an expected relationship between "wanting to do well" and "feeling responsibility to do well". The correlation between questions 2 and 8 suggests a possible relationship between reporting a more democratic adult environment and finding the task more enjoyable (less painful). The correlations between question 5 and questions 7 and 10 suggest plausible links between "satisfaction with performance" and (a) liking the instructor's approach and (b) crediting one's performance to desire rather than task difficulty.

The correlations between goal difficulty and post-test performance were higher in groups which performed poorest and lower in groups which performed best (see Table 7).

Table 7

Correlations Between Goal Level and Post-test Performance for Treatment Groups

TREATMENT	$\bar{X}$ PERFORMANCE	$\bar{X}$ GOAL	CORRELATION
A	582	282	.26
B	340	248	.88
C	429	261	.62
D	282	228	.90

As might be expected the correlation between pre-test and post-test performance on the dependent variable was significant ($R = .66$ $P < .01$). The correlation between strength and post-test performance, however, was extremely low ($R = .004$). This can be partially attributed to the fact that endurance workloads were proportional to strength.

The questionnaire data also provided a bit of descriptive information about the nature of the total sample. When asked to explain why they carried on as long as they did on the task (item #1), 44% of the subjects who responded to the question stated that they did so in order to reach a specific goal. The answers of another 27% of those who responded could be interpreted as "pursuit of excellence".

Questionnaire item #3 revealled that there was virtually no difference between groups in how they perceived their pain tolerance. Although only 25% of subjects reported that the adults they know very often let them make decisions about what to do (item #8), 67% of subjects reported that they feel they perform better when they make up their own mind about things (item #9). Responses to item #10 revealed that 72% of subjects felt their performance was more due

to their own desire than the difficulty of the task.

Discussion

A somewhat unexpected initial finding was the extreme variance in scores. When one individualizes the endurance task workload (25% of personal maximum strength), one anticipates a reasonably limited variance or range in performance scores. Previous pilot testing on older subjects had reinforced expectations of a maximum three or four minute range in performance scores. Actual pre-test performance scores ranged from less than one minute (52 contractions) to well over twelve minutes (720 - contractions) among the experimental population.

These findings would tend to support the suggestions that (a) psychological factors play an extremely important role in physical endurance testing and (b) there is a great range in people's motivation to perform such tasks. It would seem important for anyone involved in so-called maximal endurance testing to consider the tremendous impact psychological factors are likely to have on performance. This contention is reinforced by the overall results of this investi[illegible] which show that simple goal setting treatments often result in su[illegible]cts more than doubling their endurance performance.

Besides making it extremely difficult to show significant treatment effects, the extreme variance in pre-test performance resulted in two adjustments in the planned testing procedure. First, a maximum performance of twelve minutes (720 contractions) was established in order to make testing practical and avoid blisters or serious injury to the highly motivated subjects. Secondly, those six subjects who exceeded the maximum performance on the pre-test were eliminated from the sample and randomly replaced by alternative subjects in the same strength

block. No more than two subjects were replaced in any treatment and the changes did not result in significant differences in group pre-test performance.

These eliminated subjects were part of the low strength block and were of relatively young age (11 or 12). Growth and development literature tends to suggest that younger children have comparatively greater endurance than strength (Rarick, 1973). It has been suggested by Wenger (1977) that differentiation in muscle fibre composition may take place at adolescence and that this may have an impact on an individual's ability to do endurance work.

The significant treatment main effect in the analysis of co-variance and numerous significant differences in the Scheffé multiple comparisons suggest the rejection of hypothesis 1 (that performance on the endurance task will not be significantly different in groups utilizing different goal setting procedures). The results indicate that goal setting procedures can have a significant effect on the performance of an endurance task. Treatment A, for example, which was characterized by explicit, difficult, group-set goals produced a significantly greater performance than treatments B, D, and E.

The evidence for the rejection of hypothesis 2 (that performance on the endurance task will not be significantly different in groups which utilize explicit as opposed to general goals) is not completely conclusive. Of the two treatments involving explicit experimenter-set goals (C and D) only treatment C produced a significantly greater performance than treatment E which was characterized by a general experimenter-set goal. Since the only difference between treatments C and D was goal difficulty it appears that goal difficulty may be a

confounding or contributing variable. These findings appear consistent with Locke and Bryan's (1966) contention that specific but difficult standards or goals result in better performance. Treatment C effects appear somewhat supportive of the suggestion of Cox (1972) that explicitness of a goal, intention, or contract can have considerable impact on commitment and behavioural performance.

The evidence for the rejection of hypothesis 3 (that performance on the endurance task will not be significantly different in groups which utilize group-set as opposed to experimenter-set goals) is also not conclusive. Although treatment A featuring group-set goals produced the greatest performance gain, the results were not significantly greater than those of treatment C which was yoked to treatment A in terms of difficulty and featured experimenter-set goals. It is, however, worthwhile to note that the "ceiling effect" of a maximum allowable performance could conceivably have influenced the possible significance in this comparison. There were 9 subjects in treatment A whose performance was stopped at the maximum limit compared to only 4 in treatment C. The chi-square analysis of the number of subjects reaching maximum performances in each group suggested significant differences.

Although group B whose treatment featured subject-set goals outperformed group D whose treatment was yoked to that of group B in terms of difficulty and featured experimenter-set goals, the Scheffé comparison did not produce a significant difference. Therefore, it is necessary to accept hypothesis 4 (that performance on the endurance task will not be significantly different in groups which utilize subject-set as opposed to experimenter-set goals).

Although goal difficulty appears as though it may be a contributing or confounding variable, the Scheffé comparison of groups C and D (which differed only in terms of goal difficulty) did not produce a significant difference. Group C with the more difficult goals performed better than Group D but this does not warrant the rejection of hypothesis 5 (that performance on the endurance task will not be significantly different in groups setting explicit goals of moderately different difficulty). In fairness to this comparison, however, the difference in mean goal difficulty was not that great and although the goals seemed like a considerable increase over a previous maximum performance, the large number of subjects exceeding their goals would suggest according to Locke (1968) that the goals were not really that difficult. It is interesting to note that group goal setting resulted in more difficult goals ($\overline{X}$ = +79) than individual subject goal setting ($\overline{X}$ = +54).

In assessing the particular effects of goal source, goal explicitness, and goal difficulty it appears that although all seemed to have some influence on performance, combinations of these particular goal features were necessary to produce statistically significant performance improvement. However, in light of the fact that the difference between success and failure in sport and physical education is often very minute performance differences, all results should probably be considered carefully.

It would seem important to carefully assess the exact nature of treatment A which produced the greatest performance increase. In addition to featuring a reasonably difficult goal which Locke (1968) suggests is important for performance, the treatment also involves the determination of a very explicit goal which Kiesler (1971) suggests

should result in increased commitment to the task. Wankel and McEwan (1976) hypothesize that greater commitment would be expected to lead to greater effort and better performance. Kanfer et al. (1974) suggest that determining an explicit goal results in a psychological contract which is likely to affect behavioural performance and self-control.

Although the subjects in treatment A were individually tested like all other subjects, the source of their goal was a group and they had experienced a group process. Their goals were known by the other members of their subgroup and it is possible that increased social and public awareness of goals could increase commitment and/or facilitate performance. Argyle (1957) has pointed out that social pressure can be felt in private as well as public situations, and Wankel and McEwan (1976) found that making goals more public resulted in better performance.

The group process may also result in increased normative information and goal acceptance. Locke (1968) has pointed out that individuals tend to strive harder to improve task performance when a norm or high achievement exists within the group. The concensus of opinion required by group process could also influence the degree of goal acceptance and task commitment. Steers and Porter (1974) point out that goal acceptance could be an important factor in the goal-performance relation.

Having "participated" in the goal setting process in treatment A may also contribute to commitment and performance. Studies by Tomekovic (1962), Lawler and Hackman(1969), and Scheflen et al. (1971) have indicated that participation can influence behavioural commitment and performance. The questionnaire data revealed that a high percentage of subjects feel they perform better when they make up their own minds about

what to do, yet very few reported an environment of democratic adults. French et al. (1966) on the other hand found that participation in goal setting was strongly and positively related to performance only when subjects had a past history of high participation.

The correlation of questionnaire item #10 responses with performance would not be surprising to attribution theorists. Results here support their contention that people who attribute behaviour and event outcomes to themselves as opposed to the environment (perceived internal locus of control) display greater achievement motivation (Weiner, 1974). Subjects who performed best tended to credit the performance to their own desire as opposed to environmental factors. However, one must remain cognizant of the fact that it was a post-hoc questionnaire and the correlation could be partially due to people's tendency to credit success to themselves and failure to the environment. Since a high percentage of the subjects in the study felt the limiting factor (locus of control) in their performance was within themselves, perhaps future study should investigate whether certain goal setting procedures and group processes influence perceived locus of control.

In attempting to explain the fact that correlations between goal difficulty and post-test performance were lowest in groups which performed best it is necessary to consider subjective observations. Many subjects substantially exceeded their original goals and the experimenter noted that the better performers appeared to spontaneously reset their goals during testing. These subjects would achieve an original goal, appear more confident and motivated and continue in pursuit of another more difficult goal. These goals seemed to be set spontaneously and some subjects even vocalized their new goals or intentions upon

achieving the original one. These observations support the contention that personal goal setting influences behaviour and performance, and they help to explain the lower correlations between original goal and final performance among the better performers. It is also possible that the "ceiling effect" of the maximum allowable performance may have influenced the correlation of the better performers.

In summary this study begins to reveal some of the possible benefits of different goal setting techniques over the more traditional leadership approach of being authoritarian about a general objective (Do the best you can).

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

The main purpose of this study was to test the effects of specific goal setting procedures on performance on an endurance task. The manipulated goal setting features included goal explicitness and goal source, and goal difficulty was yoked in treatments for purposes of comparison.

Seventy-five boys (aged 11-14) were pre-tested on a hand grip exercise endurance task, and post-tested on the same task following treatments involving various combinations of the manipulated goal setting features. Although task workload was proportional to individual maximum strength, there was a great deal of variance or range in performance scores. Pre-test performances ranged from less than one minute (52 contractions), to more than twelve minutes (720 + contractions).

Comparisons of the performances of different treatment groups revealed that the goal setting features of explicitness, source and difficulty independently contributed to performance gains, but combinations of these features in a treatment were often necessary to produce statistically significant performance differences. The treatment characterized by difficult explicit goals and a group source of goal produced the most dramatic and significant performance gain.

Post hoc questionnaire data was also collected in an attempt to assist in the explanation of performance differences. In response to an open-ended question on why they continued the task as lo they did, 44% of those responding mentioned the pursuit of a specific goal.

The answers of another 27% of those responding were coded as "pursuit of excellence".

There was virtually no difference in how the groups perceived their relative pain tolerance, but subjects who performed best tended to report that the task was more enjoyable (less painful). Group differences in appreciation of the instructors approach were not significant and subjects who performed best reported greater satisfaction with performance. Subjects who performed best on the endurance task also tended to credit their performance to their own desire as opposed to environmental factors.

Although 67% of the experimental population felt they perform better when they make up their own mind about what to do, only 25% of subjects reported that adults in their environment very often let them make their own decisions. Subjects who performed best tended to report an environment of more democratic adults.

Correlations between goal level and actual performance were lower for groups with the better performances. Evidence of spontaneous re-setting of specific goals along with the "ceiling effect" of a maximum allowable performance help to explain this result.

Conclusions

1. Simple goal setting leadership techniques can have a significant effect on the commitment, motivation, and performance of subjects.
2. The features of goal explicitness, goal difficulty, and goal source appear to contribute to these performance effects.
3. The leadership approach characterized by difficult explicit goals and a group source of goal produced the greatest commitment and most significant performance gain.

CHAPTER VI

RECOMMENDATIONS

Recommendations

1. Future research on this topic with children should utilize samples of a narrower age range to avoid possible growth and development differences. In addition, the age range associated with the onset of adolescence might be avoided.
2. Future research of this nature on maximum endurance testing should utilize a workload which exceeds twenty-five per cent of maximum strength. This would reduce (a) the variance in performance scores, (b) the testing time, (c) the possibility of any plateau or accommodation effects in pain level, and (d) the "ceiling effect" caused by a maximum allowable performance.
3. Future testing of this nature might involve larger treatment sample sizes. Any improvement in maximal performance could be important to the practitioner, yet these results can be difficult to claim as statistically significant with small sample sizes and high variance in scores.
4. Further in-depth research should be done on the collaborative group goal setting process to help explain the dynamics of its observed effects on commitment, motivation, and peformance.
5. Further research might investigate the relevance of attribution theory to commitment and self-control. In particular it would be interesting to determine if treatments which emphasize participative goal setting and self-responsibility result in any

shift in perceived locus of control or achievement motivation.

6. Field studies on the collaborative goal setting technique should be carried out to determine its suitability in different situations and its limitations for different leadership personalities.
7. Practitioners in the field of sport and education should begin to adjust programmes and leadership techniques on the basis of research findings in the areas of goal setting, commitment, and self-control.
8. Careful consideration should always be given to the psychological and motivational factors which influence maximal endurance testing.

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APPENDIX A

WRITTEN EXERCISE AGREEMENT

GOLDEN BEARS SPORTS CAMP

EXERCISE AGREEMENT

I understand the exercise task and agree to try my best to do .... consecutive repetitions and then to carry on as long as possible.

Signed .....

APPENDIX B

PERSONAL PERFORMANCE PROFILE

UNIVERSITY OF ALBERTA

Hockey Camp Profile on Grip Strength and Endurance

Name _____

Age _____

Dominant Hand Grip Strength _____Kg.

Average Grip Strength of Boys
the same age at the hockey camp _____Kg.

Dominant Hand Grip Endurance at
workload of ½ of maximum
Grip Strength

Trial 1 _____repetitions

Trial 2 _____repetitions

Average Endurance of Boys the
same age at the hockey camp

Trial 1 _____repetitions

Trial 2 _____repetitions

APPENDIX C

RAW DATA

RAW DATA

TREATMENT	BLOCK	SUBJECT =	AGE (YRS.)	STRENGTH (KGS.)	PRE-TEST	GOAL	POST-TEST	QUESTIONNAIRE RESPONSES									
								# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10
A	L	1	12	22	150	250	650	1	2	3	3	4	3	4	3	1	3
A	L	2	11	23	412	625	720	3	2	3	3	3	2	4	1	3	3
A	L	3	12	25	108	250	250	1	3	1	3	4	3	4	2	1	2
A	L	4	11	23	506	625	720	1	2	2	3	3	2	3	2	3	1
A	L	5	12	24	152	250	720	4	2	2	4	4	4	3	3	3	4
A	M	6	13	31	153	220	311	4	1	2	2	3	3	2	3	3	4
A	M	7	13	27	150	220	286	1	3	3	4	3	3	4	2	3	3
A	M	8	14	30	287	220	720	1	1	3	2	3	2	3	2	3	4
A	M	9	13	32	125	220	720	2	2	3	3	4	2	3	2	2	4
A	M	10	12	28	172	220	720	8	1	2	3	3	2	3	3	3	4
A	H	11	13	33	249	225	720	3	1	4	3	4	2	4	3	1	4
A	H	12	14	39	126	225	137	3	1	3	2	3	2	4	2	2	3
A	H	13	14	46	095	225	720	1	2	3	2	4	2	3	2	2	3
A	H	14	14	41	206	225	617	1	2	3	2	3	1	4	2	3	3
A	H	15	13	32	156	225	720	3	2	2	3	4	2	4	2	3	3

RAW DATA

TREATMENT	BLOCK	SUBJECT #	AGE (YRS.)	STRENGTH (KGS.)	PRE-TEST	GOAL	POST-TEST	QUESTIONNAIRE RESPONSES									
								# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10
B	L	1	12	20	446	600	720	1	3	2	4	4	3	3	2	4	3
B	L	2	12	19	077	085	200	3	3	3	1	4	1	4	1	3	2
B	L	3	12	22	097	130	215	1	2	3	4	4	2	2	3	3	4
B	L	4	11	20	080	090	140	2	3	3	4	3	3	4	2	4	2
B	L	5	12	22	552	600	720	3	1	3	3	3	2	3	3	3	2
B	M	6	10	25	091	125	242	2	3	3	4	1	4	3	2	2	2
B	M	7	12	31	146	300	225	1	2	2	3	3	3	2	2	3	1
B	M	8	11	27	052	090	091	1	3	3	4	4	4	3	1	2	2
B	M	9	12	27	294	502	630	2	3	3	4	3	2	3	2	3	3
B	M	10	14	31	113	130	150	4	3	3	4	3	4	3	3	3	2
B	H	11	12	42	186	205	641	4	2	3	3	4	3	3	3	3	3
B	H	12	13	48	078	080	080	1	2	3	4	3	3	3	2	3	1
B	H	13	13	51	154	175	259	8	2	2	4	4	2	3	2	1	3
B	H	14	13	49	303	350	503	1	2	3	4	4	2	4	3	3	3
B	H	15	13	46	249	270	290	1	3	2	4	3	3	3	3	3	3

RAW DATA

TREATMENT	BLOCK	SUBJECT #	AGE (YRS.)	STRENGTH (KGS.)	PRE-TEST	GOAL	POST-TEST	QUESTIONNAIRE RESPONSES									
								# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10
C	L	1	11	21	072	151	116	7	2	2	4	4	2	4	2	4	4
C	L	2	12	23	185	264	400	2	2	2	4	4	4	4	2	3	3
C	L	3	12	23	112	191	242	1	2	2	4	3	2	3	2	3	3
C	L	4	13	23	214	293	720	2	2	3	4	4	3	4	2	3	4
C	L	5	13	22	145	224	720	5	1	2	3	4	3	3	2	3	2
C	M	6	12	28	247	326	500	3	2	3	4	4	2	3	1	3	4
C	M	7	12	30	069	148	305	4	2	3	4	3	2	4	3	3	3
C	M	8	11	27	065	144	144	2	3	3	4	4	3	4	1	1	1
C	M	9	11	29	232	311	435	2	2	3	3	3	3	4	3	4	3
C	M	10	14	26	445	524	720	2	2	2	4	4	3	4	2	3	4
C	H	11	12	33	069	148	550	1	2	3	4	3	3	2	1	2	4
C	H	12	12	34	274	353	720	2	1	4	3	3	3	3	3	4	3
C	H	13	12	33	389	468	469	1	2	3	3	4	3	4	1	1	2
C	H	14	12	32	118	197	197	1	2	3	4	3	2	3	2	4	3
C	H	15	13	35	099	178	202	1	2	3	3	3	3	4	2	1	3

RAW DATA

TREATMENT	BLOCK	SUBJECT #	AGE (YRS.)	STRENGTH (KGS.)	PRE-TEST	GOAL	POST-TEST	QUESTIONNAIRE RESPONSES									
								# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10
D	L	1	11	22	339	393	469	3	1	3	4	3	3	3	2	2	3
D	L	2	12	18	169	223	205	1	3	3	4	3	3	3	2	3	4
D	L	3	11	19	134	188	234	2	3	2	3	4	3	3	2	3	3
D	L	4	10	16	110	164	217	3	3	2	4	3	4	3	1	1	3
D	L	5	11	21	686	740	720	6	1	2	4	2	4	3	3	2	2
D	M	6	12	31	112	166	233	1	1	3	4	3	2	3	1	1	4
D	M	7	11	23	100	154	209	3	1	2	4	4	4	3	1	3	4
D	M	8	12	26	074	128	161	1	3	3	4	4	4	4	1	3	4
D	M	9	12	27	118	172	173	1	2	3	3	3	3	3	1	4	2
D	M	10	10	30	147	201	400	3	3	3	3	3	2		2	4	3
D	H	11	12	32	090	144	105	2	2	3	3	3	2	3	1	2	1
D	H	12	13	40	081	135	220	3	4	2	3	3	2	4	2	3	4
D	H	13	13	32	091	145	146	5	2	3	2	3	2	2	1	2	3
D	H	14	13	34	286	340	580	1	2	4	4	4	3	3	2	3	4
D	H	15	15	48	077	131	161	6	1	3	3	3	4	3	3	3	4

RAW DATA

TREATMENT	BLOCK	SUBJECT #	AGE (YRS.)	STRENGTH (KGS.)	PRE-TEST	GOAL	POST-TEST	QUESTIONNAIRE RESPONSES									
								# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10
E	L	1	12	24	574	000	720	3	2	3	4	4	2	4	2	3	3
E	L	2	12	19	132	000	076	2	3	4	2	2	4	4	1	2	2
E	L	3	11	14	109	000	135	6	1	3	4	4	2	4	2	1	1
E	L	4	11	19	059	000	091	2	3	2	4	3	3	3	2	3	4
E	L	5	14	22	280	000	090	7	3	2	3	2	1	4	2	3	2
E	M	6	11	25	061	000	102	1	1	3	3	2	2	3	2	3	3
E	M	7	11	24	143	000	167	5	2	3	4	2	3	3	1	3	4
E	M	8	11	28	078	000	087	4	2	2	4	3	3	3	3	1	4
E	M	9	13	30	099	000	160	2	3	3	2	3	2	3	2	2	3
E	M	10	11	28	358	000	409	3	4	3	3	3	2	3	2	4	3
E	H	11	12	33	102	000	175	1	3	2	4	3	2	3	1	3	4
E	H	12	13	32	079	000	176	5	1	3	4	2	2	3	2	3	1
E	H	13	13	33	108	000	202	3	3	2	4	4	3	4	2	2	2
E	H	14	13	34	143	000	300	3	2	3	3	3	2	3	3	1	3
E	H	15	13	43	093	000	135	2	3	3	3	4	3	3	3	3	4

APPENDIX D

POST-HOC QUESTIONNAIRE

APPENDIX D

NAME_____

QUESTIONNAIRE

Please answer all questions.

1. Explain why you carried on as long as you did at this task.

Place an "X" beside the best answer.

2. Towards the end did you find the task

____enjoyable?

____a bit unpleasant?

____quite painful?

____very painful?

3. Compared to other kids do you thin' pain bothers you

____much more?

____a bit more?

____a bit less?

____much less?

4. Was it important for you to do well on this task?

____I didn't care much.

____I wanted to do okay.

____I wanted to do well.

____I really wanted to do well.

5. How pleased were you about how well you did?

____Very unhappy

____Not very pleased

____Fairly pleased

____Very happy

6. Did you feel much responsibility to do well?

____No, not much.

____Yes, some.

____Yes, quite a bit.

____Yes, a great deal.

7. Did you like the way the instructor asked you approach the task?

____No, I didn't.

____It wasn't bad.

____Yes, it was okay.

____Yes, I really liked it.

8. Most of the adults that I know (parents, teachers, coaches, leaders, etc.)

____Simply tell me what to do.

____Sometimes give me a say in what to do.

____Often let me decide what to do.

____Always let me decide what to do.

9. I do things better when

____Someone else tells me to do well.

____Someone else tells me exactly what to do.

____I make up my own mind to do well.

____I make up my own mind exactly what to do.

10. How long I continued this task was

____Almost completely due to its difficulty.

____Pretty much due to its difficulty.

____Pretty much due to my desire.

____Almost completely due to my desire.

APPENDIX E

QUESTIONNAIRE RESPONSE FREQUENCY TABLES

APPENDIX E

QUESTIONNAIRE RESPONSE FREQUENCY TABLES

ITEM #1: "Explain why you carried on as long as you did at this task".

(Answers were coded into eight categories as specified)

RESPONSE	TREATMENT					
	A	B	C	D	E	TOTAL
TO REACH A SPECIFIC GOAL	7	7	5	5	2	26
PURSUIT OF EXCELLENCE	1	3	6	2	4	16
NO RESPONSE	4	2	1	5	4	16
COMPETING AGAINST OTHERS	2	2	1	0	1	6
MISCELLANEOUS REASONS	0	0	1	1	2	4
PURSUIT OF FITNESS	0	0	0	2	1	3
TO TEST STAMINA	0	0			1	2
WAS FIT	1	1	0		0	2

ITEM #2: "Towards the end did you find the task".

RESPONSE	TREATMENT					
	A	B	C	D	E	TOTAL
1. enjoyable	5	1	2	5	3	16
2. a bit unpleasant	8	6	12	4	4	34
3. quite painful	2	8	1	5	7	23
4. very painful	0	0	0	1	1	2
MEAN ON SCALE OF 1 TO 4	1.8	2.4	1.9	2.1	2.4	2.15

ITEM #3: "Compared to other kids do you think pain bothers you"?

RESPONSE	TREATMENT					
	A	B	C	D	E	TOTAL
1. much more	1	0	0	0	0	1
2. a bit more	5	4	5	5	5	24
3. a bit less	8	11	9	9	9	46
4. much less	1	0	1	1	1	4
MEAN ON A SCALE OF 1 TO 4	2.6	2.7	2.7	2.7	2.7	2.71

ITEM #4: "Was it important for you to do well on this task"?

RESPONSE	TREATMENT					
	A	B	C	D	E	TOTAL
1. I didn't care much	0	1	0	0	0	1
2. I wanted to do okay	5	0	0	1	2	8
3. I wanted to do well	8	3	5	6	5	27
4. I really wanted to do well	2	11	10	8	8	39
MEAN ON A SCALE OF 1 TO 4	2.8	3.6	3.7	3.5	3.4	3.39

ITEM #5: "How pleased were you about how well you did"?

RESPONSE	TREATMENT					
	A	B	C	D	E	TOTAL
1. Very unhappy	0	1	0	0	0	1
2. Not very pleased	0	0	0	1	5	6
3. Fairly pleased	8	7	7	10	6	38
4. Very happy	7	7	8	4	4	30
MEAN ON A SCALE OF 1 TO 4	3.5	3.3	3.5	3.2	2.9	3.29

ITEM #6: "Did you feel much responsibility to do well"?

RESPONSE	TREATMENT					
	A	B	C	D	E	TOTAL
1. No, not much	1	1	0	0	1	3
2. Yes, some	9	5	5	5	8	32
3. Yes quite a bit	4	6	9	5	5	29
4. Yes, a great deal	1	3	1	5	1	11
MEAN ON A SCALE OF 1 TO 4	2.3	2.7	2.7	3.0	2.4	2.64

ITEM #7: "Did you like the way the instructor asked you to approach the task"?

RESPONSE	TREATMENT					
	A	B	C	D	E	TOTAL
1. No, didn't	0	0	0	0	0	0
2. I[illegible]asn't bad		2	1	1	0	5
3. , it was okay		10	5	12	10	43
4. es, I really liked it	8	3	9	2	5	27
MEAN ON A SCALE OF 1 TO 4	3.5	3.1	3.5	3.1	3.3	3.29

ITEM #8: "Most of the adults that I know (parents, teachers, coaches, leaders, etc.)"

RESPONSE	TREATMENT					
	A	B	C	D	E	TOTAL
1. Simply tell me what to do	1	2	4	7	3	17
2. Sometimes give me a say in what to do	9	7	8	6	9	39
3. Often let me decide what to do	5	6	3	2	3	19
4. Always let me decide what to do	0	0	0	0	0	0
MEAN ON A SCALE OF 1 to 4	2.3	2.3	1.9	1.7	2.0	2.03

ITEM #9: "I do things better when"

RESPONSE	TREATMENT					
	A	B	C	D	E	TOTAL
1. Someone else tells me to do well	3	1	3	2	3	12
2. Someone else tells me exactly what to do	3	2	1	4	3	13
3. I make up my own mind to do well	9	10	7	7	8	41
4. I make up my own mind exactly what to do	0	2	4	2	1	9
MEAN ON A SCALE OF 1 TO 4	2.4	2.9	2.8	2.6	2.5	2.63

ITEM #10: "How long I continued this task was"

RESPONSE	TREATMENT					
	A	B	C	D	E	TOTAL
1. Almost completely due to its difficulty.	1	2	1	1	2	7
2. Pretty much due to its difficulty.	1	6	2	2	3	14
3. Pretty much due to my desire.	7	6	7	5	5	30
4. Almost completely due to my desire.	6	1	5	7	5	24
MEAN ON A SCALE OF 1 TO 4	3.2	2.4	3.1	3.2	2.9	2.95

APPENDIX F

NON-PARAMETRIC ANALYSIS OF PERFORMANCE IMPROVEMENT SCORES

APPENDIX F

NON-PARAMETRIC ANALYSIS OF PERFORMANCE IMPROVEMENT SCORES

DATA:

SUBJECT NUMBER	TREATMENT									
	A		B		C		D		E	
	SCORE	RANK	SCORE	RANK	SCORE	RANK	SCORE	RANK	SCORE	RANK
1	500	8	274	19	044	60	130	37.5	146	32
2	308	16	133	36	215	23	036	66	-056	75
3	142	33	118	40	130	37.5	100	45	026	69
4	214	24	060	56	506	7	107	42	032	68
5	568	4	168	28	575	3	034	67	190	27
6	158	29	151	31	253	20.5	121	39	041	62.5
7	136	35	079	52	236	22	109	41	024	70
8	433	13	039	64	079	52	087	48	009	73
9	595	2	336	15	203	25	055	57.5	061	55
10	558	6	037	65	275	18	253	20.5	051	59
11	471	10	455	11	481	9	015	71	073	54
12	011	72	002	74	446	12	139	34	097	46
13	625	1	105	43	080	50	055	57.5	094	47
14	411	14	200	26	079	52	294	17	157	30
15	564	5	041	62.5	103	44	084	49	042	61
MEAN	379	18.1	146	41.5	247	29.0	108	46.1	041	55.2

SCORE - Number of contractions on post-test minus number of contractions on pre-test.

RANK - Ranking of performance improvement score among all subjects.

ANALYSIS:

Kruskal-Wallis Test For Main Effect

Critical value of "H" (α = .05) = 9.5

Value of "H" = 26.9*

Post Hoc Confidence Intervals For Simple Contrasts of Rank Means

Critical value of confidence interval (α = .05) = ± 24.5

Mean A - Mean B = -23.4

Mean A - Mean C = -10.9

Mean A - Mean D = -28.0*

Mean A - Mean E = -37.1*

Mean B - Mean C = 12.5

Mean B - Mean D = - 4.6

Mean B - Mean E = -13.7

Mean C - Mean D = -17.1

Mean C - Mean E = -26.2*

Mean D - Mean E = - 9.1

* = significant at α = .05