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# Using subgoals as a Mechanism for altering perceptions of situational control, mastery, and task-related stress

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USING SUBGOALS AS A MECHANISM FOR ALTERING  
PERCEPTIONS OF SITUATIONAL CONTROL, MASTERY,  
AND TASK-RELATED STRESS

A Thesis  
Presented to the  
Department of Psychology  
and the  
Faculty of the Graduate College  
University of Nebraska

In Partial Fulfillment  
of the Requirements for the Degree  
Master of Arts  
University of Nebraska at Omaha

by  
James E. Kieffer  
March 1994

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THESIS ACCEPTANCE

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University of Nebraska, in partial fulfillment of the  
requirements for the degree Master of Arts, University of  
Nebraska at Omaha.

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April 6, 1994  
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## Abstract

The empirical literature suggests that subgoals may have an effect upon feelings of task-related stress which is more intense than the effect of distal goals on this variable. First, subgoals may alter an individual's perception of the task in such a way that the task related goal is not seen as being so overwhelming. Second, there is an increased feedback mechanism associated with subgoals that may alter perceptions of situational mastery and control and in turn perceptions of situational stress.

The effect of receiving more frequent feedback is dependent upon the valence of the feedback. Specifically, positive feedback leads to an increase in perceptions of situational control and mastery and therefore reduces feelings of situational stress. Negative feedback has the opposite effect.

The relationship between subgoals and perceptions of mastery had been investigated; however, the suggested connections between subgoals, control, and stress had not. In order to investigate these possible effects, subjects were divided into six goal type by feedback type conditions. Each group was asked to participate in a timed arithmetic test for which they had been given four, five minute goals, one, 20 minute goal, or no goals. The goals were

manipulated so that some groups received consistent negative feedback, some groups received consistent positive feedback, and some groups received no feedback.

After the test, subjects were asked to fill out several self-report measures assessing perceptions of situational control, mastery, and feelings of task related stress. It was hypothesized that those subjects in the positive feedback condition would have scores on the mastery and control measures that were significantly higher, and scores on the stress measure that were significantly lower than the no-feedback condition subjects. The same differences were hypothesized between the scores on these measures for the no-feedback group and the negative feedback group.

Further, it was hypothesized that those subjects in the positive feedback/subgoal groups would have scores on the mastery and control measures that were significantly higher, and scores on the stress measure that were significantly lower than the subjects in all other goal type/feedback type conditions.

The results of this research confirm the hypotheses pertaining to the main effect of feedback on dependent variables. However, no significant differences were discovered due to the variable's interaction.

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My final words are reserved for the members of my family. To them: Mom, Dad, Connie, Michel Ann, Fred, and Gary my deepest love. You have been my friends, my counselors, and an endless source of strength.

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Using Subgoals as a Mechanism for Altering  
Perceptions of Situational Control, Mastery,  
and Task Related Stress

Chapter 1

The total absence of stress is impossible and perhaps undesirable to be totally without stress (Selye, 1976). However, continued intense stress is a well documented source of physiological and psychological disorders (Cooper & Marshall, 1976; Glass, 1972; Matteson & Ivancevich, 1979; Paine, 1982; Selye, 1980). Past research has asserted that several variables exist which contribute to the intensity of stress. These variables include: (a) intensity of the situation, (b) unpredictability of the situation, and (c) personal control over the situation. The more intense the pressures of the situation, the more likely it is to be interpreted as intensely stressful. The same is true when the situation is interpreted as being more unpredictable and/or more uncontrollable.

A substantial portion of the stress reduction literature focuses on the concept of personal control over the stressful situation (Lefcourt, 1973; Mandler & Watson, 1966; Sells, 1970). Averill (1973) discussed three types of personal control: behavioral, cognitive, and decisional.

Behavioral control refers to a person's ability to modify the stressful stimulus via direct action. This action may include preventing the application of a stressful stimulus, deciding who will deliver a stressful stimulus, or deciding to whom a stressful stimulus will be directed (Averill, 1973). From the viewpoint of the receiver of the stressful stimulus this is probably the most desired type of control to have; however, in most situations it is not available.

Decisional control was defined by Averill (1973) as the range of choice or number of options open to an individual. For example, Lewis and Blanchard (1971) offered subjects the choice of whether they wanted to be the teacher or the subject in an experiment that involved punishment in the form of electric shocks to learners who gave wrong answers. They found that having the opportunity to make this choice reduced the amount of physiologically measured stress experienced by subjects in which ever role they chose. Again, the major problem with decisional control is that many times choices are not available to the person exposed to the stressful situation.

Cognitive control refers to "the processing of potentially threatening information in such a manner as to reduce the stress and/or the psychic cost of adaptation" (Averill, 1973, p. 293). Thompson (1981) reviewed the

stress literature involving manipulation of behavioral, decisional, or cognitive control. He found that cognitive control had a more uniformly positive effect. Restated, Thompson (1981) found that cognitive control was consistently more effective than behavioral or decisional control in reducing the level of stress experienced in an aversive situation. Another positive feature of cognitive control is that, theoretically, it is available for one to use in most situations.

There are two major goals of the present research. One is to determine whether perceptions of cognitive control over a situation can be modified by dividing the situation's distal goal into proximal goals or subgoals. The second is to further substantiate the theory that subjects with perceptions of high cognitive control and mastery experience less psychological stress from threatening situations than do those subjects who have low perceptions of control and mastery.

Although the relationship between using subgoals and cognitive control has not been empirically tested, the nature of subgoal strategies suggests that they may be an effective means for modifying one's perceptions of cognitive control over a situation. Dividing a task into subgoals may affect perceptions of cognitive control in two ways.



First, subgoals may affect perceptions of control by reducing the enormity of a large task into smaller more accomplishable tasks. Second, with subgoals, the opportunity is more frequently provided for one to seek and/or receive feedback about mastery over a task. It is logical to suggest that one's perceptions of mastery over a situation should have a direct impact upon perceptions of control over a situation. Specifically, when one feels that one has mastered the requirements of a situation, then one can interpret that situation as less threatening.

It should be noted that feedback valence alters one's sense of situational mastery and cognitive control in the same direction (Bandura, 1977; Bandura & Cervone, 1983). For example, negative feedback has a negative impact upon one's perceptions of mastery and control. Positive feedback has a positive impact upon the same (Bandura & Cervone, 1983).

As stated above, the second goal of this research is to investigate whether perceptions of situational control and situational mastery affect experiences of situationally related stress. Specifically, research in the area of self-efficacy and stress has revealed that situational anxiety can be effectively reduced by increased perceptions of mastery and control (Bandura & Barab, 1973; Bandura, Blanchard, & Ritter, 1969; Blanchard, 1970). Subsequent

research by Bandura (1977) has shown that perceptions of low mastery in the face of threatening situations provoke anxiety or stress.

The remaining portion of this introduction will be divided into five sections. First, I will discuss some categories of sources of situationally induced stress and how these source categories have been empirically linked to perceived level of control and/or mastery over the situation. Second, I will present arguments that demonstrate how sense of cognitive control and mastery can be modified through restructuring strategies. In the third section, I will propose that subgoal strategies are a form of cognitive restructuring that modify perceptions of cognitive control and mastery over a situation. Finally, I will present predictions regarding the related effects of goal type and feedback on perceived cognitive control, mastery, and task related stress.

Categories of Causes of Work-Related Stress and the Mediating Value of Perceptions of Personal Control and Mastery

Because of the researcher's interest in organizational and stress management, the present discussion will focus exclusively on sources work-related stress. However, it should be acknowledged that many other sources of stress exist, such as health-related stress and forms of stress

that exist in other social situation besides work (i.e. family, recreational situations).

James and Jonathan Quick presented a thorough review of the sources of work-related stress in the second chapter of their book, Organizational Stress and Preventive Management (1984). They categorized sources of situational stress into four groups: (a) task demands, (b) physical demands, (c) role demands, and (d) interpersonal demands. The following discussion of each source category will initially list all the members of that category as presented by Quick and Quick (1984). However, due to the large number of sources of stress listed under each category, a discussion of each source is not feasible; therefore, only a few examples will be chosen from each category for elaboration. Selected sources of stress will be discussed with references to research which supports the strong relationship between perceptions of control or mastery over a situation and the amount of stress experienced in that situation.

Task demands. Task demands are the specific requirements that a person who occupies a certain position must meet to successfully perform the job (Quick & Quick, 1984). Some of the individual elements or causes of stress included in this group are occupational category, managerial

jobs, career progress, routine jobs, boundary-spanning activities, performance appraisal, work overload, and job security.

Performance appraisals fit in most directly with the above definition. The feedback procedures involved in performance appraisal processes produce stress for both the supervisor doing the performance appraisal and the employee who is the object of the appraisal (Ilgen, Fisher, & Taylor, 1979). For the employee, results of performance appraisals often determine whether one receives a promotion and/or raise, or more importantly, whether one keeps one's job! Performance appraisals are also stressful for the supervisor conducting them. Appraisals perceived as unfair or incorrect can adversely affect the relationship between supervisors and their employees, and they can affect the way in which supervisors are viewed by their superiors (Bernardin & Beatty, 1984).

The connection between stress produced by a performance appraisal situation and perceived control or mastery over that situation is not as direct. Ivancevich (1982) suggested that stress which accompanies a performance appraisal situation can be reduced by providing employees with more frequent feedback about their performance. Bandura and Schunk (1981) clarified the relationship between stress and feedback by stating that positive feedback about

one's performance supplies one with a sense of mastery over the situation. Schunk (1983) stated that when one's sense of mastery is altered, one's sense of cognitive control is altered in the same direction. Therefore, an increase in perceptions of situational mastery will lead to an increase in perceptions of situational control, which will in turn lead to a decrease in task-related stress (Bandura, 1977; Bandura & Barab, 1973; Bandura, Blanchard, & Ritter, 1969; Blanchard, 1970). Although they are simultaneously affected in the same direction, there is a subtle difference between the concepts of situational mastery and situational cognitive control. The former refers to one's perceptions about one's ability to make an adequate response to a situation (Averill, 1973). Cognitive control reflects the perceptions about one's ability to reduce the stressfulness of making that response by using effective mental strategies (Schunk, 1983). The synchronized increase or decrease of these concepts can be explained by understanding that when one receives information about one's mastery over a situation one is also receiving information about the effectiveness of one's mental strategies.

Physical demands. The host of physical agents that may cause individual stress are considered under the second group of sources of stress called physical demands (Quick & Quick, 1984). The range of research concerning the effects

of the physical environment on stress is broad and includes such variables as temperature (Selye, 1976), illumination, sound waves, vibrations (Ivancevich & Matteson, 1980), and office design (Steele, 1973).

In the temperature domain, Spacapan and Cohen (1983) have found that expectations of control over extreme temperature conditions reduced stress reactions in subjects. Similar effects have been reported by Seligman (1975) and Baum and Valins (1979).

As one of the three aspects of hardiness (Kobasa, 1979), perceptions of a high internal level of control, as measured by Rotter's Locus of Control Scale (1954), were positively associated with emergency room nurses' low susceptibility to stress from exposure to persistent loud noise (Topf, 1989). Negative correlations between high internal locus of control and level of stress have also been discovered by several other investigators (Averill, 1973; Fisher, 1983; Glass, Rheim, & Singer, 1971; Miller, 1979).

Role demands. The distinction between task demands and role demands is subtle and, therefore, worthy of a short discussion. Task demands are concerned with specific work activities as outlined in a job analysis. Role demands encompass those behaviors that others, called role senders, expect of an employee in fulfilling a particular organizational role (Quick & Quick, 1984). These demands

vary according to the position of the role sender. For example, the role a subordinate expects a supervisor to fulfill may be different from the role expected by that supervisor's supervisor. There are two sources of stress associated with role demands: role conflict and role ambiguity. Role conflict occurs when differences in the demands of two role senders make it impossible or very difficult for the role filler to meet one or the other's expectations (Quick & Quick, 1984). This leaves the role filler with a sense of low mastery and low control over the situation, which is stressful (Bandura, 1977).

Role ambiguity is the result of an employee having inadequate information about expected role performance (Quick & Quick, 1984). Organ and Greene (1974) suggested that role ambiguity is moderated by one's perception of personal control as measured by Rotter's Locus of Control Scale (1954). People high in internal locus of control possess strategies that prompt them to seek out more information about their situation so that they can achieve a sense of mastery over it, thus, they suffer less from role ambiguity than do people high in external locus of control.

Interpersonal demands. As Selye (1974) pointed out, learning to deal with people is one of the most stressful aspects of life. Each of us has developed a distinct set of social needs, due to the unique social interaction

experiences we have encountered. These needs can become a source of stress for all parties involved in an interaction when one person's needs conflict with the needs of others. Problems with status incongruence, social density, abrasive personalities, leadership style, and group pressures are all products of these need conflicts and are included in the fourth category of sources of stress: interpersonal demands (Quick & Quick, 1984).

Social density can become a potential stressor when its level is either too great for the individual or is below the level a person needs. When the atmosphere in which we work violates our needs for interpersonal space and distance, our ability to master our work is impeded (Evans, 1979). In contrast, when a person's opportunity to interact with others is denied or severely limited by inadequate proximity for social contact, that too can interfere with our work mastery (Evans, 1979).

Baum and Gatchel (1981) reported that stress reactions were reduced in college dorms when frequency of contact in socially dense situations was reduced. Baron and Roden (1978) and Baum and Valins (1979) also supported this finding in crowded urban neighborhoods.

In summary, the four categories of sources of stress are (a) task demands, (b) physical demands, (c) role demands, and (d) interpersonal demands. However, it is not



the demand per se that produces stress; the critical factor is perceived lack of control or mastery over the demand situation. From the sampling of evidence presented above, it appears that perceptions of an increase in level of cognitive control and mastery results in reduced stress reactions compared to stress reactions in situations that are perceived to be low in possibilities for cognitive control and mastery.

#### Modifying Perceptions of Cognitive Control by Using Cognitive Reconstruction Techniques

Before discussing cognitive reconstruction and how it can be used to modify one's perception of control and mastery over a possibly stressful situation, it is necessary that we define the concept of cognitive structures.

Meichenbaum and Deffenbacher (1988) defined cognitive structures as:

the assumptions, beliefs, commitments, and meaning systems that influence the way the world and the individual are construed. They are the core organizing principles that influence what is attended to, how information is structured, and what importance is attached. They function to set behavior in motion, to guide the choice and direction of particular sequences of thought, feeling, and action,... In a sense

cognitive structures control the scripts for internal dialogue, feelings, and behavior." (p. 70)

Researchers have defined several belief systems which serve as the basis of cognitive structures (Kobasa, 1979; McClelland, 1961; Rotter, 1954). One belief system which has received recent attention is Hardiness (Kobasa, 1979). Kobasa (1979) suggests that people practice different styles of situational adaptation. These different styles are based upon the extent of a person's level of hardiness. Hardiness is composed of a person's viewpoint on three life themes: (a) control, (b) commitment, and (c) challenge.

The control theme is based upon Rotter's (1954) theory of locus of control. At issue is the extent to which a person feels he or she exerts influence over the outcomes in his or her life. People who feel they have a high level of control over their outcomes are said to have a high internal locus of control. Those who feel that their outcomes are controlled by fate or luck are said to have a high external locus of control.

The second life theme is sense of commitment. Sense of commitment addresses the level of commitment that one feels towards work, schooling, relationships, etc..

The third life theme is sense of challenge. Challenge refers to the extent to which one views obstacles to goal

attainment as an excuse to give up or a challenge to be overcome.

People who have a high internal locus of control and who have a high sense of challenge and commitment are considered hardy individuals (Kobasa, 1979). The hardy individual's outlook aids in the development of healthy emotional responses and coping strategies (Allred, 1989; Campbell et al., 1989, Parkes & Rendall, 1988). Research indicates that hardy individuals experience a significantly lower level of life stress than do non-hardy individuals (Orr & Westman, 1990; Ouellette Kobasa & Puccetti, 1983).

If the readers of this report will excuse a momentary aside, I would like to explain why such a detailed explanation was lavished upon this personality variable which seemingly has nothing to do with the purposes of the present research. The present research efforts are being taken advantage of as an opportunity to conduct an investigation into the stability of hardiness across situations. To be more specific, hardiness is going to be measured as a dependent variable and the measurements will be tested to determine whether significant differences exist between perceptions of hardiness as the result of the effects of the independent variables of goal type and/or feedback type.

In returning to the original purpose of this research let it be said that Meichenbaum (1972) asserts that when existing cognitive structures are detrimental to a person's healthy functioning, then it is necessary to alter the cognitions through restructuring techniques. One type of restructuring technique is Meichenbaum's Stress Inoculation Training (SIT) (1972). SIT techniques have been used with a variety of stress laden populations and problems, such as teachers (Forman, 1982), dental phobias (Moses & Hollandsworth, 1985), and Type A behavior (Levenkron, Cohen, Mueller, & Fisher, 1983).

SIT therapists have discovered that most anxiety producing thoughts involve a preoccupation with one or more of a few major detrimental themes. These themes are: fear of personal endangerment, loss of control, and fear of rejection (Meichenbaum & Deffenbacher, 1988). The results of applied restructuring techniques in dealing with these maladaptive cognitions have been very successful. Specifically, in dealing with a fixation on loss of control, cognitive restructuring has been effective in developing within the client a perception of regained control over life (Meichenbaum & Deffenbacher, 1988).

In summary, cognitive structures are the strategies we establish for ourselves for evaluating life situations. Belief systems have been identified which serve as the

foundation of our cognitive structures. When our present strategies interfere with our successful day-to-day functioning, they need to be changed through restructuring techniques. Research has shown that one of the major maladaptive cognitions is fixation on a sense of lack of control and that cognitive restructuring techniques are successful in altering these and other detrimental thought patterns.

SIT is a time intensive technique. It may involve years of counseling and behavior modification therapy before any effects on one's perceptions of life control are realized (Meichenbaum & Deffenbacher, 1988). However, a technique may exist which allows one to immediately cognitively reconstruct a particular situation and therefore gain a sense of control over that situation. This technique is setting subgoals. However, this technique requires subgoals to provide situational information that is salient enough to totally or partially override the negative cognitive structures that an individual may possess.

#### Subgoals as a Form of Cognitive Restructuring

Subgoal strategies are a form of cognitive restructuring in which a long-term or distal goal is broken down into more easily attainable goals, called subgoals or proximal goals. Training people in the use of subgoal cognitive restructuring strategies has been successfully

attempted in the areas of education (Bandura & Schunk, 1981; Morgan, 1985) and sports (Hall & Byrne, 1988). The training consists of teaching the subject to look for natural divisions of accomplishments that may exist in a threatening task. The distal task is then broken down into these natural divisions; the intent to accomplish each division serves as a subgoal. For example, Bandura and Schunk (1981) divided the distal goal of learning to subtract into seven subgoals that corresponded to the seven sub-procedures necessary for one to learn to accomplish the overall goal of subtraction.

The basic requirements of a successful goal setting strategy, as stated by Latham and Locke (1991), are to set specific, challenging but attainable, attractive goals and to provide feedback to the performer. Compared to distal goals, subgoals are more specific, more easily attainable without affecting the challenge of the overall goal, and provide more opportunities to receive feedback (Bandura & Schunk, 1981).

It is logical to suggest that there is a connection between the perceptions of the achievability of a task and perceptions of control over that task. The more achievable a task is perceived to be, the more control a person is likely to feel over that task.

The frequent feedback received when working under a subgoal situation allows people to compare their actual performance against standards to which they have committed themselves (Ilgen, Fisher, & Taylor, 1979). Positive feedback communicates that the performance standard has been achieved or surpassed. The benefits of positive feedback on performance, motivation (Hall & Byrne, 1988; Morgan, 1985), intrinsic interest, and self efficacy (Bandura & Schunk, 1981; Schunk, 1983), are well documented. Bandura and Schunk (1981) and Schunk (1983) credit these positive effects to the increased sense of mastery and cognitive control that one feels over the situation as a result of the communication about one's successful performance.

Negative feedback reveals a discrepancy between actual performance and the performance standards. When most people receive negative feedback, they begin to doubt their ability to achieve the set goal(s). Therefore, a sense of mastery and cognitive control is not encouraged (Bandura, 1986; Bandura & Cervone, 1983).

In summary, subgoals can be used as a form of cognitive restructuring which divides distal goals into proximal goals. Subgoals may provide information about a situation which overrides a person's negative cognitive structures and promotes a sense of situational control within that person. Proximal goals seem more attainable than distal goals and

thus seem to be more under the control of the individual. Proximal goals also provide more frequent opportunities for feedback. Positive feedback increases perceptions of situation control and mastery. Negative feedback has the opposite effect. The effects of the more frequent subgoal feedback on mastery and control are more extreme than the effects of the single opportunity for feedback provided when distal goals are used.

#### The Subgoal Feedback Mechanism as a Moderator of Task-Related Stress

Bandura and Schunk (1981) suggested that proximal goal setting strategies could be beneficial in reducing performance related stress because they are a form of situational cognitive restructuring. However, these speculations have never been empirically tested.

What has been tested is the effect of the valence of subgoal feedback on the direction of one's sense of mastery and control. If feedback is negative, one's sense of mastery and cognitive control is reduced (Bandura & Cervone, 1983). Bandura (1977) and Feltz and Reissinger (1990) stated that perceptions of low mastery lead to elevated levels of anxiety. Conversely, positive feedback increases or allows one to maintain one's perceptions of situational mastery and cognitive control (Bandura & Schunk, 1981). When perceptions of cognitive control or mastery are



high, situational anxiety is reduced (Averill, 1973; Bandura, 1977; Bandura & Cervone, 1983; Ivancevich, Matteson, Friedman, & Phillips, 1990; Keita & Jones, 1990).

To summarize, evidence attests to the effect of the valence of feedback on perceptions of situational control and mastery. Research also supports the negatively correlated relationship between perceptions of situational control and mastery and feelings of stress to that same situation. Therefore, it is logical to assume that any technique, such as subgoals, which can intensify the effect of feedback on perceptions of situational mastery and control will also affect feelings of stress about that same situation.

### Conclusions

In conclusion, it is suggested that subgoals allow individuals to reconstruct a distal task which is perceived to be unachievable and therefore uncontrollable, into a several sub-tasks. These subtasks are perceived to be more achievable and thus, the situation is perceived to be more under the individual's control. This increase in a person's perceptions of situational control should lead to a decrease in feelings of situational stress.

In addition, the frequent feedback received from using subgoals has an effect on one's sense of situational mastery and control. The direction of that effect is positively

correlated with the valence of the feedback and is more intense than the effect due to distal goal feedback.

Finally, it is suggested that the effects of the increased achievability of the subgoals and the increased feedback provided by the subgoals can combine to further intensify the increased perceptions of control and mastery over the situation, when the feedback is positive. Therefore, the effects on decreased feelings of situational stress should be intensified as well. When the subgoal feedback is negative, the aforementioned combination should have the opposite effect.

The following hypotheses are offered for empirically investigating these assertions:

Hypothesis 1a: A main effect of feedback on perceptions of control is predicted such that perceptions of control would be significantly higher for those subjects in the positive feedback conditions than for those subjects in the negative or no-feedback conditions. In addition, those subjects in the no-feedback conditions were predicted to have significantly higher perceptions of situational control than those subjects in the negative feedback conditions.

Hypothesis 1b: An interaction of goal type and feedback type on perceptions of control was predicted. Specifically, it was predicted that subjects in the subgoal/positive feedback condition would have significantly higher

perceptions of control than those subjects in all other conditions.

Hypothesis 2a: A main effect of feedback on perceptions of mastery is predicted such that perceptions of mastery would be significantly higher for those subjects in the positive feedback conditions than for those subjects in the negative or no-feedback conditions. In addition, those subjects in the no-feedback conditions were predicted to have significantly higher perceptions of situational mastery than those subjects in the negative feedback conditions.

Hypothesis 2b: An interaction of goal type and feedback type on perceptions of mastery was predicted. Specifically, it was predicted that subjects in the subgoal/positive feedback condition would have significantly higher perceptions of mastery than those subjects in all other conditions.

Hypothesis 3a: A main effect of feedback on task-related stress is predicted such that stress would be significantly higher for those subjects in the negative feedback conditions than for those subjects in the negative or positive feedback conditions. In addition, those subjects in the no-feedback conditions were predicted to have significantly higher feelings of task related stress than those subjects in the positive feedback conditions.

Hypothesis 3b: An interaction of goal type and feedback type on feelings of task-related stress was predicted. Specifically, it was predicted that subjects in the subgoal/positive feedback condition would have significantly lower levels of task-related stress than those subjects in all other conditions.

Hypothesis 4: It was hypothesized that the ranking of the groups from high levels of mastery and control to low levels of the same, would be subgoal/positive feedback, distal goal/positive feedback, subgoal/no feedback, distal goal/no feedback, subgoal/negative feedback, then distal goal/negative feedback. The ranking for measures of stress from low to high levels was the same as stated in the previous sentence.

The distal goal/negative feedback group was hypothesized to experience the lowest perceptions of control and mastery and the highest stress, due to the effects of the negative performance feedback combined with the lack of perceptions of control produced by the enormity of the distal task.

## Chapter 2

### Methods

A multigroup, posttest design was used to test the effect of type of goal and type of feedback on task-related stress, perceived level of situational control, and perceptions of mastery. Subjects were randomly assigned to one of six conditions: (a) a positive feedback, subgoal group, (b) a negative feedback, subgoal group, (c) a positive feedback, distal goal group, (d) a negative feedback, distal goal group, (e) a no-feedback, subgoal group, and (f) a no-feedback, distal goal group.

Four dependent variables were measured. One dependent variable, perceived task-related stress, was measured by using a situational anxiety measure (See Appendix B, Stress Measure). The second dependent variable, perceived situational mastery, and the third dependent variable, perceived situational control were measured by self-report measures (See Appendix A, Control Measure and Appendix C, Mastery Measure). The personality trait of hardiness was measured via the Personal Views Survey (See Appendix D, Personal Views Survey) ( S. Kobasa's personal communication, 1993 and constituted the fourth dependent variable.

## Subjects

Subjects were drawn from the pool of students taking introductory psychology at the University of Nebraska at Omaha. Participation was on a voluntary basis. Extra credit points were awarded for participation.

One hundred and ninety one subjects were tested. Sixteen sets of data had to be disregarded due to subjects' failure to completely fill out the instruments. After elimination of these subjects' data, thirty subjects remained in each of the following conditions: the positive feedback/subgoal condition, the positive feedback/distal goal condition, and the no feedback/distal goal condition. Twenty-seven subjects remained in the negative feedback/subgoal condition and the no feedback/subgoal condition. Thirty-one subjects remained in the negative feedback/distal goal condition.

## Measures

Measure of task-related stress Levels of task-related stress were measured by 10 questions that were developed from items on the anxiety portion of the Hopkins Symptom Checklist (HSCL) (Derogatis, Lipman, Covi, Rickels, & Uhlenhuth, 1970; Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974). As its name suggests, the HSCL is a checklist composed of one word or short phrase items. The twelve items on the anxiety portion of the measure pertain to

physical and psychological symptoms associated with anxiety (Derogatis et al. 1970, 1974).

A review of other anxiety and/or stress measures was conducted with the result that the HSCL was found to be the most suitable measure for the purposes of this study. This conclusion was based on the fact that the HSCL was more easily converted into a situation specific measure of stress. One of the other measures reviewed was the Taylor Manifest Anxiety Scales (TMAS, Taylor, 1953). The questions on the TMAS are designed to assess the level of stress one experiences to life in general. For example, question 11 on the TMAS is, "I work under a great deal of tension". The same lack of situation specificity is true for the other measures reviewed: The State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1979) and the Hamilton Rating Scale for Anxiety (Hamilton, 1960).

Reliability of the entire HSCL has been well supported by empirical study, as has reliability for the individual dimensions measured by the test. Specifically, in the context of the entire test, coefficient alphas of .84 have been reported for the anxiety dimension of the HSCL (Derogatis, et al., 1974). Research pertaining to the test-retest reliability of the HSCL has reported coefficients that range from .70 with an eight month delay (Kanner, Coyne, Schaefer, & Lazarus, 1981) to .86 with a one week

delay (Derogatis, et al., 1974). Finally, tests of interrater reliability that compared rater consistency on the primary dimension of the HSCL across patients, have resulted in an average coefficient of .67 (Derogatis et al., 1974).

Criterion related validity studies conducted on the HSCL attest to its sensitivity to changes in anxiety symptoms in both patients clinically diagnosed with anxiety disorders and in normal populations (Rickels, Lipman, Garcia, & Fisher, 1972; Uhlenhuth, Lipman, Butler, & Stern, 1974). It has also exhibited substantial validity in comparison to medical records of low symptom level outpatient clients (Andrew, Schonell, & Tennant, 1977; Metzler & Hochstien, 1970).

Rickels et al. (1972) compared the HSCL scores of psychiatric outpatients to two groups of normal gynecological patients. The resulting  $F(4,259)$  was 19.41 which is well beyond the .001 probability level.

Research conducted by Uhlenhuth et al. (1974) also attested to the criterion related validity of the HSCL by indicating that it is a sensitive detector of the differences in stress levels that exist between (a) genders,  $F(1,721) = 3.79$ ,  $p < .05$ , (b) different races,  $F(2,721) = 3.07$ ,  $p < .05$ , (c) marital status,  $F(4,721) = 3.24$ ,  $p < .02$ , and (d) social class,  $F(1,721) = 11.11$ ,  $p < .005$ .



Construct validity of the HSCL has best been demonstrated in a study conducted by Derogatis et al. (1970) in which expert clinicians compared the symptoms-dimension clusters on the HSCL to a factor analysis of the symptoms of 837 psychiatric patients. A matching procedure showed a very high agreement between the symptoms associated with each dimension on the HSCL and those same symptom to dimension associations in clinical reality.

In order to assess varying degrees of intensity of stress, the items on the anxiety portion of the HSCL were reworded into complete sentences. These sentences asked the respondents to evaluate the intensity of their present experience of each state on a five point scale varying from strongly agree to strongly disagree. Four of the 10 questions on the stress measure have been negatively worded and six questions positively worded to guard against response bias (Appendix B, Stress Measure).

These alterations of the original scale preclude generalization of the previously calculated reliability figures to this research situation. Therefore, new reliability indices were calculated for the revised measure using the data gathered in this study.

Measure of perceived situational mastery The measure of perceived situational mastery was constructed according to the guidelines outlined by Bandura and Schunk (1981)

(Appendix C, Mastery Measure). They recommended that the pertinent task be broken down into its separate components, and the questions on the mastery measure reflect those components. These questions should ask the respondent to rate their perceptions of efficacy or mastery on each component (Bandura & Schunk, 1981).

Standardized tests that reflect general perceptions of self-efficacy do exist, but research has shown that they do not possess the predictive power of situationally specific measures (Wang & Richarde, 1988).

Measures of perceived situational control Perceived situational control was assessed via a modification of the control portion of the Personal Views Survey (Kobasa, Maddi, & Kahn, 1982). The Personal Views Survey is the second generation of the original Hardiness Test (HRT) developed by Suzanne Kobasa (1979). The HRT was revised by Kobasa, Maddi, and Kahn in 1982 after a factor analysis was conducted on the initial form. Only questions within each of the three dimensions (control, commitment, and challenge) that had factor loadings of .30 or better were retained. The revised test consists of 50 questions (See Appendix D, Personal Views Survey).

The control portion of the Personal Views Survey consists of 17 questions. Past research has produced a coefficient alpha of .70 and a test-retest reliability of

.68 for this dimension of the survey (Kobasa, Maddi, & Kahn, 1982). In addition, Kobasa et al. (1982) reported a five year stability coefficient of .61.

Several studies have been conducted to support the construct validity of the Personal Views Survey. Chief among these is a study by Campbell, Amerikaner, Swank, & Vincent (1989) which compared the Personal Views Survey to the Personal Orientation Inventory (POI), one of the five most widely used assessment instruments in the field of clinical psychology (Knapp, 1976). Correlational analysis conducted on the inner directedness portion of the POI and the control portion of the Personal Views Survey, both of which are based on Rotter's theory of Internal Locus of Control, resulted in an  $r(42) = .35$ ,  $p < .01$  (Campbell et al, 1989).

Because the aim of this study was to assess perceived control over a specific situation, the questions on the control portion of the Personal Views Survey were modified to reflect this intent. This modification resulted in the control measure being reduced to eight questions usable for this study. Five of the questions on the measure were negatively worded and three positively worded in order to guard against response bias (See Appendix A, Control Measure)

As with the stress measure, the alterations of the original control scale from the Personal Views Survey preclude generalization of the reliability figures previously discussed to the revised control measure used in this research. Therefore, new reliability indices were calculated for the revised measure using the data gathered in this study.

Personal Views Survey As discussed, the present research also provided the opportunity for some data to be gathered pertaining to a variable not directly associated with this research. This variable was hardiness and it was measured by the Personal Views Survey (See Appendix D, Personal Views Survey). The structure of the Personal Views Survey and the statistics pertinent to its reliability and validity have already been discussed.

Manipulation check Subjects' perceptions about the direction of the feedback they received was assessed via a manipulation check measure (See Appendix E, Manipulation Check).

### Procedures

The procedures section is organized as follows: (a) procedures common to all feedback groups, (b) procedures common to subgoal feedback groups, (c) procedures common to the distal goal feedback groups, and (d) procedures common to no feedback groups.

Procedures common to all feedback groups Upon entering the test room, each subject was given two copies of the consent form (Appendix F, Consent Form). The subjects were asked to read one copy, ask any questions they had about the consent form, and sign it if they wished to continue with the experiment. They were told that they were to keep the other copy of the consent form for their records. One subject withdrew her participation after finding out about the requirements of participation.

After the subjects signed the consent forms, the experimenter explained the nature of the study. All subjects were deceived by being told that the project was designed to assess their intelligence quotient (IQ) via a new measure of intelligence called the Arithmetic Performance Speed Assessment. During the explanation of the procedures that were followed in the test session, the subjects were further deceived by being told that (a) they would be given goal sheets which listed the average performance of individuals their age taking this test for the specific time allotted; (b) the goal sheets were to be used for comparison of their performance during the test, so that they could see whether they were performing above, at, or below average; and (c) when they completed the test they would be taken to another room for a face-to-face feedback session that would consist of an expert scoring their test

and giving them feedback about their IQ. The self-report measures were alluded to in a vague off-hand manner so as not to arouse any suspicion about their true importance. These procedures were considered necessary in order to provide the subjects with a reasonable explanation for the procedures that they were going through without arousing suspicions about the true nature of the study, and to introduce a contingency, a face-to-face evaluation of IQ, that would provoke anxiety in the subjects. If the true nature of the study were explained, subjects might have been motivated by impression management mechanisms to self monitor their stress, control, and mastery reactions to the test.

The subjects were then given the pretest (Appendix G, Pretest). Subjects were told that the pretest was designed to acquaint them with the format of the actual test. This test and all other measures were coded with a number for matching purposes. The subjects were asked to write their age on the top of the test. The pretest consisted of 31 math problems that required the subject to add together a series of seven, double digit numbers. The subjects were asked to answer as many of the problems as they could in a five-minute period that was started and stopped by the experimenter. Pilot data indicated that having 31 problems on this test would ensure that even subjects with high

levels of arithmetic skill would not exhaust the available problems in the allotted time period.

When the five-minute period was completed, the experimenter collected the pretest. Each subject's score on this test consisted of the number of problems completed. Because the actual intent of the study was concerned with the subjects' scores on the self-report measures and not their performance on the math test, errors in calculations were not considered in determining the subjects' pretest score. However, subjects were told that their IQ scores were based on the number of problems correctly completed in the 20-minute time period. This manipulation was designed to motivate the subjects to be concerned with working as accurately as possible. This pretest score was then used to calculate the subgoals or the distal goal for each subject as explained in the following sections.

The experimenter then explained that he was leaving the test room to go down the hall to make sure that the feedback room was ready for the subjects and to construct the goal sheets. The experimenter then left the room to score the pretests and convert the scores into subgoals or a distal goal for each subject. When the experimenter returned, the subjects were given the actual test packet and the goal sheets. This packet consisted of the actual test (see Appendix H, Arithmetic Performance Speed Assessment),

and all posttest self-report measures. At this point, the actual test began.

When the 20-minute math test was completed, the subjects were asked to turn to the back of their test booklets and complete the measures found there, in the order in which they were presented. The perceptions of situational control measure was presented first, the situational stress measure second, the perceptions of situational mastery measure third, the manipulation check for type of feedback received was presented fourth, and the hardiness measure was presented last. When these measures were completed, the test booklets were collected, the subjects were debriefed about the deceptions to which they had been exposed, and the true intent of the study was revealed. It was made clear to the subjects that if they discussed the true intent of the study with other possible subjects that they may contaminate the data received from these subjects. The subjects were then given their extra credit cards and dismissed.

An arithmetic test was selected for the experimental task because research into "math anxiety" has shown that mathematic tasks can provoke high levels of stress in a large percentage of the population in the United States (Fennema & Sherman, 1976; Richardson & Suinn, 1972; Suinn, 1988). It has also been indicated that this stress reaction



is closely associated with one's perceptions of mathematical competence (Alexander & Martray, 1989).

Procedures common to the subgoal feedback groups. For the subgoal feedback groups, the number of problems completed on the pretest was used to establish the subgoals which varied according to whether the subject was in a group that received positive or negative feedback. If the subject was in a negative feedback condition, their pretest score was multiplied by four and then 10 was added to that product. This number was divided by four and the result used as the five-minute subgoal. The 10, 15, and 20 minute subgoals were calculated by doubling, tripling, and quadrupling the five minute subgoal figure. These subgoal figures were written in the appropriate spaces on each subject's subgoal sheet (See Appendix I, Subgoal Sheet).

Past research using this same type of arithmetic task has shown that using math pretest scores as an indicator of the subject's rate of performance on the actual test, in order to set subgoals, is an extremely accurate procedure (Klawnsky, 1991). Specifically, a study conducted by Klawnsky (1991) revealed a test-retest reliability coefficient of .95. This figure is similar to the test-retest reliability coefficient of .97 generated from the pilot data gathered for this study.

The procedure of adding 10 to the product of multiplying the pretest score by four was used, because past research indicated that in this type of task this practice would result in a subgoal that is difficult enough to be unobtainable but is not rejected (Harrison, Klawnsky, Suh, & Shanahan, 1989; Klawnsky, 1991). Maintaining a wide margin between actual performance and goal performance was necessary in the negative feedback condition in order to give the subject the clear indication that they were not very close to achieving the subgoals set for them.

The subgoals for the positive feedback subjects were calculated in the same way as the negative feedback subgoals, with the exception that 10 was subtracted from the product of multiplying the pretest score by four. The result was subgoal scores that gave the test taker the consistent message that they were performing above the average.

When the experimenter returned to the test room after having calculated the subgoals, he instructed the subjects that during the test he would notify them each time a five minute interval had elapsed. They were also told that at each of these intervals they should write the number of the most recently completed problem on the goal sheet in the space labeled "achieved" next to the appropriate subgoal time. Then they should compare that figure to the subgoal

figure that the experimenter had calculated. For example, at the first five-minute interval the subjects were told to write the number of the problem they had just complete in the "achieved" space which was next to the five-minute goal figure, and to compare that achieved figure with the five-minute subgoal figure. Then they were told that they should continue with the test until the 10-minute interval when they would again be asked to write down the problem they have just completed and compare that figure to the 10-minute goal. It was explained that these procedures would continue until the 20-minute time limit was reached. This procedure helped assure that the subjects received the intended type of feedback.

An examination of the goal sheets was conducted after each groups of subjects was run. These examinations revealed that subjects were consistently writing down the number of problems achieved at each five-minute interval, on the goal sheet provided. Therefore it can be said with some assurance that subjects in the subgoal conditions were comparing their performance to the subgoals set for them.

Procedures common to the distal goal feedback groups.  
The goal which the negative feedback/distal goal subjects received was calculated by quadrupling their math pretest score and adding 10 to this figure. Positive feedback/distal goal subjects received a goal that was

calculated by multiplying their pretest score by four and then subtracting 10 from it. These procedures yielded the same distal goal figure that the subjects received if they were operating under the subgoal conditions. The distal goal figures were written in the space provided on the distal goal sheet (See Appendix I, Distal Goal Sheet).

Upon returning to the testing room after calculating the distal goals for each subject, the experimenter distributed the goal sheets. In order to keep the distal and the subgoal conditions as alike as possible, the distal goal subjects were notified of each five-minute interval that passed during the test. However, the distal goal group was not directed to compare their performance to their goal sheet at each five-minute interval. Only when the 20-minute interval was announced were the subjects told to write the number of the problem they just completed on the goal sheet and compare that figure to the goal figure.

Procedures common to the no-feedback groups. All of the procedures followed above, were followed with the no-feedback groups. The only exception was that the no-feedback groups were not given goal sheets. Therefore, they had no opportunity to compare their performance to a goal or goals.

The subgoal/no-feedback groups were alerted as to the passage of each five minutes of time during the 20 minute

test. They were also instructed before the test to think about the test as being four separate five minute tests. This hopefully maintained the effects of the subgoal situation, independent of the feedback given by goal comparisons.

The distal goal/no-feedback groups were alerted as to the passage of each five minutes of time during the 20 minute test, but were not instructed to think of the test as four, five minute tests.

## Chapter 3

### Results

#### Frequencies, Reliability, and Correlations

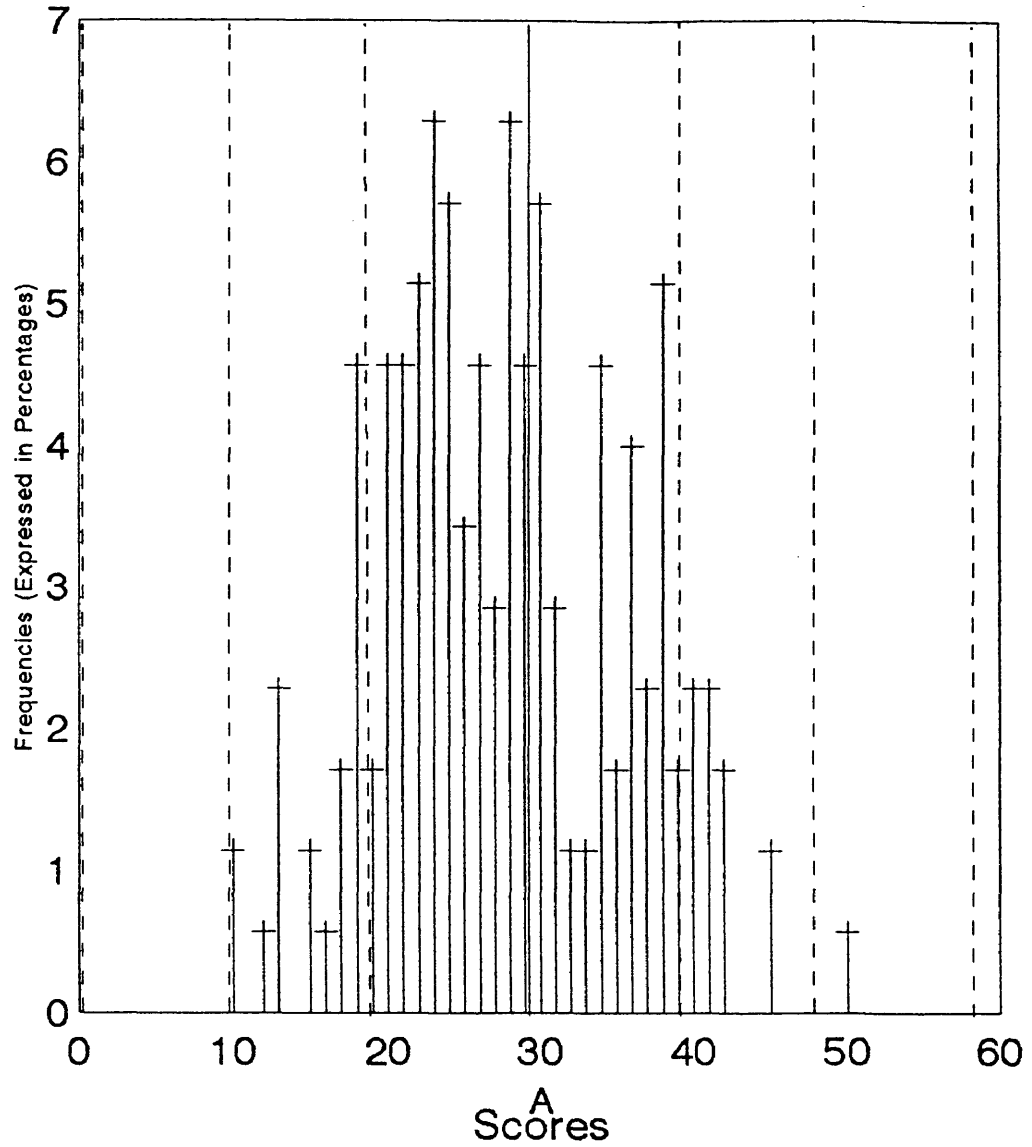
The distribution of the frequency of scores for each of the dependent variables resulted in the histograms presented in Figures 1, 2, and 3. As can be seen, the distributions conform to the normal curve, with the exception of the mastery measure, which is slightly positively skewed. No scores on the mastery, control, and stress measure are beyond three standard deviations from the mean in either direction.

Cronbach's alphas were calculated for all dependent variable measures. The analyses resulted in an acceptable alpha for the perceptions of stress measure:  $\alpha = .88$ ,  $N = 175$ . Moderate alphas of .66 for the perceptions of control measure and .68 for the perceptions of mastery measure were also obtained.

Results of correlational analyses between all dependent measures can be seen in Table I. The directions of the relationships between all coefficients are consistent with those theorized and are significant at the .01 probability level.

Univariate, 3 x 2 analysis of variance (ANOVA) procedures were run on subjects' scores on the control,

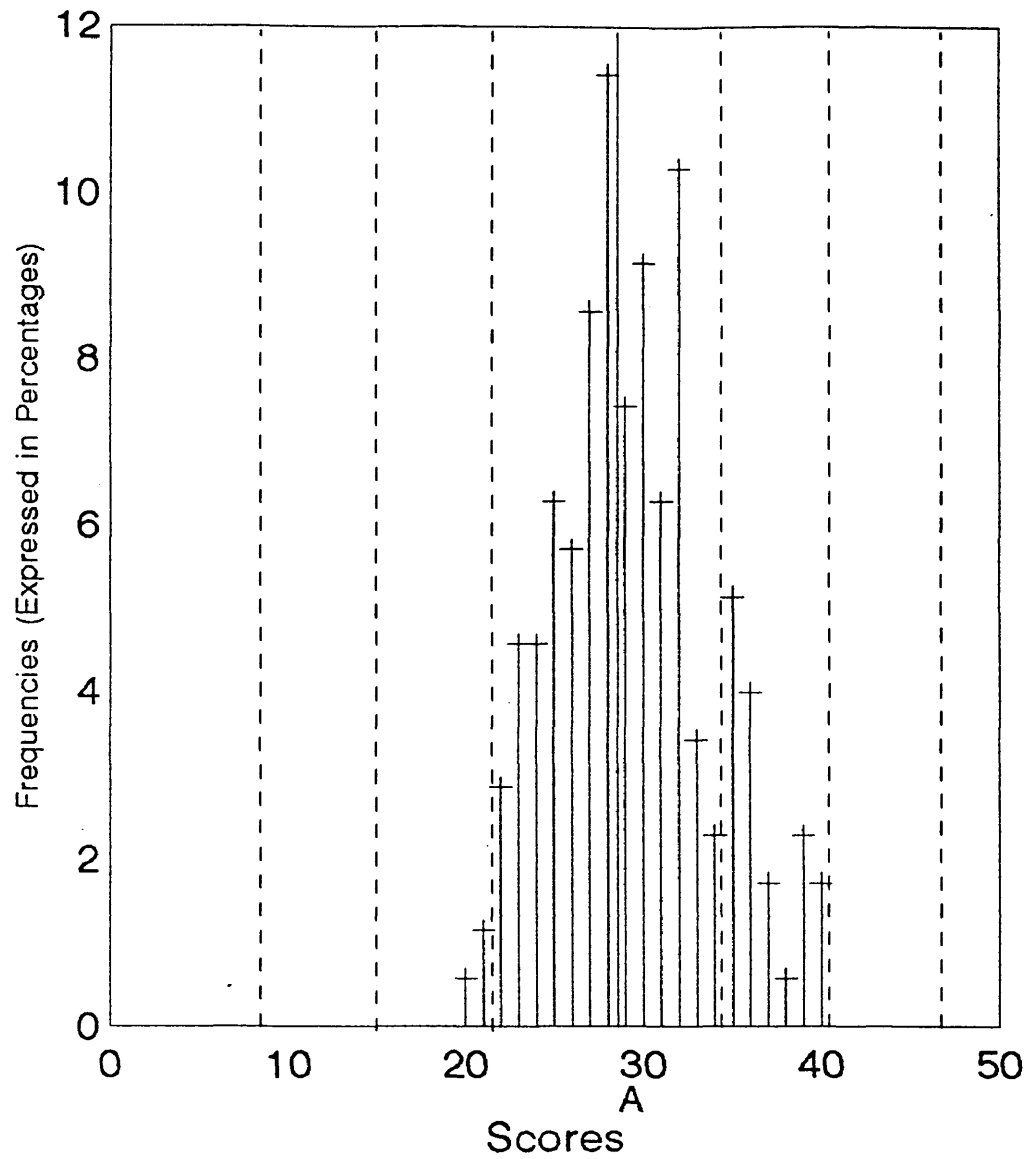
Figure 1  
 Frequencies of Scores on the Perceptions of Stress Measure



"A" indicates the mean ( $M = 27.68$ )

First, Second, and Third SDs from the mean are indicated by the dotted lines ( $SD = 7.94$ )

Figure 2  
Frequencies of Scores on the Perceptions of Control Measure

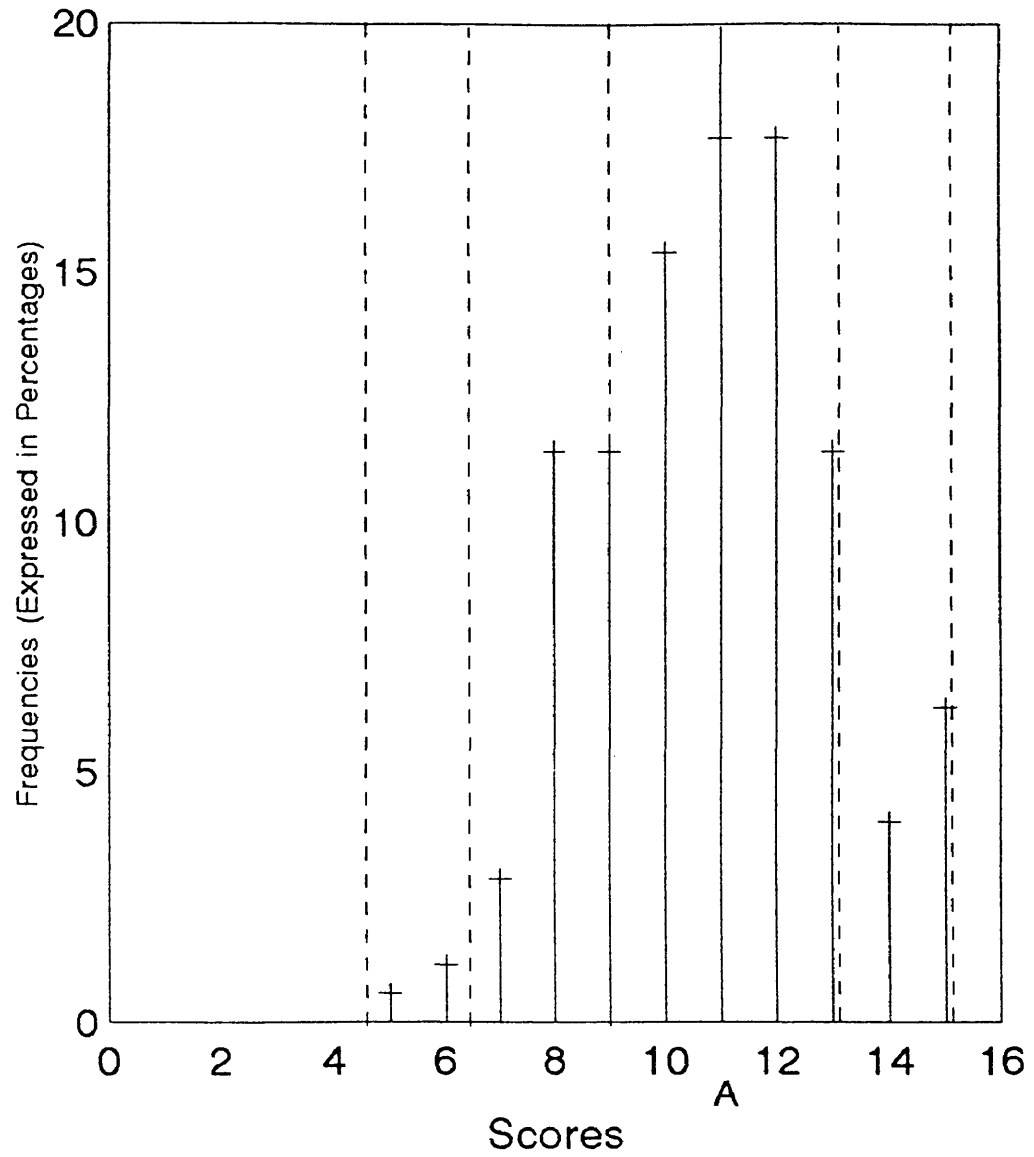


A indicates the means ( $M = 29.42$ )

First, Second, and Third SDs from the mean are indicated by the dotted line ( $SD = 4.41$ ).



Figure 3  
Frequencies of Scores on the Perceptions of Mastery Measure



"A" indicates the mean ( $M = 10.85$ )

First, Second, and Third SDs from the mean are indicated by the dotted lines ( $SD = 2.14$ )

Table I

Intercorrelations Between Dependent Measures

Scale	2	3
1. Control	-.2536**	.3946**
2. Stress	-	-.2288**
3. Mastery		-

N = 175 \*\* p<.01

mastery, and stress measures. The resulting summary tables can be seen in Tables II, III, and IV.

#### Effects of Feedback Type and Goal Type on Perceptions of Control

The ANOVA conducted on the control measure indicated that no significant amounts of variance in control scores between groups were accounted for by the effect of goal type, by valence of feedback, or by the interaction of these two variables. The mean control scores for the groups are presented in Table V. Therefore, no support was found for the assertions made in Hypotheses 1a and 1b.

#### Effects of Feedback Type and Goal Type on Perceptions of Mastery

The ANOVA conducted on the mastery measure scores revealed that a significant portion of between group variance in these scores was accounted for by type of feedback (See Table III). The Omega square statistic indicates that size of the effect can be considered moderate ( $\omega^2 = 5\%$ ).

Direct comparison were made between the mastery scores of the positive feedback group and the no-feedback group and between the no-feedback group and the negative feedback group using

Table II

Summary Table for ANOVA Conducted on Perceptions of Control  
as a Function of Goal Type and Feedback Type

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Within Cells	3287.80	170	19.34		
Feedback Type	85.47	2	42.73	2.21	.113
Goal Type	13.40	1	13.40	.69	.406
Feedback by Goal Type	35.38	2	17.69	.91	.403

Table III

Summary Table for ANOVA Conducted on Perceptions of Mastery  
as a Function of Goal Type and Feedback Type

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Mastery					
Within Cells	771.80	170	4.54		
Feedback Type	45.62	2	22.81	5.02	.008
Goal Type	1.44	1	1.44	.32	.574
Feedback by Goal Type	10.29	2	5.15	1.13	.325

Table IV

Summary Table for ANOVA Conducted on Feelings of Task-Related Stress as a Function of Goal Type and Feedback Type

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Stress					
Within Cells	10545.10	170	62.03		
Feedback Type	404.49	2	202.25	3.26	.041
Goal Type	37.91	1	37.91	.61	.436
Feedback by Goal Type	94.15	2	47.08	.76	.470

Table V

Treatment Condition Means of Perceptions of Situational  
Control as a Function of Goal Type and Feedback Type

	Positive Feedback	No Feedback	Negative Feedback	Total
Subgoals	30.17	30.83	27.87	29.62
Distal Goals	29.48	29.53	28.86	29.29
Total	29.83	30.18	28.36	

t-tests. The results of these comparisons indicate that the positive feedback group ( $M = 11.35$ ) scored significantly higher on the mastery measure than did the no-feedback group ( $M = 10.88$ ,  $t(1,174) = -1.95$ ,  $p = .05$ ) and the no-feedback group scored significantly higher in the mastery measure than did the negative feedback group ( $M = 10.24$ ,  $t(1,174) = -2.02$ ,  $p = .04$ ) (See Table VI).

These results are consistent with the effects proposed in Hypothesis 2a; however, the same cannot be said for the effects proposed in Hypothesis 2b. There were no significant differences found between group scores on the mastery measure due to the main effect of goal type or due to the interaction effect of goal type and feedback type.

#### Effects of Feedback Type and Goal Type on Stress

A significant portion of the variance between groups was accounted for by feedback type (See Table IV). Effect size analysis resulted in an Omega square statistic for this variable of five percent. According to Keppel (1991), variables which account for five to eight percent of the variance in the dependent variable are considered to have moderate effects. Goal type did not account for a significant portion of the variance of stress measure scores.



Table VI

Treatment Condition Means of Perceptions of Situational  
Mastery as a Function of Goal Type and Feedback Type

	Positive Feedback	No Feedback	Negative Feedback	Total
Subgoals	11.80	10.67	10.04	10.84
Distal Goals	10.93	11.10	10.45	10.83
Total	11.35	10.88	10.24	

Direct comparisons were made between the stress scores of the positive feedback group and the no-feedback group and the no-feedback group and the negative feedback group using  $t$ -tests. These analyses indicated significant differences between the negative feedback condition ( $M = 29.81$ ) and the no-feedback condition ( $M = 27.68$ ,  $t(1,174) = 2.26$ ,  $p = .03$ ) and between the no-feedback condition and the positive feedback condition ( $M = 25.58$ ,  $t(1,174) = 1.97$ ,  $p = .05$ ). The subjects in the negative feedback condition scored significantly higher on the measure of stress than the subjects in the no-feedback condition and subjects in the no-feedback condition scored significantly higher on this measure than the subjects in the positive feedback condition (See Table VII).

The results of these direct comparisons provide total support for the assertions made in Hypothesis 3a. However, no support was found for the proposed effects of the interaction of goal type and feedback type on feelings of task-related stress as outlined in Hypothesis 3b. In other words, no significant differences were detected between groups stress scores due to the main effect of goal type or due to the effect of the interaction of goal type and feedback type.

Table VII

Treatment Condition Means of Feelings of Task-Related Stress  
as a Function of Goal Type and Feedback Type

	Positive Feedback	No Feedback	Negative Feedback	Total
Subgoals	25.43	28.19	28.63	27.42
Distal Goals	25.73	27.17	31.00	27.97
Total	25.58	27.68	29.81	

### Effects of the Feedback Manipulation

An analysis of the manipulation check revealed that 13 subjects in the negative feedback condition performed beyond the goals set for them. This analysis also revealed that three subjects in the positive feedback condition performed below the goals set for them. ANOVAs were run for each dependent variable excluding these subjects. Six subjects were eliminated from the negative feedback/subgoal condition, seven subjects from the negative feedback/distal goal condition, and three subjects from the positive feedback/distal goal condition. The independent variables used in each ANOVA were feedback and goal type.

The general results of these ANOVAs were not different from the result achieved with the ANOVAs conducted on the original data set. More specifically, the significant main effects for feedback type on the stress measure scores and mastery measure scores that were detected in the original analyses were also detected in these modified analyses. The summary tables for these analyses can be seen in Table VIII.

### Ranking the Conditions

The means and standard deviations for control, stress, and mastery are presented in Table IX for each of the six conditions tested in this study. The conditions are ranked

Table VIII

Summary Table for ANOVA on Perceptions of Control, Perceptions of Mastery, and Stress as a Function of Feedback Type and Goal Type, Run with a Modified Sample

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Control					
Within Cells	2955.26	154	19.19		
Feedback	105.68	2	52.84	2.75	.067
Goal Type	18.86	1	18.86	.98	.323
Feedback by Goal Type	31.36	2	15.68	.82	.444
Mastery					
Within Cells	703.78	154	4.57		
Feedback	28.88	2	14.44	3.16	.045
Goal Type	.32	1	.32	.07	.790
Feedback by Goal Type	9.98	2	4.99	1.09	.338

Table VIII (cont.)

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Stress					
Within	10256.06	154	62.16		
Cells					
Feedback	441.09	2	220.54	3.55	.031
Goal Type	47.66	1	47.66	.77	.382
Feedback	151.59	2	75.79	1.22	.298
by Goal					
Type					

Table IX

Ranked Means and Standard Deviations of the Scores on the  
Control, Stress, and Mastery Measures

<u>Conditions</u>	<u>M</u>	<u>SD</u>
Control		
Distal/No	30.83	4.12
Subgoal/Positive	30.17	4.15
Subgoal/No	29.30	4.82
Distal/Positive	29.27	4.31
Distal/Negative	29.07	4.49
Subgoal/Negative	27.70	4.30
Stress		
Distal/Negative	31.00	8.35
Subgoal/Negative	28.63	7.57
Subgoal/No	28.19	7.29
Distal/No	27.17	7.80
Distal/Positive	25.73	8.11
Subgoal/Positive	25.43	7.64

Table IX (cont.)

<u>Conditions</u>	<u>M</u>	<u>SD</u>
	Mastery	
Subgoal/Positive	11.80	1.86
Distal/No	11.10	2.30
Distal/Positive	10.93	2.07
Subgoal/No	10.67	1.75
Distal/Negative	10.45	1.92
Subgoal/Negative	10.04	2.69



from high to low by the mean score for each dependent variable. For example, the distal/no-feedback condition generated the highest mean score for perceptions of situational control. The condition that had the highest mean score for experiences of situational stress was the distal negative feedback condition. Finally, the highest mean score for perceptions of situational mastery was achieved by the subgoal/positive feedback condition.

For the control and mastery measures, means scores tended to be clustered for all feedback type by goal type groups between the undecided and agree range of perceptions of control. Little variance is seen between the scores on perceptions of mastery. This lack of variance coincides with the fact that the scores for this measure were distributed within a narrow range of scores and were slightly skewed in a positive direction (See Figure 3). The group mean scores for feelings of stress are clustered around the midpoint of the scale and the standard deviation figures indicate high variance in scores.

As can be seen on Table IX, the rank orders for the dependent variables do not coincide with the rank orders suggested in Hypothesis 4. However, if the no feedback conditions are removed from the mean scores for the measure of stress, the rank order is congruent with the rank order

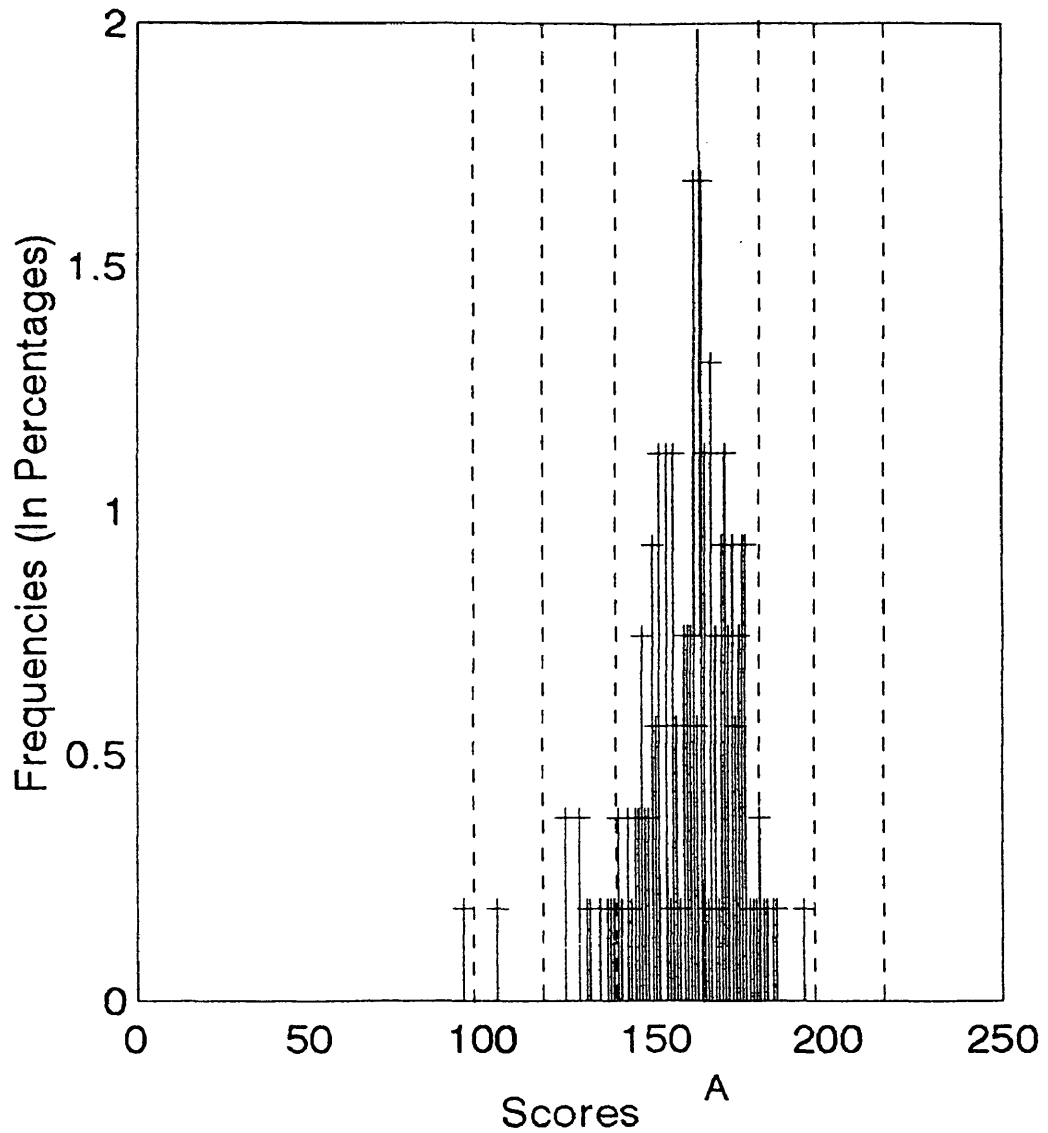
suggested in Hypothesis 4. In the rankings of the control and mastery means the only order of conditions that is congruent with Hypothesis 4 is the positive feedback/subgoal conditions and the positive feedback/distal goal conditions.

#### Effects of Feedback Type and Goal Type on Hardiness

The distribution of the scores on the Hardiness measure can be seen in Figure 4. Cronbach's alpha was calculated for the Hardiness measure and the resulting statistic was of an acceptable level:  $\alpha = .87$ ,  $N = 175$ . No significant differences were detected between groups' scores on the Hardiness measure as a result of the effects of feedback type, goal type, or the interaction of these two variables (See Tables X and XI).

Figure 4  
Frequencies of Scores on the Personal Views Survey

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A indicates the Mean ( $M = 159.30$ )

The first, second, and third standard deviations are indicated by the dotted lines ( $SD = 14.67$ )

Table X

Summary Table of ANOVA Conducted on Hardiness as a Function  
of Goal Type and Feedback Type

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Within Cells	36340.9	170	213.77		
Feedback Type	623.12	2	311.56	1.46	.236
Goal Type	9.91	1	9.91	.05	.830
Feedback by Goal Type	632.32	2	316.16	1.48	.231

Table XI

Groups Scores Means on Hardiness as a Function of Goal Type  
and Feedback Type

	Positive Feedback	No Feedback	Negative Feedback	Total
Subgoals	158.23	159.03	159.22	158.83
Distal Goals	159.00	164.40	154.59	159.33
Total	158.62	161.71	156.91	

## Chapter 4

### Discussion

The main effects of feedback on the three dependent measures will be addressed first. Second, the main effects of goal type on the dependent measures will be discussed. Third, the effects of the independent variables on hardness will be reviewed. Finally, some suggestions for improvements that need to be made in future replications of this study and ideas for future research in this field will be presented.

#### Effects of Feedback Type

The results obtained for the effect of feedback on perceptions of situational mastery and experiences of stress lend support to Hypotheses 2a. Specifically, support was found for the Hypothesis which proposed that those subjects in the positive feedback condition would have higher scores on the perceptions of mastery measure than subjects in the negative feedback condition and, that those subjects in the no-feedback condition would have significantly higher scores on the mastery measure than those subjects in the negative feedback condition.

In addition, support was found for Hypothesis 3a which stated that subjects in the positive feedback condition would have scores on the stress measure that were

significantly lower than the scores of subjects in the no feedback condition and that subjects in the no-feedback condition would have stress measure scores significantly lower than the subjects in the negative feedback condition.

The findings associated with Hypothesis 2a lend further support for the hypotheses of Bandura and Cervone (1983) which assert that valence of feedback has an effect upon perceptions of situation mastery. The findings associated with Hypothesis 3a introduce new information that suggest feedback valence has an effect upon feelings of task-related stress.

The lack of significant differences between scores on the control measure, across the types of feedback, could be attributed to the inaccuracy of the control measure. The internal consistency reliability coefficient for this measure was moderate in size ( $r = .66$ ) and this measure was not validated before its use in this study. A validation of this type would be difficult due to the fact that existing control measures are generic measures that assess control over life in general.

A second explanation could be that perceptions of situational control are not affected by valence of feedback. This explanation is not likely, due to the fact that past research (Bandura & Cervone, 1983) supports a strong relationship between these two variables.

A third explanation could be that the subjects did not receive the type of feedback that they were intended to receive. To clarify, a check of the feedback manipulation revealed that 13 of the 58 subjects in the negative feedback condition performed beyond the goals set for them and only three of the sixty subjects in the positive feedback condition performed below the goal set for them. This means that these subjects did not receive the negative or positive feedback that they were intended to receive. Therefore, analyses were conducted to see if removing the data of these subjects from their respective conditions, would alter the results achieved in the original analyses.

The general indications of the results of these analyses were not any different from those achieved in the original analyses (See Table VIII). If significant results had been achieved for the effect of feedback type on the control measure, it would have indicated that those subjects who didn't fall for the feedback manipulation confounded the results of the original analyses.

Reduction of the sample size in the negative feedback condition could be preventing detection of an effect for feedback type on the control measure. This suggests that more subjects are needed in this cell.

A possible explanation can be provided for those subjects who performed beyond the goals set for them (did



not receive the negative feedback intended for them). Posttest discussion sessions were conducted after each testing situation in order to obtain informal feedback as to the strength of the feedback and goal type manipulations. During these sessions, some subjects in the negative feedback conditions remarked that the pretest allowed them an opportunity to try out different strategies for working the problems. On the actual test, they chose to use the strategy with which they achieved the most success on the pretest and; therefore, they were able to perform well beyond their pretest performance.

Due to the lack of differences in control measure scores it is difficult to determine the path of feedback's effect on the stress scores achieved in this research. Are the achieved differences in stress scores due to the direct effects of the feedback manipulation or are they due to a direct effect that feedback has upon perceptions of situational control which in turn effects feelings of task-related stress.

#### Effects of Goal Type

As previously mentioned, the results of the analysis do not indicate any support for Hypotheses 1b, 2b, and 3b which address the effects of the interaction of goal type and feedback type. The lack of effect of goal type (subgoals vs. distal goals) on the measures of control, mastery, and

stress may be due to the fact that subgoals do not provide any perception altering effects. In other words, subjects were not affected by subgoals' increased feedback mechanism or by the purported ability that subgoals have to alter perceptions of large, overwhelming distal goals into less threatening, less overwhelming minigoals. Another explanation for the lack of an effect for goal type might be the lack of strength of the goal manipulation. In other words, perhaps the manipulations that differentiated the subgoal condition from the distal goal condition were not sufficiently salient for subjects to be affected by the difference. This reasoning can be corroborated by remarks made by subjects in discussions which followed the testing sessions. For example, when questioned about the goal manipulations, some of the subjects in the subgoal conditions remarked that they did not think about the four different opportunities to compare their performance against the subgoals, as four separate goals to be achieved.

This lack of ability to perceive the intended type of goal or goals is especially evident in the no-feedback conditions. The manipulation used to maintain the difference between subgoals and distal goals was so weak as to make goal type differentiation almost non-existent. Therefore, any difference between the scores of distal goal and subgoal subjects on the dependent measure may be reduced

due to the lack of differentiation in dependent measure scores between the distal goal/no feedback groups and the subgoal/no feedback group.

In addition, subjects may have established and used their own subgoal strategies even when they were in conditions that called for them to perform to a distal goal. For example, in posttest discussion session, some distal goal subjects remarked that they set their own subgoals for each of the five minute periods, based on the distal goal they had been given. Those self-set goals could have the same effect on distal goal condition subjects' perceptions of control, mastery, and experience of stress as it had on subgoal condition subjects.

Analysis of the effects of goal type on perceptions of control, mastery, and stress lends some support to this argument. More specifically, in the positive feedback/distal goal condition, mean scores for perceptions of control and mastery were slightly higher and mean scores for stress were slightly lower than they were in the negative feedback/distal goal condition. However, the above logic cannot explain why mean scores for perceptions of control and mastery in the no feedback/distal goal conditions were higher than the mean scores in the other two conditions.

Effects of Goal Type and Feedback Type on Perceptions of Hardiness

The Personal Views Survey was included in this research in an attempt to contribute further support for the position that hardiness is a stable individual difference variable. The efforts were successful due to the fact that no significant differences were present across the hardiness scores of subjects, due to the goal type or feedback type manipulation. Therefore, even though they are conceptually similar, it is important to be aware of the differences between situationally specific variables such as self-efficacy and situational control, and personality characteristic such as hardiness.

Summary

To briefly summarize the previous information. First, valence of feedback had the following effects upon perceptions of mastery and stress: (a) subjects who received positive feedback had significantly higher scores on the mastery measure than did subjects in the no-feedback condition; (b) subjects who received no-feedback had significantly higher scores on the mastery measure than did subjects in the negative feedback condition (c) subjects in negative feedback conditions had stress scores that were significantly higher than the stress scores of subjects in the no-feedback conditions, and (d) subjects in the no-

feedback condition had stress scores that were significantly higher than those subjects in the positive feedback condition. Fourth, the fact that valence of feedback did not have a significant effect upon perceptions of situational control is probably due to the inadequacy of the control measure. Fifth, this study did not find any significant effects of goal type on perceptions of mastery, control, or experience of stress. Likely explanations are that these results were achieved (a) because goal type has no effect upon perceptions of control, mastery, and stress and (b) because it is difficult to develop experimental conditions that are saliently different with respect to goal type; for example, it is difficult to prevent distal goal condition subjects from using their own subgoal strategies.

#### Concluding Remarks

In conclusion, some brief remarks can be made about improvements and questions that should be considered in future research in this area. First, some effort should be directed towards developing a valid measure of perceptions of situational control. Many measures exist that assess perceptions of control over life in general (Kobasa, 1979; Rotter, 1954), but none could be located that are designed to assess control over specific situations.

Second, any future research in the area of subgoals should direct some intensive attention to the development of

techniques that will assure a salient difference between distal goal and subgoal conditions. The major problem is subjects' ability to use their own cognitively constructed subgoal strategies, even when they are in a distal condition.

Third, research conducted by Swann and Ely (1984) indicates that the level of certainty with which individuals hold self-concepts may have a significant impact upon their reaction to feedback which is in conflict with those concepts. Researchers conducted investigations in this area may want to include a situation specific measure of self-concept and a measure of concept certainty as additional independent variables

Finally, it would be interesting to determine what kind of effect feedback type and goal type had upon actual performance. Will positive feedback subjects remain committed to the task and maintain or increase their speed and accuracy of performance? Will negative feedback subjects be affected in just the opposite way? Do subgoals have the ability to influence task performance more intensely than do distal goals? These are all viable questions for future research.

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**Appendix A**

## Control Measure

Beneath each of the following statements, please circle the code that best reflects your feelings about that statement as it pertains to the math test you just completed. The definitions of the codes are given below.

SA - Strongly Agree  
A - Agree  
U - Undecided

D - Disagree  
SD - Strongly Disagree

The score I get on this test can be attributed to good or bad luck.

SA                      A                      U                      D                      SD

My score on this test is the result of the effort I applied while taking it.

SA                      A                      U                      D                      SD

My score on this test does not reflect whether I tried hard or not.

SA                      A                      U                      D                      SD

There was very little I could do to perform well on this test.

SA                      A                      U                      D                      SD

Things beyond my control influenced my performance on this test.

SA                      A                      U                      D                      SD

The score I receive on this test will be an accurate measure of my addition ability.

SA                      A                      U                      D                      SD

Chance will play very little part in the score that I get on this test.

SA                    A                    U                    D                    SD

I don't feel I had much control over this test situation.

SA                    A                    U                    D                    SD

**Appendix B**

### Stress Measure

Beneath each of the following statements, circle the code that best reflects your feelings about that statement. The definitions of the codes are given below.

**Scale:**

<p><b>SA- Strongly Agree</b>  <b>A - Agree</b>  <b>U - Undecided</b></p>	<p><b>D - Disagree</b>  <b>SD - Strongly Disagree</b></p>
--	---

I feel nervous or shaky inside.

SA	A	U	D	SD
----	---	---	---	----

My heart is pounding or racing.

SA	A	U	D	SD
----	---	---	---	----

I feel no tension anywhere in my body.

SA	A	U	D	SD
----	---	---	---	----

My breathing is slow and regular.

SA	A	U	D	SD
----	---	---	---	----

I am experiencing a sense of apprehension.

SA	A	U	D	SD
----	---	---	---	----

I am calm.

SA	A	U	D	SD
----	---	---	---	----

I feel relaxed.

SA	A	U	D	SD
----	---	---	---	----

My head is aching.

SA	A	U	D	SD
----	---	---	---	----

My shoulders and neck feel tight.

SA                    A                    U                    D                    SD

I feel a sense of concern.

SA                    A                    U                    D                    SD

**Appendix C**



## Mastery Measure

Beneath each of the following statements, circle the code that best reflects your feelings about that statement. The definitions of the codes are given below.

## Scale:

SA- Strongly Agree	D - Disagree
A - Agree	SD - Strongly Disagree
U - Undecided	

In the future, I am certain that I could perform well on this test.

SA                      A                      U                      D                      SD

Because this test was too demanding, I would not even bother to try to take it in the future.

SA                      A                      U                      D                      SD

I know exactly what to do to perform well on this type of test.

SA                      A                      U                      D                      SD

## Appendix D

### Personal Views Survey

Below are some items that you may agree or disagree with. Please indicate how you feel about each one by circling a number from 1 to 4 in the space provided. A one indicates that you feel the statement is not at all true; circling a four means that you feel the item is completely true.

As you will see, many of the items are worded strongly. This is to help you decide the extent to which you agree or disagree.

Please read all the items careful. Be sure to answer all on the basis of the way you feel now. Don't spend too much time on any one item.

- 1 = Not at all true
- 2 = A little true
- 3 = Quite a bit true
- 4 = Completely true

- |  |   |   |   |   |
|--|---|---|---|---|
| 1. I often wake up eager to take up my life where it left off the day before       | 1 | 2 | 3 | 4 |
| 2. I like a lot of variety in my work  | 1 | 2 | 3 | 4 |
| 3. Most of the time, my bosses or superiors will listen to what I have to say      | 1 | 2 | 3 | 4 |
| 4. Planning ahead can help avoid most future problems                              | 1 | 2 | 3 | 4 |
| 5. I usually feel that I can change what might happen tomorrow, by what I do today | 1 | 2 | 3 | 4 |
| 6. I feel uncomfortable if I have to make any changes in my everyday schedule      | 1 | 2 | 3 | 4 |
| 7. No matter how hard I try, my efforts will accomplish nothing                    | 1 | 2 | 3 | 4 |
| 8. I find it difficult to imagine getting excited about working                    | 1 | 2 | 3 | 4 |
| 9. No matter what you do, the "tried and true" ways are always the best            | 1 | 2 | 3 | 4 |

10. I feel that it's almost impossible to change my spouse's mind about something 1 2 3 4
11. Most people who work for a living are just manipulated by their bosses 1 2 3 4
12. New laws shouldn't be made if they hurt a person's income 1 2 3 4
13. When you marry and have children you have lost your freedom of choice 1 2 3 4
14. No matter how hard you work, you never really seem to reach your goals 1 2 3 4
15. A person whose mind seldom changes can usually be depended on to have reliable judgement 1 2 3 4
16. I believe most of what happens in life is just meant to happen 1 2 3 4
17. It doesn't matter if you work hard at your job, since only the bosses profit by it anyway 1 2 3 4
18. I don't like conversations when others are confused about what they mean to say 1 2 3 4
19. Most of the time it just doesn't pay to try hard, since things never turn out right anyway 1 2 3 4
20. The most exciting thing for me is my own fantasies 1 2 3 4
21. I won't answer a person's questions until I am very clear as to what he is asking 1 2 3 4
22. When I make plans I'm certain I can make them work 1 2 3 4
23. I really look forward to my work 1 2 3 4
24. It doesn't bother me to step aside for a while from something I'm involved in if I'm asked to do something else 1 2 3 4
25. When performing a difficult task at work, I know when I need to ask for help 1 2 3 4

26. It's exciting for me to learn something about myself 1 2 3 4
27. I enjoy being with people who are unpredictable 1 2 3 4
28. I find it's usually very hard to change a friend's mind about something 1 2 3 4
29. Thinking of yourself as a free person just makes you feel frustrated and unhappy 1 2 3 4
30. It bothers me when something unexpected interrupts my daily routine 1 2 3 4
31. When I make a mistake, there's very little I can do to make things right again 1 2 3 4
32. I feel no need to try my best at work, since it makes no difference anyway 1 2 3 4
33. I respect rules because they guide me 1 2 3 4
34. One of the best ways to handle most problems is just not to think about them 1 2 3 4
35. I believe that most athletes are just born good at sports 1 2 3 4
36. I don't like things to be uncertain or unpredictable 1 2 3 4
37. People who do their best should get full financial support from society 1 2 3 4
38. Most of my life gets wasted doing things that don't mean anything 1 2 3 4
39. Lots of times I don't really know my own mind 1 2 3 4
40. I have no use for theories that are not closely tied to facts 1 2 3 4
41. Ordinary work is just too boring to be worth doing 1 2 3 4
42. When other people get angry at me, it's usually for no good reason 1 2 3 4

43. Changes in routine bother me 1 2 3 4
44. I find it hard to believe people who tell me the  
work they do is of value to society 1 2 3 4
45. I feel that if someone tries to hurt me, there's  
usually not much I can do to try and stop him 1 2 3 4
46. Most days life just isn't very exciting for me 1 2 3 4
47. I think people believe in individuality just to  
impress others 1 2 3 4
48. When I'm reprimanded at work, it usually seems to  
be justified 1 2 3 4
49. I want to be sure someone will take care of me  
when I get old 1 2 3 4
50. Politicians run our lives 1 2 3 4

**Appendix E**

## Manipulation Check

Please respond to the following statement by placing a check mark next to the answer that most appropriately reflects your performance on the math test you have just completed.

When I checked my performance against the goal(s) set for me, I found that I

\_\_\_\_\_ performed at or beyond the goal(s) set for me.

\_\_\_\_\_ failed to achieve the goal(s) set for me.



**Appendix F**

## Consent Form

IRB PROTOCOL NUMBER 296-93**ADULT CONSENT FORM****TITLE OF RESEARCH STUDY**

Analysis of Intelligence Quotients (IQ's) of University of Nebraska at Omaha students using the Math Performance Speed Assessment Test (MPSA).

**INVITATION TO PARTICIPATE**

You are invited to participate in this research study. The following information is provided in order to help you to make an informed decision whether or not to participate. If you have any questions please do not hesitate to ask.

**BASIS FOR SUBJECT SELECTION**

You have been offered the opportunity to volunteer for participation in this investigation due to the fact that you are involved in a psychology class at the University of Nebraska at Omaha.

**PURPOSE OF THE STUDY**

The purpose of this study is to assess the IQ's of students at the University of Nebraska at Omaha by using the MPSA; thereby, providing more data to attest to the measure's accuracy.

**EXPLANATION OF PROCEDURES**

All participants in this research will first be asked to complete a 5 minute math speed test. The purpose of this 5 minute test is to acquaint the participant with the format of the actual test. Then, all participants will be asked to complete the 20 minute long math speed test. When the test is finished all participants will again be asked to complete a set of self-report measures. Finally, each participant will be asked to go into a separate room to meet with a test scorer. This person will score your performance on the math performance speed test and determine your IQ based on your math performance speed score. The entire procedure will take approximately one hour.

**POTENTIAL RISKS AND DISCOMFORTS**

There are no known risks associated with this research. You may feel some anxiety usually associated with taking a math test.

**POTENTIAL BENEFITS**

There are no known direct benefits associated with participation in this research.

**POTENTIAL BENEFITS TO SOCIETY**

Results obtained from this research will add to the body of knowledge concerning the validity and reliability of the MPSA as a measure of intelligence.

**ALTERNATIVES TO PARTICIPATION**

Your instructor can inform you of any alternative methods for earning extra credit that may exist.

**COMPENSATION FOR PARTICIPATION**

Students will be awarded extra credit for participation in this research at the rate of one extra credit point per half hour of participation. Please be sure to get your extra credit voucher before you leave the scoring room.

**ASSURANCE OF CONFIDENTIALITY**

All tests and self-report measures used in this study are coded for matching purposes. Therefore, it is not necessary for you to put your name on any of the test forms.

**RIGHTS OF RESEARCH SUBJECTS**

Your rights as a research subject have been explained to you. If you have any additional questions concerning your rights as a research subject you may contact the University of Nebraska Institutional Review Board (IRB), telephone 402-559-6463.

**VOLUNTARY PARTICIPATION AND WITHDRAWAL**

You are free to decide not to participate in this study or to withdraw at any time without adversely affecting your relationship with the investigators or the University of Nebraska. Your decision will not result in any loss of benefits to which you are otherwise entitled.

**DOCUMENTATION OF INFORMED CONSENT**

YOU ARE VOLUNTARILY MAKING A DECISION WHETHER OR NOT TO PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE CERTIFIES THAT THE CONTENT AND MEANING OF THE INFORMATION ON THIS CONSENT FORM HAVE BEEN FULLY EXPLAINED TO YOU AND THAT YOU HAVE DECIDED TO PARTICIPATE HAVING READ AND UNDERSTOOD THE INFORMATION PRESENTED. YOUR SIGNATURE ALSO CERTIFIES THAT YOU HAVE HAD ALL YOUR QUESTIONS ANSWERED TO YOUR SATISFACTION. IF YOU THINK OF ANY QUESTIONS DURING THIS STUDY PLEASE CONTACT THE INVESTIGATORS. YOU WILL BE GIVEN A COPY OF THIS CONSENT FORM TO KEEP.

-----  
SIGNATURE OF SUBJECT

-----  
DATE

-----  
SIGNATURE OF INVESTIGATOR

-----  
DATE

**IDENTIFICATION OF INVESTIGATOR**

Jim E. Kieffer

Off: 554-2704

H: 346-3629

**Appendix G**

Age \_\_\_\_\_  
Code \_\_\_\_\_

## Pre-Test

For each of the equations presented below, add together the series of seven double digit numbers and place the sum in the space provided at the right of each equation.

1)  $65 + 87 + 49 + 47 + 11 + 37 + 96 =$  \_\_\_\_\_

2)  $99 + 57 + 62 + 75 + 39 + 57 + 17 =$  \_\_\_\_\_

3)  $67 + 21 + 59 + 85 + 55 + 96 + 37 =$  \_\_\_\_\_

4)  $62 + 14 + 74 + 71 + 87 + 82 + 66 =$  \_\_\_\_\_

5)  $27 + 45 + 59 + 12 + 94 + 26 + 87 =$  \_\_\_\_\_

6)  $58 + 20 + 86 + 22 + 31 + 45 + 33 =$  \_\_\_\_\_

7)  $62 + 37 + 93 + 73 + 34 + 38 + 57 =$  \_\_\_\_\_

8)  $25 + 93 + 42 + 29 + 92 + 70 + 93 =$  \_\_\_\_\_

9)  $48 + 32 + 80 + 70 + 22 + 37 + 77 =$  \_\_\_\_\_

10)  $22 + 34 + 28 + 48 + 96 + 66 + 83 =$  \_\_\_\_\_

11)  $47 + 33 + 86 + 59 + 33 + 55 + 87 =$  \_\_\_\_\_

12)  $45 + 57 + 17 + 19 + 60 + 99 + 93 =$  \_\_\_\_\_

13)  $89 + 85 + 95 + 38 + 84 + 38 + 45 =$  \_\_\_\_\_

$$14) 84 + 82 + 63 + 41 + 14 + 67 + 14 = \underline{\hspace{2cm}}$$

$$15) 31 + 59 + 35 + 68 + 55 + 29 + 22 = \underline{\hspace{2cm}}$$

$$16) 44 + 44 + 37 + 98 + 34 + 36 + 97 = \underline{\hspace{2cm}}$$

$$17) 30 + 27 + 24 + 66 + 52 + 93 + 45 = \underline{\hspace{2cm}}$$

$$18) 58 + 32 + 18 + 81 + 47 + 45 + 35 = \underline{\hspace{2cm}}$$

$$19) 96 + 59 + 28 + 47 + 34 + 84 + 71 = \underline{\hspace{2cm}}$$

$$20) 88 + 21 + 12 + 47 + 13 + 16 + 50 = \underline{\hspace{2cm}}$$

$$21) 83 + 68 + 77 + 23 + 59 + 98 + 78 = \underline{\hspace{2cm}}$$

$$22) 18 + 60 + 66 + 92 + 51 + 53 + 39 = \underline{\hspace{2cm}}$$

$$23) 49 + 81 + 90 + 62 + 96 + 15 + 89 = \underline{\hspace{2cm}}$$

$$24) 94 + 38 + 97 + 40 + 69 + 57 + 38 = \underline{\hspace{2cm}}$$

$$25) 49 + 74 + 67 + 52 + 65 + 88 + 33 = \underline{\hspace{2cm}}$$

$$26) 46 + 90 + 52 + 47 + 19 + 56 + 24 = \underline{\hspace{2cm}}$$

$$27) 51 + 74 + 55 + 45 + 52 + 26 + 65 = \underline{\hspace{2cm}}$$

$$28) 33 + 64 + 83 + 34 + 26 + 13 + 81 = \underline{\hspace{2cm}}$$

$$29) 36 + 58 + 26 + 40 + 89 + 33 + 23 = \underline{\hspace{2cm}}$$

$$30) 31 + 94 + 93 + 20 + 22 + 61 + 19 = \underline{\hspace{2cm}}$$

$$31) 63 + 51 + 25 + 12 + 68 + 15 + 17 = \underline{\hspace{2cm}}$$



**Appendix H**

Code \_\_\_\_\_

## Arithmetic Performance Speed Assessment

For each of the equations presented below, add together the series of seven double digit numbers and place the sum in the space provided at the right of each equation.

1)  $70 + 53 + 58 + 29 + 30 + 77 + 76 =$  \_\_\_\_\_

2)  $81 + 71 + 41 + 86 + 79 + 37 + 96 =$  \_\_\_\_\_

3)  $87 + 95 + 37 + 52 + 76 + 59 + 47 =$  \_\_\_\_\_

4)  $30 + 62 + 65 + 27 + 28 + 83 + 82 =$  \_\_\_\_\_

5)  $59 + 98 + 91 + 23 + 69 + 98 + 25 =$  \_\_\_\_\_

6)  $53 + 11 + 99 + 67 + 57 + 11 + 80 =$  \_\_\_\_\_

7)  $29 + 30 + 38 + 30 + 94 + 98 + 40 =$  \_\_\_\_\_

8)  $28 + 16 + 17 + 65 + 41 + 41 + 71 =$  \_\_\_\_\_

9)  $33 + 63 + 21 + 19 + 58 + 46 + 90 =$  \_\_\_\_\_

10)  $26 + 78 + 38 + 29 + 92 + 63 + 63 =$  \_\_\_\_\_

11)  $43 + 56 + 69 + 91 + 83 + 54 + 91 =$  \_\_\_\_\_

12)  $43 + 68 + 50 + 51 + 46 + 35 + 41 =$  \_\_\_\_\_

13)  $27 + 25 + 97 + 39 + 37 + 49 + 16 =$  \_\_\_\_\_

14)  $47 + 26 + 63 + 54 + 16 + 93 + 65 = \underline{\hspace{2cm}}$

15)  $51 + 39 + 11 + 78 + 46 + 75 + 60 = \underline{\hspace{2cm}}$

16)  $83 + 21 + 11 + 33 + 13 + 54 + 66 = \underline{\hspace{2cm}}$

17)  $54 + 82 + 20 + 68 + 45 + 36 + 15 = \underline{\hspace{2cm}}$

18)  $70 + 92 + 53 + 76 + 40 + 46 + 49 = \underline{\hspace{2cm}}$

19)  $21 + 33 + 59 + 17 + 92 + 44 + 28 = \underline{\hspace{2cm}}$

20)  $87 + 75 + 28 + 67 + 26 + 32 + 79 = \underline{\hspace{2cm}}$

21)  $30 + 24 + 48 + 26 + 34 + 48 + 21 = \underline{\hspace{2cm}}$

22)  $86 + 59 + 75 + 92 + 33 + 54 + 63 = \underline{\hspace{2cm}}$

23)  $41 + 96 + 12 + 92 + 62 + 35 + 15 = \underline{\hspace{2cm}}$

24)  $48 + 22 + 99 + 13 + 35 + 55 + 92 = \underline{\hspace{2cm}}$

25)  $54 + 41 + 84 + 82 + 67 + 72 + 99 = \underline{\hspace{2cm}}$

26)  $34 + 50 + 41 + 69 + 18 + 42 + 54 = \underline{\hspace{2cm}}$

27)  $81 + 54 + 43 + 51 + 23 + 62 + 49 = \underline{\hspace{2cm}}$

28)  $68 + 88 + 37 + 30 + 29 + 15 + 53 = \underline{\hspace{2cm}}$

29)  $23 + 58 + 36 + 87 + 48 + 19 + 68 = \underline{\hspace{2cm}}$

30)  $74 + 61 + 78 + 17 + 80 + 21 + 95 = \underline{\hspace{2cm}}$

$$31) 79 + 38 + 46 + 12 + 12 + 18 + 71 = \underline{\hspace{2cm}}$$

$$32) 53 + 56 + 22 + 47 + 74 + 75 + 40 = \underline{\hspace{2cm}}$$

$$33) 90 + 74 + 63 + 71 + 43 + 40 + 28 = \underline{\hspace{2cm}}$$

$$34) 98 + 80 + 69 + 42 + 73 + 28 + 36 = \underline{\hspace{2cm}}$$

$$35) 43 + 94 + 13 + 64 + 35 + 11 + 19 = \underline{\hspace{2cm}}$$

$$36) 43 + 95 + 54 + 49 + 97 + 22 + 38 = \underline{\hspace{2cm}}$$

$$37) 40 + 28 + 50 + 14 + 52 + 96 + 56 = \underline{\hspace{2cm}}$$

$$38) 91 + 66 + 44 + 69 + 75 + 70 + 50 = \underline{\hspace{2cm}}$$

$$39) 16 + 23 + 33 + 78 + 52 + 75 + 80 = \underline{\hspace{2cm}}$$

$$40) 33 + 97 + 80 + 67 + 90 + 87 + 42 = \underline{\hspace{2cm}}$$

$$41) 13 + 95 + 79 + 69 + 40 + 17 + 17 = \underline{\hspace{2cm}}$$

$$42) 51 + 41 + 11 + 28 + 64 + 85 + 50 = \underline{\hspace{2cm}}$$

$$43) 19 + 89 + 37 + 33 + 77 + 22 + 45 = \underline{\hspace{2cm}}$$

$$44) 24 + 87 + 61 + 38 + 39 + 86 + 59 = \underline{\hspace{2cm}}$$

$$45) 93 + 52 + 33 + 86 + 26 + 26 + 18 = \underline{\hspace{2cm}}$$

$$46) 35 + 74 + 84 + 28 + 70 + 41 + 81 = \underline{\hspace{2cm}}$$

47)  $74 + 44 + 41 + 34 + 71 + 31 + 80 = \underline{\hspace{2cm}}$

48)  $16 + 59 + 95 + 25 + 94 + 12 + 98 = \underline{\hspace{2cm}}$

49)  $63 + 60 + 90 + 57 + 25 + 86 + 44 = \underline{\hspace{2cm}}$

50)  $76 + 25 + 38 + 40 + 53 + 27 + 58 = \underline{\hspace{2cm}}$

51)  $21 + 89 + 12 + 65 + 90 + 23 + 95 = \underline{\hspace{2cm}}$

52)  $84 + 44 + 49 + 77 + 83 + 38 + 20 = \underline{\hspace{2cm}}$

53)  $33 + 41 + 16 + 62 + 21 + 69 + 50 = \underline{\hspace{2cm}}$

54)  $19 + 99 + 47 + 43 + 29 + 75 + 89 = \underline{\hspace{2cm}}$

55)  $82 + 18 + 11 + 16 + 38 + 19 + 97 = \underline{\hspace{2cm}}$

56)  $87 + 58 + 73 + 15 + 26 + 82 + 78 = \underline{\hspace{2cm}}$

57)  $79 + 33 + 45 + 55 + 80 + 56 + 21 = \underline{\hspace{2cm}}$

58)  $21 + 37 + 57 + 35 + 53 + 43 + 57 = \underline{\hspace{2cm}}$

59)  $55 + 21 + 96 + 93 + 99 + 84 + 41 = \underline{\hspace{2cm}}$

60)  $80 + 98 + 26 + 18 + 69 + 34 + 69 = \underline{\hspace{2cm}}$

61)  $11 + 11 + 29 + 40 + 56 + 31 + 30 = \underline{\hspace{2cm}}$

62)  $80 + 31 + 38 + 40 + 84 + 41 + 72 = \underline{\hspace{2cm}}$

63)  $66 + 41 + 95 + 64 + 52 + 23 + 58 = \underline{\hspace{2cm}}$

$$64) 75 + 46 + 90 + 29 + 67 + 89 + 28 = \underline{\hspace{2cm}}$$

$$65) 37 + 30 + 98 + 76 + 58 + 60 + 27 = \underline{\hspace{2cm}}$$

$$66) 51 + 79 + 85 + 54 + 42 + 45 + 70 = \underline{\hspace{2cm}}$$

$$67) 50 + 41 + 94 + 98 + 59 + 53 + 61 = \underline{\hspace{2cm}}$$

$$68) 19 + 29 + 16 + 42 + 55 + 56 + 78 = \underline{\hspace{2cm}}$$

$$69) 41 + 31 + 60 + 52 + 60 + 33 + 91 = \underline{\hspace{2cm}}$$

$$70) 77 + 58 + 43 + 73 + 17 + 25 + 76 = \underline{\hspace{2cm}}$$

$$71) 95 + 35 + 68 + 79 + 79 + 48 + 21 = \underline{\hspace{2cm}}$$

$$72) 60 + 90 + 94 + 65 + 66 + 96 + 95 = \underline{\hspace{2cm}}$$

$$73) 30 + 58 + 80 + 56 + 32 + 41 + 51 = \underline{\hspace{2cm}}$$

$$74) 73 + 45 + 32 + 41 + 57 + 76 + 58 = \underline{\hspace{2cm}}$$

$$75) 65 + 80 + 42 + 79 + 72 + 69 + 73 = \underline{\hspace{2cm}}$$

$$76) 20 + 77 + 25 + 95 + 82 + 22 + 19 = \underline{\hspace{2cm}}$$

$$77) 24 + 92 + 26 + 26 + 71 + 66 + 77 = \underline{\hspace{2cm}}$$

$$78) 76 + 31 + 82 + 72 + 89 + 23 + 36 = \underline{\hspace{2cm}}$$

$$79) 55 + 36 + 21 + 58 + 63 + 14 + 63 = \underline{\hspace{2cm}}$$

$$80) 84 + 64 + 43 + 19 + 50 + 97 + 77 = \underline{\hspace{2cm}}$$

$$81) 38 + 48 + 55 + 67 + 65 + 90 + 34 = \underline{\hspace{2cm}}$$

$$82) 12 + 43 + 77 + 36 + 41 + 75 + 44 = \underline{\hspace{2cm}}$$

$$83) 72 + 51 + 18 + 28 + 97 + 29 + 62 = \underline{\hspace{2cm}}$$

$$84) 31 + 85 + 32 + 79 + 18 + 30 + 49 = \underline{\hspace{2cm}}$$

$$85) 45 + 60 + 32 + 14 + 33 + 76 + 63 = \underline{\hspace{2cm}}$$

$$86) 96 + 82 + 55 + 61 + 19 + 90 + 32 = \underline{\hspace{2cm}}$$

$$87) 60 + 60 + 76 + 71 + 69 + 76 + 26 = \underline{\hspace{2cm}}$$

$$88) 55 + 51 + 56 + 28 + 42 + 35 + 97 = \underline{\hspace{2cm}}$$

$$89) 52 + 58 + 47 + 38 + 14 + 65 + 16 = \underline{\hspace{2cm}}$$

$$90) 20 + 38 + 61 + 70 + 44 + 42 + 34 = \underline{\hspace{2cm}}$$

$$91) 70 + 22 + 88 + 46 + 74 + 75 + 82 = \underline{\hspace{2cm}}$$

$$92) 21 + 47 + 86 + 83 + 41 + 46 + 35 = \underline{\hspace{2cm}}$$

$$93) 25 + 80 + 54 + 54 + 63 + 71 + 26 = \underline{\hspace{2cm}}$$

$$94) 28 + 96 + 33 + 65 + 36 + 37 + 33 = \underline{\hspace{2cm}}$$

$$95) 22 + 22 + 42 + 62 + 24 + 68 + 59 = \underline{\hspace{2cm}}$$

$$96) 60 + 16 + 25 + 40 + 58 + 29 + 83 = \underline{\hspace{2cm}}$$

$$97) 89 + 53 + 39 + 25 + 17 + 64 + 98 = \underline{\hspace{2cm}}$$

$$98) 31 + 24 + 87 + 13 + 57 + 61 + 61 = \underline{\hspace{2cm}}$$

$$99) 69 + 85 + 40 + 82 + 27 + 68 + 40 = \underline{\hspace{2cm}}$$

$$100) 83 + 43 + 83 + 22 + 73 + 90 + 22 = \underline{\hspace{2cm}}$$

$$101) 98 + 96 + 87 + 52 + 65 + 46 + 16 = \underline{\hspace{2cm}}$$

$$102) 64 + 61 + 85 + 37 + 51 + 38 + 45 = \underline{\hspace{2cm}}$$



**Appendix I**

Subgoal Sheet

Code \_\_\_\_\_

Math Test II

5 Minute Goal \_\_\_\_\_, Achieved \_\_\_\_\_

10 Minute Goal \_\_\_\_\_, Achieved \_\_\_\_\_

15 Minute Goal \_\_\_\_\_, Achieved \_\_\_\_\_

20 Minute Goal \_\_\_\_\_, Achieved \_\_\_\_\_

Distal Goal Sheet

Code \_\_\_\_\_

Math Test II

Performance Goal \_\_\_\_\_, Achieved \_\_\_\_\_