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ANXIETY AND LEARNING FROM SOCIAL CUES

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Anxiety and Learning from Social Cues

by

Judith Butt

A dissertation submitted to the Graduate Faculty in Educational Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

1979

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Executive Officer

Supervisory Committee

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Abstract

Test or evaluative anxiety generally has been found to interfere with performance, however, there have been some circumstances under which persons high in anxiety have outperformed their low anxious counterparts. An examination of a number of studies where high anxious students have performed more effectively than those lower in anxiety suggested that under stress, especially of an evaluative nature, a greater sensitivity to social-interpersonal factors might exist for those higher in self-reported anxiety than for those who reported lower anxiety. It appeared that when task-relevant social elements existed in the learning environment, learners high in anxiety were more likely than those lower in anxiety to utilize those cues to improve their performance.

Based on these suggestions, it was hypothesized that under stress high anxious students would perform more effectively than those lower in anxiety where only social cues relevant to task solution were available, but that low anxious students would outperform their high anxious counterparts where task cues only existed. Without stress, little or no difference in performance was expected as a result of anxiety level.

A 2(sex) by 2(stress) design was utilized with 120 fifth and sixth grade students performing a concept formation task under three cue conditions: social and task cues

redundant, social cues only, task cues only. A series of multiple regression analyses were performed with state and trait anxiety measures as the independent variables and performance on the three cue condition tasks, plus the difference between social and task cues performance, as the dependent variables.

The first hypothesis, that higher anxiety under stress conditions would improve performance with social cues only, was not supported. Hypothesis 2, that low anxiety under stress would contribute to better performance when task cues only were available, was generally supported. The final hypothesis of no difference in performance without stress present was also confirmed. Sex differences in performance were frequently found. Predictions were generally stronger for females than for males. State anxiety measures were more closely related to task performance than trait measures for all three cue conditions. These findings were discussed in the context of theory and prior research. Suggestions for future research were outlined, and implications for education considered.

"Dont push the river, it flows by itself"

Fritz Perls

To Harold, who knew that, and how to help me unblock the dams that stopped the flow with never, well almost never, a push. I hope in my work in education and psychology to be able to be for some others what he has been for me.

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The past seven years have been a period of immense education, change, for me and there are a number of people, who, each in their own way, have helped this growth.

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created the tone for those working with the program, encouraging real education rather than mere accumulation of information. The atmosphere there also encouraged relationships to grow and several important ones were begun in those two years. Choosing the Queens College School Psychology Program was a wise, even if somewhat blind at the time, decision.

My fellow students both at Queens and at the Graduate Center are much appreciated for their having shared experiences, friendship, knowledge and emotional support through periods of anxiety. Many of the high points of these years have been because of them.

My therapist, Harold Pivnick, to whom this is dedicated, has been the most important of my teachers during these years. Under his tutelage the segregation of my intellect and feelings has slowly given way to a unified knowing, a meshing of intellectual and emotional knowledge, a most important component of educational growth.

A special thank you needs to be extended to the people I work with: administrators, children, parents, psychologists, secretaries and teachers for their belief and encouragement, for their adaptation to my study and work needs during these last four years, and for their time and participation in my research.

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INTRODUCTION

Philosopher, Charles Frankel, notes that the phrases used by an age to describe itself are not always accurate reflections of the actual character of the age, but that the label "The Age of Anxiety" has been more generally accepted than most labels applied to the present time. Spielberger (1966) suggests that the powerful influence of anxiety in contemporary life is clearly reflected in many facets of our culture: literature, arts, sciences, religion, etc. He cites a passage from Time which portrays the ubiquity of this unpleasant emotion:

> "Anxiety seems to be the dominant fact - and is threatening to become the dominant cliche - of modern life. It shouts in the headlines, laughs nervously at cocktail parties, nags from advertisements, speaks suavely in the board room, whines from the stage, clatters from the Wall Street ticker, jokes with fake youthfulness on the golf course and whispers in privacy each day before the shaving mirror and the dressing table. Not merely the black statistics of murder, suicide, alcoholism and divorce betray anxiety (or that special form of anxiety which is guilt), but almost any innocent, everyday act: the limp or overhearty handshake, the second pack of cigarettes or the third martini, the forgotten appointment, the stammer in midsentence, the wasted hour before the TV set, the spanked child, the new car unpaid for" (Time, March 31, 1961, p. 44, as cited by Spielberger, 1966).

Philosophical, medical and psychological reports on anxiety have regarded it as cause for creative works, for insomnia and many physical ills, as well as for many criminal acts. Rollo May (1950), in analyzing historical trends in anxiety, notes that although anxiety has always

existed in the life of humans, in this century it has become a more overt and salient characteristic of our age.

Though anxiety has been a topic of interest since the early philosophers, Freud first raised anxiety to prominence in psychological theory. It has since occupied a central place in almost every theory of personality and psychopathology (Spielberger, 1966).

In the early 1900's, particularly following Pavlov's 1927 discovery of experimental neurosis in animals, most research on anxiety was done with animals (Spielberger, 1966). In 1950 the publication of May's The Meaning of Anxiety, Mowrer's Learning Theory and Personality Dynamics, Dollard and Miller's Personality and Psychotherapy, and the volume, Anxiety, edited by Hoch and Zubin, indicated that anxiety in the human animal was emerging as a significant area of scientific study (Spielberger, 1966, 1972).

Since the 1950's there has been a vast amount of literature on anxiety. In spite of this tremendous interest and much productivity, there is little consensus on a definition of anxiety and therefore on methods of measuring it. Phillips (1971) notes that despite the lack of concurrence, the three major theoretical approaches to anxiety (learning theory, psychoanlaytic theory and cognitive behavioral theory) all give insight into anxiety

and its role in school performance. Phillips attempts to integrate the various theories and finds that despite their somewhat different variables and concepts, "their formulations converge on the following points:

1. Anxiety is manifested on physiological, penomenological and behavioral levels. In a given individual, discrepancies among the expressions of anxiety on these different levels may be attributed, in part, to the person's defensive operations.

2. There are two broad categories of anxiety: (a) "state" or "acute" anxiety and (b) "trait" or "chronic" anxiety. Trait anxiety refers to the level of anxiety which generally characterizies the individual and the probability that he will respond to a variety of situations with a sharp increase in anxiety. State anxiety refers to whether the person is intensely anxious at some particular time.

3. Anxiety is elicited by psychological stress. Anxiety can result from a variety of stressful conditions including the threatened deprivation of an anticipated satisfaction, the interruption of an ongoing behavioral sequence, uncertainty concerning the outcomes of external (environmental) and internal (cognitive) events, or the potential implementation of socially unacceptable impulses.

4. Anxiety reactions to stress usually occur in conjunction with other reactions to stress, including various emotional responses, defense mechanisms, and coping behaviors.

5. The consequences of anxiety are most likely to be disruptive, to interfere with organized behavior patterns, and to have a debilitating effect on learning efficiency. However, under certain definable circumstances, anxiety may facilitate learning and bring about effective adaptation and/or performance"(Phillips, 1971, pp. 17-18).

The Practical Importance of Evaluative Anxiety

It has long been noted that there are children whose potential is not reflected in current academic performance and that children of similar measured intelligence often achieve at widely discrepant levels in the same instructional setting. Observed factors likely to affect learning, such as apparent attention, cooperation and motivation frequently have not accounted for all of their differences in achievement.

One of the directions research took in trying to account for this ability-achievement discrepancy was to examine children labeled underachievers in contrast to children labeled achievers or overachievers. R. Taylor (1964), reviewing the literature on underachievement, noted that underachievers differed from overachievers in several characteristics, among them more free floating anxiety and lowered ability to handle their anxiety. Also generally reported were negative self values such as self-derogatory attitudes, low self-confidence, passivity, and more conflict over dependence-independence. These correlates of underachievement, it will be noted later, also occur frequently in studies of correlates of anxiety.

Other researchers hypothesized that evaluative anxiety might account for students' inability to make opti-

mal use of their cognitive competencies. Spielberger (1966) reported on a number of studies, conducted by himself and colleagues at Duke Univesity, relating anxiety to complex learning, academic achievement, intelligence and college dropout rate. It was found that high anxious students in the average or middle range of intellectual ability obtained lower grades than low anxious students of similar ability. More than 20% of a group of students classified as high anxious, as measured by the Manifest Anxiety Scale (J.A. Taylor, 1953) administered when they were freshmen, dropped out of school before graduation for reasons of academic failure as compared to 6% of those rated low anxious. Excluding the lowest ability groups, whose failure could have been deemed due to ability factors, the percentage of high anxious dropouts was almost four times greater than the percentage of low anxious academic failures.

Fein (1968) in identifying the factors operating in the high dropout rate of nursing school students, found very high or very low anxiety levels among several factors common in dropouts. No relationship between intelligence and school dropout rate was found. Howeover the relationship of anxiety and intelligence test score may already be confounded. Numerous researchers, beginning with Mandler

and Sarason (1952) have questioned whether intelligence test scores adequately reflect the abilities of high anxious test-takers since the elements of this type of test (threatening to self-esteem, often timed) frequently raise interfering anxiety during the testing procedure.

In a review of anxiety's effects on learning in settings ranging from the traditional classroom to computer managed or assisted instruction, Sieber, O'Neil and Tobias (1977) have documented the interference of anxiety upon achievement under a wide variety of instructional methods.

In our achievement oriented society, where tests are a common instrument for evaluating one's past success and future entrance to advancement, the frequency and intensity of evaluative anxiety can be readily understood. Not only do others judge one by means of test scores, but how well one does on a test also influences our own self-concept and what we judge ourselves to be.

It is apparent, from the studies reviewed, that high and low anxious students do not have equal success in the academic situation and that high anxiety is frequently deleterious. Research devoted to investigating more precisely the behaviors manifested by those high and low in anxiety during learning tasks, and the characteristics of tasks to which those high in anxiety are most prone to respond, may

help to advance understanding of the process by which anxiety affects learning and may ultimately lead to delineating the means by which the problem of debilitating anxiety may be,at least partially, alleviated.

Goals of the Current Study

This study hopes to extend our knowledge of how high and low anxious students function in the learning process with the eventual goal of adapatation of instruction so as to promote the optimal use of the cognitive abilities of both high and low anxious students.

Based on research drawn from several fields (personality, social psychology, individual differences and educational psychology), it is hypothesized here that students scoring high on a measure of test anxiety are likely to be more attentive to social cues in evaluative situations than those scoring lower on this anxiety measure. It is further predicted that low test-anxiety individuals, on the other hand, will attend more to task cues and less to social cues than those high on the anxiety measure. This difference is expected to lead, as it has in past research, to superior performance for low anxious persons in a cognitive testing situation. On the other hand, it is hypothesized that when there are cues relevant to task solution that are socially or inter-personally mediated, anxiety will facilitate learning and in these learning situations, it is expected that high test-anxious individuals will perform better than their low anxious counterparts.

The majority of research studies on anxiety and learning indexed in Psychological Abstracts have used college

students as subjects of this study. Research with elementary school children appears to offer several advantages over college students: the opportunity to provide information which might lead to a better understanding of the developmental aspects of test anxiety and the chance to propose theory-based interventions earlier in the student's educational career, an advantage to both individual and society in terms of development of human potential. This study, therefore, will examine the hypothesized differential responses of high and low anxious students using an elementary school population.

Chapter I
Anxiety and Learning

A number of specific evaluation anxieties have been investigated in recent years including social anxiety (e.g. Watson and Friend, 1969), audience anxiety (.e.g. Paivio, 1965), speech anxiety (e.g. Meichenbaum, Gilmore and Fedoravicius, 1971), sexual performance anxiety (e.g. Masters and Johnson, 1970) and test anxiety. Wine (In press) notes that while there is a component similar to all of these aspects of evaluative anxiety, i.e., a reaction to cues in the situation with a "habitual, overlearned set of self-oriented cognitions", persons high in one kind of evaluative anxiety are not necessarily so in all of the other ones. She points out that the person's social learning history will determine just which type of evaluative cues set off an axious reaction for that person, and, too, will shape the nature of the specific cognitions involved for that individual.

Wine suggests that test anxiety is the most investigated of the specific evluation anxieties because it lends itself so readily to cognitive analysis, i.e., dependent measures in the study of test anxiety have naturally been cognitive performance on a variety of learning tasks.

S. Sarason, Davidson, Lighthall, Waite and Ruebush (1960) further note that not only is test anxiety frequent,

but it is also "associated with severe personality disturbance and concomitant difficulties in the school learning situation (p. 9). These researchers cite two major reasons for focusing study on test anxiety:

> "First the test situation frequently evokes the anxious response at a strength which should allow us to evaluate our theoretical conceptions about the significances of anxiety in the organization and development of personality. Second, if test anxiety is an important and frequent response to the test situation, then the development of a valid methodology for its assessment would have relevance for the general problem of the nature and effects of test-taking attitudes and reactions" (p. 10).

Test Anxiety Theory

Test anxiety theory began with the work of S.B. Sarason and his associates at Yale University in the early 1950's. Their framework essentially (Sarason, et al., 1960) attributed the current anxiety in testing situations to earlier parent-child evaluative experiences. The child's inability to meet parental standards for performance or achievement and resulting negative judgments were hypothesized to lead to hostility on the child's part toward the parent. The child's hostile feelings were presumed to lead to guilt, followed by self-derogation and repression of the hostility. This hostility was also assumed to lead to unconscious negative fantasies and fear of loss of support, rejection or retaliation from the parents. In turn these fears were expected to lead the child to seek approval, direction, etc. from the parent. The child's effort to avoid negative evaluation from the parent may then hamper development of independence, spontaneity and creativity. Hill and S.B. Sarason (1966) emphasized the high test-anxious child's strong dependency needs and fear of failure. Research evidence for the Hill and Sarason theory has been reviewed by Ruebush (1963).

A different conception of test anxiety was developed by Atkinson (1964) and further elucidated by Atkinson and

Feather (1966). They related test anxiety to the motive to avoid failure and considered achievement motivation as reflecting the motive to approach success. Atkinson and Feather (1966) summarized research with adults that supported their basic hypotheses that persons more motivated to achieve success than to avoid failure selected tasks of intermediate difficulty, persisted longer in working on achievement oriented tasks, and would also achieve more on those tasks than the more anxious person. On the other hand, more anxious individuals were more motivated to avoid failure than achieve success and therefore selected either very simple or very difficult tasks, the latter being safe to fail because of their difficulty.

A third theory of test anxiety, that of Hill (1972), combines elements of both the Sarason and Atkinson theories with somewhat changed emphases. Hill assumes, as do Sarason and his colleagues, that evaluative anxiety begins in response to high parental standards and criticism before the child begins school. He adds the Atkinson and Feather component that the parental standards and reactions create motivational dispositions in children to obtain praise and avoid criticism. Hill suggests that as guilt increases, children are more responsive to adult evaluative reactions. (This would be consistent with the Sarason position on de-

pendency.) Additionally, Hill suggests, with increasing anxiety, the motive to obtain praise becomes less primary and the motive to avoid criticism becomes stronger. Because of this, low anxious children may exhibit stronger motives to obtain praise rather than to avoid criticism, while high anxious children may exhibit the opposite syndrome. Hill notes, as have numerous developmental psychologists, that as the child becomes older, the parents become less of the focus for evaluative feedback and, in turn, the teacher, and later peers, replace parents in that role.

Supporting Hill's hypotheses, Crandall (1967) found that low anxious children orient to their own internal evaluations of their performance and attend more to their performance in problem solving tasks, while high anxious children are oriented more toward evaluation from the adult experimenter. Both Allen (1966) and Crandall (1967) found that low anxious children attended more to the informational component of the adult experimenter's reaction than to the social cue accompanying it, while the opposite was so for the high anxious children.

Research by Turnure (1970) and Turnure and Zigler (1964) indicate that, in the normal course of development, children shift from outer-directedness to inner-directed-

ness in problem solving strategies between 6 1/2 and 7 1/2 years of age, with the resultant ability to ignore irrelevant distractions while working on a task. That is, there is a reduction of the tendency to seek external cues, or as Turnure (1970) labels it an "attention-mobilizing" response, solidifying by age 7 1/2. These findings suggest that high anxious children's reactions are more typical of younger children, while the reactions of low anxious children are more typical of older children.

Definition of Test Anxiety

The definition of anxiety adhered to in this research is one formulated by Spielberger and widely used in anxiety research. It views anxiety as "a specific emotional state which consists of unpleasant, consciously-perceived feelings of nervousness, tension and apprehension, with associated activation or arousal of the autonomic nervous system" (Spielberger, 1972, p. 45). While not excluding the emotional or physiological reaction, it is the relative presence of worry, the cognitive perception, that characterizes the definition of test anxiety used by cognitive attentional theory (Wine, 1971) and this research. Although other labels for this construct, Wine suggests, may be more appropriate than test anxiety, there are problems with the use of each, and therefore the traditional label will be retained and high and low test anxious will be operationally defined, as Wine (1971) suggests, by scores at the extremes on measures of debilitating test anxiety.

Test anxiety is closely related to, and a specific case of, evaluation anxiety (Wine, in press, b) the latter including phenomena such as stage fright, fear of speeches, etc. It is an anxious reaction experienced in a testing-evaluative situation. Wine suggests the common element in evaluation anxieties is the negative self-cognitions

activited in the anxious person with conditions of evaluative stress.

Stress, often used synonymously with anxiety, will be defined here, following Levitt (1967), as an adjective describing a stimulus situation. A stress situation will be one that includes cues intended to arouse anxiety, a stressed person one who has experienced a stress situation, and a stress reaction, the result of the person's response to the stress situation.

Attentional Interpretation of Anxiety

In a review of test anxiety and task performance studies, Wine (1971) suggested that the difference between high anxious and low anxious students on test performance seems largely due to an attentional factor. High anxious students appear to divide their attention between internal cues (self-evaluative thoughts, perception of autonomic responses and self-deprecatory thinking) and external task cues to a greater extent than low anxious students. This allows the low anxious students to perform better on cognitive tasks under threatening conditions (tests ,evaluative situations) by devoting a greater portion of their attention to task relevant concerns.

While the time off task is hypothesized to contribute to reduced levels of performance for high anxious learners in comparison to their lower anxious classmates, Tobias (in press) notes that there are occasional findings in the literature indicating that persons high in anxiety outperformed their low anxious counterparts. He hypothesizes that students with high anxiety might perform more effectively than those with lower anxiety in specific situations-those where attention to social cues is important. He notes that high anxious students may be scanning the environment to reassure themselves, and, when in this process , cues useful for task

performance are available, these cues can be expected to be more noted by high than by low anxious persons. Such reassurance may be reinforcing to high anxious persons since it relieves the fear of negative evaluation. If, there are no social cues relevant to task demands, the performance of those high in anxiety is likely to be lower than for the individual low in anxiety.

Although the Wine interpretation of high anxious learners' poor performance, i.e. due to internal attention, and the Tobias hypothesis of attention to possibly non-relevant environmental rather than relevant task cues appears to conflict, cognitive attentional theory of the effects of anxiety on learning could encompass both phenomena. Both Wine (1971) and Tobias (in press) are hypothesizing time off task whether spent in internal worry type cognitions or searching for reassurance from the environment. I. Sarason interprets anxiety within a cognitive social learning framework and describes anxiety as a "type of self-preoccupation characterized by self awareness, self-doubt and self-depreciation" (Sarason, 1975c, p. 27). Self-preoccupied covert activities and behaviors should theoretically contribute, Sarason believes, to the "ways in which a person searches the environment for cues, selects cues that are relevant to thought and action, integrates new information with old, and makes decisions that eventuate in

observable behavior" (I. Sarason, 1975c. p. 28). While these covert cognitive activities cannot be observed, Sarason suggests they can be inferred from attentional training research and the line of research that deals with modeling and its relationship to performance. It is advanced here that a task alternately involving the elements of task cues only, task and social cues and social cues only, administered in an evaluative situation, could lead to being able to differentiate the direction of attention of high and low anxious learners.

A Proposed Model of How Anxiety Affects Learning

Linking anxiety, learning and instruction, Tobias (1977), following an information processing model, suggests that anxiety does not affect instructional outcomes directly, but instead affects the cognitive processes required by the material and by the instructional method and these, in turn, affect performance. He suggests anxiety may interfere at three points of the instructional process: (1) Pre-processing, (2) processing (the activities performed on the input in order to store it, and (3) prior to output (when material has been learned, but cannot be retrieved when needed for performance). The interference of anxiety may not be limited to any one of these stages, and may even be cumulative in effect, Tobias hypothesizes. (See Figure 1)

Interference at the prepocessing stage may, by virtue of the high anxious learner's inward attentional focus, restrict or reduce input for the high anxious student. Restricted input, in turn, leaves the student in the processing stage with the additional burden of having to infer the parts of the input missed.

Anxiety can influence performance at the processing stage where the input is transformed and a solution to the problem needs to be generated. One example of such

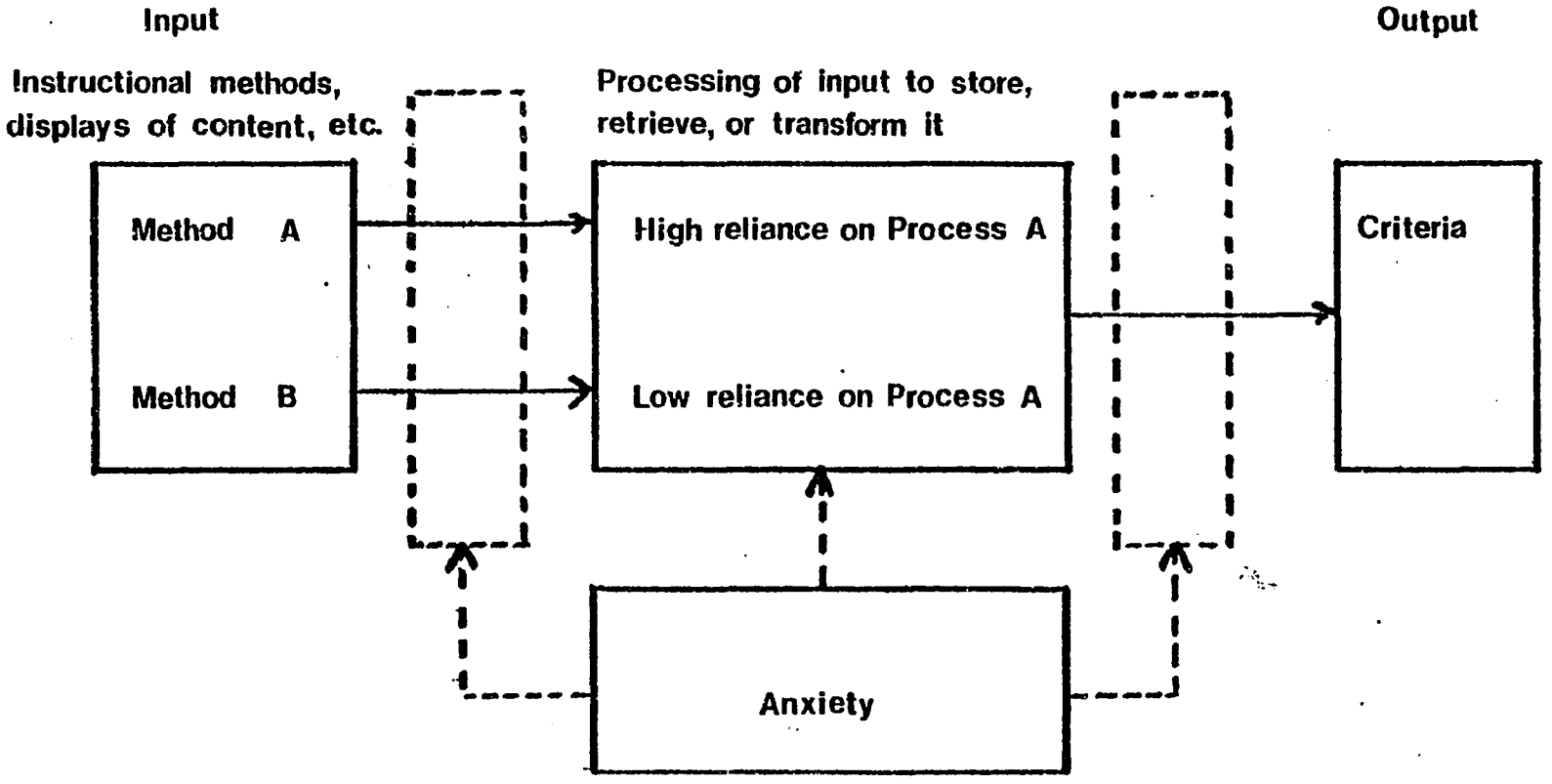


Figure 1. Model outlining the effects of anxiety on learning from instruction. (From Tobias, 1977, Copyright 1977 by Lawrence Erlbaum Associates. Reprinted by permission.)

processing inteference is reduced efficiency in memory processes when prior learned rules or problem-solving techniques are needed to generate an answer. Research by Sieber, Kameya and Paulson (1970) to be reviewed later, suggests memory support may be an effective means to reduce the interference of anxiety at this stage in the learning process.

A second example of the debilitating influence of anxiety during processing is the restricted coding findings of Mueller (1976). Mueller, in summarizing research, indicated restricted cue utilization appears to be concommitant with high anxiety, and presents evidence from several studies suggesting that this cue utilization deficit is likely due to more restrictive encoding of the stimuli by high anxious subjects. Mueller, himself, found that high anxious subjects exhibited less organized recall as evidenced in less clustering in categorizing word lists and less subjective organization in learning unrelated word lists.

Further supporting the interfering effects of anxiety are findings by West, Lee and Anderson (1966) who sought to demonstrate the narrowing of the perceptual field as a result of anxiety. This narrowing was operationalized by the ability to select relevant from irrelevant information in problem solving situations. By manipulating amount of

irrelevant information, West, et al. found that the ability to select relevant from irrelevant information was significantly more difficult for the high anxious learner than for the low. Anxiety interacted with irrelevant information to produce poorer performance for high anxious subjects.

The third point at which anxiety could affect learning is before the output stage. It is assumed here that learning has occurred but has then been "forgotten" or lost before it could be reproduced.

Not specifically detailed by Tobias' model, but compatible with it, is a possible additional effect at the preprocessing stage of learning. Anxiety may affect the kind or type of stimuli that the learner may attend to. Research reviewed by Tobias (in press) and Wine (in press) suggests that high anxious learners may attend to personally mediated social-evaluative cues instead of task cues more than low anxious learners. It is the intent of this research to test this hypothesis and possibly, if confirmed, both add support to and extend the model proposed by Tobias (1977).

Debilitating Effects of Anxiety on Performance

Anxiety in testing situations is common to most test takers, but some individuals experience regularly such a high degree of anxiety in such situations that it interferes with test performance.

Korchin and Levine (1957) analyzed the types of errors and the rate of learning verbal materials of both high and low anxious learners. They found little difference between the anxiety groups when the material was simple and easily associated. There were, however, significant differences when more difficult or unfamiliar materials were involved. This difference was more pronounced when the material was contradictory to the learner's prior knowledge. The researchers concluded:

> "In the situation in which the subject has to make a novel adjustment and cannot utilize existing behavior patterns, the possibility of failure and the consequent loss of self-esteem can further release anxiety and further reduce the subject's ability to develop appropriate behavior" (Korchin and Levine, 1957, p. 238).

Particularly disruptive to high anxious learners in almost all studies reviewed is the testing or learning situation that is stressful or evaluative in nature. One common way of studying this situation has been the use of ego-involving instructions (I. Sarason, 1956, 1957, 1958, 1961, I. Sarason & Palola, 1960, Speilberger & Smith,

1966, Sinclair, 1969). This paradigm involves informing the learner in the stressful condition that his performance on the task involved reflects intellectual ability or is predictive of success in school or life. This condition is then contrasted with a reassuring condition in which the test taker is assured that this performance is a minimally evaluative one, e.g. it is an experimental exam and has nothing to do with the course grade (Paul & Erikson, 1964) or the score is meaningless because the test is still in the experimental stage (Mandler & S.B. Sarason, 1952).

The results of studies varying the instructions in this way generally show an interaction between test anxiety level and evaluative emphasis. High test-anxious students tend to perform more poorly with the ego-involving evaluative instructions than in the reassuring condition and the reverse is the case with low test-anxious subjects (Wine, 1971).

In a few of these studies, under reassuring conditions, high test-anxious individuals performed better than low test anxious ones (I. Sarason, 1958). I. Sarason (1972b) attributed this advantage for high test-anxious students to the possibilty that the reassurance for the low test-anxious individuals may have reduced

their ego-involvement in the task. He concluded that "high and low test-anxious individuals may differ most importantly in the meanings they attach to preperformance cues" (I. Sarason, 1972b, p. 387).

Mandler (1972) suggests, instead, that reassuring instructions provide suggestions at variance with the self-deprecating, failure inducing, interfering instructions high test-anxious subjects give themselves. On the other hand, Mandler conjectures, since low anxious subjects do not generate or even think about these interfering responses, the reassuring instructions suggest to them that doing poorly is a possibility. While the low anxious subject is told in effect "you might consider worrying," the high anxious subject is already doing so and the instructions may then be truly reassuring to the high anxious individual.

An alternative way of viewing this performance effect is that reassurance acted as a facilitating cue, raising the performance of high anxious learners. If, as hypothesized here, social/interpersonal cues are differentially effective for high and low anxious persons, facilitating learning more for those high in anxiety, the experimenter's reassurance might have acted as such a cue.

In a study of off-task glancing in evaluative situations as related to test-anxiety level, Nottelmann and Hill (1977) found, as expected, that high test-anxious children had the lowest performance score and the highest number of off-task glances. While Turnure (1970) has proposed that off-task glancing (often labeled distractibility) may represent an outer-directed problem solving strategy, Nottelmann and Hill noted that, in their experiments, it might represent a tendency to avoid performing those tasks. Support for this avoidance hypothesis came from observations that although off-task glancing was higher for the high test-anxious children, number of glances at the experimenter was not significantly different for children of various levels of test anxiety. Additionally, low and medium anxious children asked more questions of the experimenter and almost all of the questions they asked were task related. High anxious children asked very few questions. Whether they were task related or not was not reported.

In a study looking at correlates of achievement motivation and debilitating anxiety in family and school situations, Hermans, ter Laak and Maes (1972) administered a personality questionnaire to 40 children aged 9 and 10. Children scoring at the extremes on achievement motivation and

debilitating anxiety were observed in parent-child interactions at home and were rated by current teachers and those from the previous academic year.

The first three items of the 7 item rating scale involved "social dependence behavior in task situations;" (Hermans, et al, 1972 p. 522) the fourth item, goal setting behavior; the fifth, attention; the sixth, personal responsibility and the last, persistence. Results indicated that children high in debilitating anxiety (described and measured similarly by Alpert and Haber, 1960) were more socially dependent particularly when their intelligence was low. Specifically, high debilitating-anxiety children, teachers reported, "had to be taken step by step to the answer, whle the low debilitating-anxiety children tended to solve problems without help" (Hermans, et al 1972, p. 525). A debilitating-anxiety by intelligence interaction indicated that high debilitating anxiety-low intelligence children looked more frequently for support, but when the high anxiety was combined with high intelligence, the children showed more initiative. This finding is consistent with most prior research where both anxiety and intelligence were independent variables. It appears that anxiety's effect on performance is mediated by intelligence level, high anxiety having the greatest negative effect on

performance when intelligence level is low, a more moderate effect in the middle range of intelligence and causing the least debilitation when intelligence is high (Spielberger, 1966, Denny, 1966, Speilberger and Katzenmeyer, 1959, Cronbach and Snow, 1977).

Hermans, et al (1972) further noted that, in the rather complex tasks administered, the higher anxious children made more irrelevant responses than relevant ones, and as the tasks became more difficult for them, especially for lower intelligence children, there was an increase in proportion of irrelevant responses. These responses frequently seemed to be socially dependent ones, Hermans, et al. noted.

Studies by Ruble and Nakamura (1972) and Turnure and Zigler (1964) suggest that a cognitive or problem solving style that is characterized as distractible and social rather than task oriented, while inappropriate for optimal performance in some cognitive tasks may be more effective in other tasks. Turnure (1970) suggests that the child's glances away from the task may not reflect inattentiveness as much as seeking help and therefore this may be the optimal time to teach. The Turnure and Zigler study (1964) also indicated that children were more imitative after failure experiences than following success experiences.

Further research in effective instructional methodology geared to high anxious learners is clearly needed.

Research already exists suggesting that high anxious children with high levels of off-task behavior can benefit from programs or training that teaches them how to alleviate or reverse the interfering effects of anxiety or distractibility and improve performance. One example of such a training situation was an experiment by Dusek, Mergler and Kermis (1976). These researchers demonstrated that high anxious children's performance on a learning task could be differentially improved, relative to their low anxious counterparts, by teaching the technique of labeling central stimuli--a way of directing attention to the critical aspects of the task. The Dusek, et al, training procedure is an example of the design of instruction for high anxious learners to maximize transfer.

The current study seeks to further explore the differences in kind of attention demonstrated by high and low anxious learners and their relation to task performance. It will be hypothesized that social cues, personally mediated will be attended to more under evaluative conditions by high anxious learners than by low anxious ones. In these circumstances, therefore, high anxious learners will be expected to outperform their low anxious counterparts.

Anxiety and Task Complexity

Based on Spence-Taylor drive theory many researchers have predicted that high anxiety would facilitate performance on simple tasks and impair performance on complex tasks. Tobias (in press) notes that research in instructional contexts has generally failed to find such an effect. Spence and Spence (1966) have stated that although this effect has been found in simple experimental tasks such as eyelid conditioning (Spence, 1964) and complex paired associate learning tasks (Atkinson, 1964), their studies were primarily concerned with classical conditioning and that "We have always recognized that such high and low anxiety groups undoubtedly differ in a number of characteristics and that all performance differences that occur between anxiety groups cannot be explained in terms of drive level" (Spence & Spence, 1966, p. 292). They further note that "Development of a theory of anxiety as a personality phenomenon would thus appear to demand that these additional factors and the conditions under which they are evoked be identified and the manner in which they influence performance be determined" (Spence & Spence, 1966, p. 292).

Tobias (in press) has hypothesized, instead, an ordinal interaction of anxiety and simple and complex

learning in instructional settings. He expects that the performance of high anxiety students will be impaired on difficult materials in comparision to that of their classmates lower in anxiety, while on simple materials little difference between anxiety groups will be found. He notes that this hypothesis is in line with most of the findings in meaningful instructional situations summarized by Sieber, O'Neil and Tobias (1977).

Results relating difficulty to anxiety, however, have not always been consistent. I. Sarason (1960) notes that the interpretation given to the variable of complexity needs further consideration, as complex tasks may be either anxiety producing and/or cognitively difficult and that either or both of these dimensions may account, in part, for the anxiety-related performance variation.

Tobias (1972), in reviewing the difficulty issue, noted that a frequent measure of difficulty has been a statistically significant difference between the number of errors committed on materials labeled simple and those labeled difficult. Since it is possible to have significant differences which are very small, he questioned whether this was an adequate index of task complexity for both the arousal and maintenance of anxiety at the level neces-

sary for it to depress performance. Tobias suggested an additional measure of difficulty be reported, such as the percentage of errors involved, that is the proportion of errors to correct responses.

The nature and/or requirements of the task seem to be another organizing schema through which to view whether the effects of anxiety can be expected to facilitate or debilitate performance. While it has generally been found that anxiety facilitates rote learning, or may be a positive force where the main requirement of the task is persistence or motivation to achieve, in tasks which are either unfamiliar or more dependent on improvising or novel problem-solving skills, anxiety tends to be disabling (Castaneda, Palermo & McCandless, 1956, S.B. Sarason, et al, 1960, Stevenson & Odom, 1965, Russell & Sarason, 1965).

The following section will attempt to delineate those learning situations, other than rote motor performance or conditioning tasks, where anxiety has either proved to be a positive force, or where, through instructional methodologies circumventing the interfering effects of anxiety, its debilitating force on performance was reduced. Possible explanations for these results will then be examined.

Facilitating Effects of Anxiety on Performance

While there seems to be little doubt that anxiety generally has disruptive effects on learning, in some situations it can organize and facilitate learning "by raising the general level of activity or vigilance" (Korchin & Levine, 1957, p. 234). Mandler (1975) notes there seems to be both theoretical and empirical agreement that the consequences of conditioned fear (anxiety) fall into two classes, one where the fear/anxiety operates as a secondary drive, exhibiting all of the features of drives (e.g. motivation, the establishment of new behavior, etc.), and the other a conditioned fear or conditioned emotional response where it may "interfere with or suppress ongoing behavior" (Mandler, 1975, p. 183).

Waite (1959) found high anxious persons made fewer errors in solving Porteus Mazes than low anxious in an untimed, no pressure to respond, situation (Sieber, 1977).

Ruebush (1960) found a positive correlation between anxiety and performance on a complex task-locating figures imbedded in a matrix of lines. Time, again, was not a factor and in this task the most efficient performance was obtained by working slowly. Since subjects with high anxiety often require more time to complete complex tasks, Ruebush expected these anxiety-prone children to be slower

and more cautious in their approach. This was the case, and the high anxious children solved more problems.

The Waite (1959) and Ruebush (1960) tasks, however, had all relevant information necessary for solution displayed, and did not require the subjects to supply information not available. Sieber (1977) notes that with tasks where high anxious persons are required to seek or supply information, they do not exhibit caution and accuracy and commit more errors than those low in anxiety (Castaneda, Palermo & McCandless, 1966, Lanzetta, 1963, and Stevenson & Odom, 1965 as cited by Sieber, 1977). In addition, it has been noted that high anxious subjects will persist longer at a task than low anxious and this attribute likely meshed with the requirements of the Waite and Ruebush tasks, contributing to the superior performance of the high anxious subjects in these studies.

Potter (1974) studied correlates of observed oral participation in elementary school classrooms. While not directly related to a specific learning task performance, Potter found that high anxiety, though not the highest anxiety, emerged as a facilitating or motivating force in class participation. Children within one standard deviation above the mean in anxiety, as measured by the Test Anxiety Scale for Children (Sarason, et al., 1958)

both raised their hands more to respond to the teacher and initiated individual seat work conversations with the teacher more frequently than children lower in anxiety. Potter noted that other studies generally have indicated high test-anxious children tended to avoid participation in evaluative situations, but that these studies generally used only subjects at the extremes on anxiety measures. Her study, utilizing regression analysis rather than analysis of variance, included children with the full range of anxiety scores. Potter believed that inclusion of anxiety in the middle range contributed to this effect. She conjectured that anxiety within one standard deviation above the mean is likely an example of what Davis (1944, as cited by Potter, 1974) refers to as "adaptive or socialized" anxiety which results in the individual striving for "socially acceptable reinforcements" (Potter, 1974, p. 191).

The kind of anxiety-coping techniques used by the learner also appears to affect the degree of facilitation or interference that anxiety has on task performance. Suinn (1965) found that students' performance on a complex task, the midterm exam in a college course, a presumably high anxiety situation, was significantly related not to their level of test anxiety but to the adequacy of their anxiety-coping techniques. Anxiety-coping response was measured by pre-exam memory loss on a verbal task learned

several weeks prior to the exam. Additional verbal recall scores were obtained both one week before and several days after the exam to ascertain if memory loss was truly a function of anxiety or forgetting. Subjects with inadequate anxiety-coping mechanisms (as defined by pre-exam memory loss on the verbal task) performed more poorly on the midterm exam than those with less memory loss on the verbal task. There was no significant difference on exam performance between the high and low anxiety groups as defined by scores on the Taylor Manifest Anxiety Scale (Taylor, 1953). Suinn suggested that students with high anxiety could perform as well as those with lower anxiety provided that they were able to effectively cope with their anxiety.

Support for this interpretation comes from Levitt's (1967) review of studies on the effects of anxiety. Levitt noted that even when the central tendency measure of performance did not differ between high and low anxiety groups, higher variability was frequently found in the performance of the high anxious groups than the low anxious. He suggested that the particular defense called into play by the high anxious person to guard against anxiety may have contributed to the difference in the behavioral effects of the anxiety.

The results of a study by Grimes and Allinsmith (1961) lend support to this assumption. In analyzing the inter-

action of traits of compulsivity and anxiety with structured and unstructured first grade reading program achievement, Grimes and Allinsmith found the most successful learning performance was by high anxious-high compulsive children taught via a structured method. High anxious-low compulsive children in the same teaching situation performed significantly more poorly than their high compulsive counterparts. The poorest reading performance was achieved by high anxious-low compulsive children in a loosely structured learning environment. The high anxious-high compulsive children in the more structured environment had both their own and the instructional methodologies' imposition of order and were highly successful learners. The high anxious-low compulsive children in the loosely structured learning environment had order imposed neither by themselves nor the instructional methodology and performed the poorest of the eight groups.

In the Grimes and Allinsmith (1961) study both the pupil's anxiety-coping technique, compulsivity, and the structure imposed by the teaching methodology apparently contributed to the performance outcome. Tobias (1977) reviewed classroom anxiety-treatment interaction studies and reported that a fairly consistent theme emerging in these investigations was that students high in anxiety achieved more under instructional methods that had a high degree of

structure or organization than under less structured teaching methods.

A second context reported by Tobias (1977) to be facilitative to the high anxious student was one in which some form of memory support was provided. While long term memory does not appear to be generally affected by anxiety, numerous investigators have reported debilitating effects of anxiety on short term memory (Kreitzberg, 1978). Investigations of instructional techniques that permit self-initiated repetition of parts of the content in a learning or problem-solving task find that high anxious learners will make more use of the opportunity to repeat input than low anxious ones and the differences in performance between them are reduced as a result (Oosthoek and Ackers, 1973). Memory support has also been operationalized as provision of the prior instructional content in a problem-solving situation. The student then does not have to rely on his/her own short term memory because the elements needed for solution are displayed. A number of investigators have found this type of memory support can be effective in reducing the performance differences between high and low anxious learners in situations where anxiety has interfered with short term memory (Sieber & Kameya, 1967, Sieber, Kameya & Paulson, 1970, Paulson, 1969, Leherissey, et al, 1971).

In summary, it appears that anxiety may facilitate learning when the task is simple or familiar, when it does not require novel problem-solving ability, when motivation is an important element of successful performance, when the anxiety is moderate rather than high, when the possibility of unsuccessful performance is not a threat to self-esteem, when effective anxiety-coping mechanisms are part of the learner's repetoire or when the instructional methodology provides the support necessary to reduce anxiety or the elements needed to counteract the negative effects of anxiety. In the reassurance condition studies, reported earlier, high anxious learners had an advantage over low anxious ones when performing under reassuring instructions. A social-interpersonal element is clearly involved in these studies. A number of other studies involving modeling and other interpersonal variables, to be reported in the following chapter, also suggest that when task-relevant social or interpersonal elements are involved in the learning situation, learners high in anxiety are likely to utilize these cues to improve their performance to a greater extent than those lower in anxiety.

CHAPTER II

Anxiety and Social Factors

This chapter will review studies relating anxiety, particularly test anxiety, to a number of social variables, cumulatively suggesting a greater sensitivity to social, interpersonal factors on the part of those higher in anxiety. It will then be hypothesized that this greater sensitivity will lead to better learning for high test-anxious students on tasks where social cues are relevant to task solution.

Anxiety and Susceptibility to Persuasion

Janis (1955), studying anxiety and susceptibility to persuasion, found evidence suggesting that test anxiety and socially oriented anxiety are positively correlated and that both are positively related to susceptibility to persuasion. He noted further than neurotic anxiety had a slightly negative relationship to persuasibility. An anxiety questionnaire administered by Sarason and his associates the previous semester was utilized to assess the three anxieties (test, social and neurotic). Neurotic anxiety was measured by 21 items concerning specific phobic, hypochondriacal concerns and free floating anxiety (uneasiness without knowing why). Social anxiety was assessed by 6 items concerning sensitivity to embarassing situations and social situations, stage-fright, etc. 29 items of test

anxiety symptoms including worry and physical emotionality reactions were used to assess level of test anxiety. Although all three anxiety scales were positively interrelated, Janis noted that this reflected, perhaps, an additional component - one's willingness to admit to these feelings often considered as weaknesses. The degree of the relationship was not high enough so that it could be assumed that the scales were measuring the same thing.

Similarly, Meunier and Rule (1967) found high test-anxious students, as measured by the Test Anxiety Scale, to be more susceptible to persuasion, that is, more conforming. Attempts in the Meunier and Rule study to find a consistent correlation between students' level of confidence in their own judgment and subsequent level of conformity were unsuccessful. While low test-anxious persons' behavior was consistent with their confidence level (conforming more when confidence in their own judgment was low), this was not so for high test-anxious subjects whose behavior, while more conforming to others' judgments, was not at all consistent with their own level of confidence in their judgment.

Rule and Sandilands (1969) further investigating factors in conformity, duplicated the procedures of Meunier and Rule (1967), but included one additional variable-level of commitment. Commitment was manipulated by in-

forming half of the subjects that at the conclusion of the experiment, they would spend five minutes discussing their judgments for each trial with other persons (high commitment condition). Low commitment subjects did not receive these instructions. Their findings supported the earlier Meunier and Rule results that confidence change, produced by three different feedback conditions, was not an important mediator of the differential effects of test anxiety on conformity, though in both studies low test-anxious subjects were more confident than were high test-anxious subjects. Especially interesting, in the Rule and Sandilands study, was the finding regarding commitment. Based on the earlier Meunier and Rule study, Rule and Sandilands hypothesized that social components in the situation might be more important than originally thought. Public commitment appeared to them to be a social factor that could increase evaluative anxiety and elucidate the relevance of social responsiveness to test anxiety level. The high commitment group was informed that after the experiment they would discuss their judgments on the trials with others. All subjects received data sheets which not only allowed space for their response, but reported faked responses of eight previous subjects so as to exert pressure to conform. Subjects also rated their confidence level on each judgment. There was a significant

disordinal interaction between anxiety and commitment with high anxious subjects conforming to a greater degree under high commitment than under low commitment and the reverse being true for low anxious subjects. The researchers suggested that an interpersonal evaluation component exists in test anxiety and that high anxious persons chose to conform in a situation where they expected to discuss their answers with others to avoid the negative evaluation which could be forthcoming if they differed from the group. The much wider spread between conformity scores for low test-anxious persons in the two commitment conditions was also opposite in direction. The researchers had expected low test-anxious persons to maintain their independence of judgment under both high and low commitment conditions, but this was obviously not the case. Low test-anxious subjects conformed to a significantly greater degree than high test anxious under low commitment and significantly less than high test-anxious persons under high commitment. Rule and Sandilands conjectured that low test-anxious persons have learned a mechanism for coping with anxiety-cheating and that they routinely copied the faked previous subject's answers under the low commitment conditions where they may have felt they could get away with it without having others find out. However, in the situation where they expected to discuss their answers with others, their mean conformity level decreased substantially.

Test Anxiety and Social Anxiety

Janis' (1955) conception of social anxiety involved shyness, fear of being criticized, and low self-confidence in personal relationships with others, suggesting a feeling of personal inadequacy on the part of those high in social anxiety. This construct involves some of the same affective components assumed to be operating in test anxiety. The low self-confidence element in test anxiety may come from comparison of one's intellectual abilities with others rather than various other types of inadequacies fantasized in social anxiety. But the personal inadequacy, fear of criticism, and comparison to others are elements common to conceptions of both of these types of anxiety, suggesting a high degree of relationship is likely to be found between test and social anxieties.

Watson and Friend (1969) reported a correlation of .6 between their Fear of Negative Evaluation Scale and Taylor's Manifest Anxiety Scale. The construct, Fear of Negative Evaluation, involved fear over loss of social approval, the expectation that others would evaluate one negatively, and concern about revealing one's inferiority in an evaluative situation leading to avoidance of evaluative circumstances. It was expected to be operative in any social, evaluative situation, as for example, job interviews, conversations with one's superiors, etc.

Watson and Friend (1969) also reported that individuals high in fear of negative evaluation both became nervous in evaluative situations and worked harder to avoid disapproval or to seek social approval. They suggested that the threat of negative evaluation might encourage compliant, conforming or social approval-seeking behaviors in subjects high in fear of negative evaluation. This seems to be in accord with observed behavior of those high in test anxiety-the searching for social cues (Allen, 1966 and Crandall, 1967), the copying or modeling of the behavior of the experimenter (Sarason, Pederson & Nyman, 1968), I. Sarason & Ganzer, 1973, I. Sarason, 1975a), the ease of conditioning of negative self statements with experimenter approval (Sarason and Ganzer, 1962, 1963), Sarason and Harmatz, 1965).

Additionally, Watson and Friend (1969) found a significant positive correlation between fear of negative evaluation and defensiveness, and negative correlations between fear of negative evaluation and autonomy and dominance. They suggested that to be dominant or autonomous could open one to criticism, which is what is feared by the person scoring high on their scale of fear of negative evaluation. Dependence, passivity and self-criticism have already been noted as appearing in those high in anxiety in the literature previously reviewed.

Bearison (1976), studying anxiety and ability to coordinate social perspectives, found that under anxiety conditions, as compared to neutral conditions, subjects showed a decreased ability to coordinate social perspectives in the maintenance of social interaction. He explained this decrease in social cognition under state anxiety conditions as likely due to a regression to a less differentiated, more subjective level of cognitive functioning. Bearison cites examples of similar decreases in cognitive functioning with perceived anxiety reported by other researchers in impersonal, non-social contexts as well and hypothesized that "To the extent that the construction of knowledge of objects and impersonal events and knowledge of people and social relations are mediated by similar cognitive structures, knowledge within either domain will vary as a function of perceived anxiety" (Bearison, 1976, p. 313).

Anxiety and Personal or Impersonal Reinforcement

In a study of the effects of manifest anxiety and personal or impersonal reinforcement on discrimination learning, Horowitz and Armentrout (1965) reported that high anxious children, as defined by the Children's Manifest Anxiety Scale, tended to perform better under personal reinforcement (a verbal statement of "right" by the experimenter) than when a buzzer informed them that their responses were correct. For their low anxiety counterparts there tended to be no difference related to these two reinforcement conditions except in one problem-solving situation where the low anxious children performed better under the buzzer reinforcement. In both instances the results were statistically non-significant but the data did show a consistent trend. The researchers suggested that the Children's Manifest Anxiety Scale may contain more affiliative items than a test anxiety scale and therefore may distinguish as high anxious those children who exhibit more need for reassurance, thus producing the relationship between anxiety and personal reinforcement . Since a number of investigations, using other measures of anxiety, also suggest similar findings concerning a relationship between anxiety and proneness toward social/interpersonal styles of learning, it is possible that this behavior is a characteristic not

of the scale, but of high anxious persons in the evaluative situation. This hypothesis will be one of those tested in this research.

The studies reviewed so far suggest the fear of evaluation by others is an important component of test anxiety. They suggest that high test-anxious persons would therefore be more likely to attend to social/interpersonal cues in their environment than those scoring low on test anxiety measures in an attempt to reduce their anxiety.

This social influence is an even more important variable when subjects are emotionally aroused (Walters, Marshall & Shooter, 1960, Walters & Ray, 1960 and Bandura & Walters, 1963). Bandura and Walters (1963) suggest that a "moderate degree of arousal results in a restriction of attention to salient environmental events"; they warn, however, that extreme emotional arousal might result in either irrelevant, or an insufficient number of, cues being attended to thereby resulting in a disruption of the learning process (Bandura & Walters, 1963, pp. 10-11). This interpretation seems to explain Potter's (1974) findings that high anxiety, though not the highest, resulted in more hand raising and seeking teacher contacts during seatwork in a classroom setting.

Anxiety and Social-Interpersonal Cues

Early suggestions that high test-anxious scorers might be more sensitive to personal cues or nuances in situations involving evaluation came from verbal conditioning studies such as those by I. Sarason and Ganzer (1962, 1963) where subjects with high test-anxiety scores increased the frequency of emission of negative self references to a greater degree when reinforced that did low test-anxious scorers. Additional indications of this responsivity was noted in a study by I. Sarason and Harmatz (1965) where high anxious subjects were more strongly and favorably affected by the utterance of "good" by the experimenter than low anxious subjects.

These findings suggested to Sarason and his associates that test anxiety "may contribute to increased vigilance with regard to possibly helpful cues in the environment" (I. Sarason, Pederson & Nyman, 1968, p. 496), and that high test anxious subjects might be "relatively more interested and active in attending to cues and in 'borrowing' behaviors and attitudes from models" (I. Sarason, et al, 1968, p. 497).

In a verbal learning study involving seven conditions where it was possible to compare the reactions of groups who differed in test anxiety, Sarason, Pederson and Nyman

(1968) found that for the most difficult items of a second list, under the modeling cue condition, the high and middle test-anxiety groups performed at a superior level to the low test-anxiety group. They conjectured that this higher performance of the former groups was most likely due to their more active cue seeking which allowed them to improve more in moving from the first list to the second.

In the Rating Condition of this same study, subjects were given one task-to observe specific aspects of the behavior of the model. An "optional, irrelevant task" was attention to the material the model was working on. Later in performing on this same material, the high test anxious scoring group had larger gain scores than the middle and low test-anxious scoring groups, corroborating the earlier hypothesis that task-irrelevant responses would be more likely among the higher rather than the lower test-anxious groups. The researchers concluded that the "personality variable of test anxiety may be related importantly to the impact the opportunity to observe another person exerts on one's own behavior" (Sarason, et al., 1968, p. 509).

I. Sarason (1972a) conducted two experiments in which subjects differing in test anxiety performed on a verbal learning task after observing models. In both experiments low test-anxious students performed better than those high

in anxiety. In a condition where the model was "failed" in accord with the experimental plan, high test-anxious students performed more poorly than they did when observing a self-derogating model. The middle anxious group did about as well under both conditions, while the low test-anxious group performed significantly better after observing the failed model. Sarason notes that observing one derogate himself and observing one given a poor rating by the "authority figure" can have a different effect on students with differing levels of test anxiety. The evaluative cues, Sarason interprets, appeared to motivate those low in test anxiety to perform better, while for the highly anxious students, these same cues appeared to be threatening and were a debilitating factor in performance (I. Sarason, 1972a).

In a study of delinquent boys, I. Sarason and Ganzer (1973) attempted to change behavior of institutionalized juvenile delinquents by modeling or discussion methods. They found that, while both treatment groups contributed to reduced recividism more than a comparable control group, high anxious persons within the modeling group were more positively affected than their low anxious counterparts. Sarason and Ganzer suggested that high anxious persons are "more sensitive to cues provided by the behavior of others (models) than are low anxiety persons" (I. Sarason & Gan-

zer, 1973, p. 449). When a stressful element was introduced into the situation (televised feedback of their own performance which allowed the delinquents to compare their own performance to that of the model's), the advantages of the high anxious delinquents disappeared. This type of finding, the attenuation of performance under more than optimal arousal, already has been noted (Bandura & Walters, 1963, Potter, 1964). More research seems needed to try to specify the kind of interactions among treatments and state or trait characteristics of the persons.

Exposure to a model displaying adaptive coping behaviors in an evaluative situation seemed to facilitate performance for high anxious learners significantly more than for low anxious ones (I. Sarason, 1975a). The five conditions in this study included a coping, anxious model; a noncoping, anxious model; a low anxious model; a neutral model and a control group. The coping model indicated to observers that she experienced anxiety and tension similar to that experienced by the high anxious observer, but actively coped with it, ostensibly overcoming the difficulty by performing successfully on the task at hand. The non-coping anxious model did not overcome the admitted anxiety and therefore did not perform well on the task. Whereas low anxious subjects have been frequently found

to perform better in an experimental task involving difficult verbal learning materials (and the overall mean of this study's low test-anxious group was also higher than the overall mean for the high test-anxious group, the performance mean for the high test-anxious group exposed to the coping model was significantly higher than the means for the other high test-anxious groups and, additionally, was also higher than all of the low test-anxious group means as well. This strongly suggests the receptivity or sensitivity of high test-anxious persons to modeled cues involving effective coping with evaluative stress.

While these findings involved only the neutral instructions condition, Sarason further compared neutral instructions with achievement-oriented instructions. Typically, as reported earlier, achievement-oriented instructions have contributed to lowering the score of high anxious persons. In this study Sarason found comparable levels of performance under achievement-oriented instructions for the high and low anxiety groups under the coping model condition. Under all other conditions, high anxiety scorers performed more poorly than low when achievement-oriented instructions were administered. These results suggest quite strongly the differential ability of high anxious learners to profit from personally mediated assistance. This study was somewhat different from other studies of

anxiety and modeling in that cues specific to the task were not modeled. The facilitating factor could have only been the effective coping techniques of the model, since no task cues were given.

Additionally important was the differential effect of condition on low and high test-anxiety scorers. The low scorers showed little difference under any of the conditions, while high test-anxiety scorers performed significantly more poorly than both the low anxious, and in comparison to themselves, under all conditions other than the coping model one.

In an earlier study of test anxiety and cognitive modeling, Sarason (1973) provided more task-specific cues and found that for a difficult anagram solving task, persons high in anxiety appeared to be differentially helped by verbalizations by the model such as "I want to be sure not to let myself get stuck on one approach to the letter combinations" (Sarason, 1973b, p. 59). These findings were apparent in a condition where the model also made explicit the processes by which the correct response was arrived at.

The modeling studies, taken as a whole, suggest that exposure to task-oriented models who direct attention to the task via cognitive structuring clues is facilitating

to the high test-anxious observer's performance. Awareness that the model is successfully performing although coping with test anxiety concerns similar to those that the observer feels is additionally beneficial to high test-anxious persons.

Sarason, Kestenbaum and Smith (1972) sought to define some of the different types of conditions or situations that appeared to serve as stimuli for task-interfering responses in high test-anxious individuals. In a study of high and low test-anxious students (defined by scores on Sarason's Test Anxiety Scale, 1961), Sarason, et al. structured two types of interviews prior to presenting a learning task consisting of a list of 3 letter nonsense syllables to be learned via the serial anticipation method. The first interview condition involved discussion of the students' attitudes toward, and experiences with, test taking and being graded (Test Anxiety Interview). The second interview condition discussion was on life at the university, avoiding all talk of tests, grading or related anxieties (Campus Interview). A third group served as a control and received no interview prior to the learning task. Two sets of instructions, achievement-oriented or neutral were also manipulated.

The interview variable had a significant effect both by itself and in interaction with test anxiety. The Campus

Interview had a positive effect on task performance regardless of level of test anxiety, but had its strongest effect on high test-anxious subjects in the neutral instructions group. The researchers suggested that this effect seemed due to the development of rapport between the experimenter and the high test-anxious subject, reducing anxiety and facilitating concentration on the subsequent task. High test-anxious subjects in the Test Anxiety Interview condition performed more poorly than high test-anxious subjects in other conditions and also more poorly than low test-anxious persons in the same interview condition. Sarason, et al. suggested that talking about their evaluative anxieties served as a cue for arousal of anxiety responses that remained even after the interview and affected the following task performance in a debilitative manner. In conclusion, Sarason, et al. suggested that:

> "self-described high test anxious persons are a particular type of cue-seekers. They search the environment for stimuli that connote or imply evaluation of their achievements. However, they also search the environment for reassuring cues, cues that are anxiety-allaying. This experiment supports the view that persons high in test anxiety differ from others in their attentiveness to certain types of environmental events. Depending upon the stimuli and their reactions to these events, high test anxious individuals may perform either well or poorly" (Sarason, Kestenbaum & Smith, 1972, p. 248).

Ruble and Nakamura (1972) examined the performance of children differing in field dependence-independence on two experimental tasks. The first task - the squares - was a concept identification task and the second - two object assembly tasks, puzzles similar to those on the Wechsler Intelligence Scale for Children (Wechsler, 1949). Field dependence-independence was measured by the Gerard rod-and-frame test (Gerard, 1969), a portable version of Witkin's test which correlates .89 with the Witkin version.

While children were working on the first puzzle, the experimenter timed their performance and recorded the number of times they glanced away. Additionally for subjects in the experimental group, the experimenter quickly assembled the second puzzle, left it in view for 15 seconds and then took it apart, leaving the pieces in view for 15 seconds further. It was also noted whether the children's glances were directed at the experimenter, at the puzzle, or at both. This procedure was repeated until the child completed the puzzle or for three minutes. The child was then given the second puzzle to do.

On the other task the children had to figure out which square was correct for each of three blocks of trials; color, size and position varied over trials. During the first block of trials a social cue and a task stimulus dimension

were redundant; in the second block the social cue was the correct answer, and in the third block the small square was the answer with no relevant social cue existing. The social cue consisted of the experimenter looking at and leaning slightly toward the correct card. During the first block, the subject could have gotten the correct answer by attending either to the social cue or the task dimension. During the second block the social cue was the only cue relevant to the correct answer, and during the third block there was no relevant social cue so the child had to attend to the task dimension in order to get a correct response.

Field-independent children scored higher in both object assembly and squares task, corroborating results often found in such research. There were differences in the responsivity to social cues with field-dependent students glancing off task more than field-independent students. An interesting finding was that in the squares task the means for the field-dependent and field-independent children's scores reversed from the second block to the third block. That is, the field-dependent children tended to do better, though not significantly better, when the social cue was relevant, as it was in block two, than under the condition where there was no social cue and only the task dimension cue was available. On the other hand, the opposite occured

with the field-independent children. They performed better when only the task dimension cue was relevant.

Examining between task differences, the social cue given alone during the second block of the squares task was more relevant to field-dependent children than the cues given during the object assembly tasks. The researchers believed the reason for this difference was that the cue for the squares task required the child to be watching the experimenter's face, whereas in the object assembly tasks, the cue came from watching the puzzle that the experimenter was putting together. Apparently the more socially oriented, field-dependent child was more likely to watch a person's face rather than his/her hands doing the puzzle.

Ruble and Nakamura (1972) suggested that field-dependent children may learn better in situations involving relevant social cues. It may be, that instead of the usual conclusion that field-independent students are more effective learners, that an aptitude treatment interaction exists where one cognitive style would be more facilitative to learning in certain types of learning situations and the other style more effective in other types.

While this study dealt with children labeled field-dependent, it is reported here because of the frequently

reported positive correlation of anxiety and dependence (Kirkland, 1971, Hill, 1972) and the similarities often noted between characteristics of high anxious and field-dependent persons in learning situations.

To summarize, it appears that under varied learning conditions social-interpersonal cues in the learning environment have been differentially attended to by high and low anxious learners and when these cues are task-relevant the performance differential generally noted between high and low anxious learners has been often attenuated.

This research will attempt, by manipulating task cues, to examine whether the provision of social-interpersonal cues will enable high anxious learners to perform more effectively on a cognitive task relative to their low anxious counterparts.

Hypotheses

In general an interaction between stress and anxiety is expected such that:

1) Under the stress condition high anxious students will perform more effectively than those lower in anxiety where social cues alone relevant to task solution are available.

2) Under the stress condition low anxious students will out-perform their high anxious counterparts where task cues alone exist.

3) Under the no stress condition little or no difference in performance is expected as a result of anxiety level.

A corollary hypothesis is that high anxious students will perform more effectively when social cues alone are present than when task cues alone are present.

CHAPTER III
Method

Design

The experiment used a 2 (sex) by 2 (stress) design. Three measures of anxiety were administered to all subjects; two were trait measures completed several weeks prior to the experimental situation, and one was a brief state measure administered just prior to experimental task performance. Each subject performed the experimental task under all three cue conditions (social and task cue redundant, social cue only, task cue only) with the order of the social and task cue conditions randomly alternated.

Subjects were randomly assigned to one of the two experimental conditions: stress or non stress. Experimental instructions for the two groups are detailed in the procedure section.

Subjects

The 127 subjects in this study were drawn from 13 classes of 5th and 6th grades in two elementary schools located in a middle to upper-middle class suburb of New York City. A letter requesting permission from parents of all children in these grades to participate in the study was sent home with the students. Students and parents were informed in this letter of the general nature of the experiment and told that confidentiality of responses

would be protected, also that students might withdraw at any point during the course of the experiment should they so desire. Of 345 letters, 225 were returned, 148 granting permissions, 77 denying permission; no response was received from 120 parents. Teachers were asked whether they noted a difference among refusal, acceptance and no-response groups on a number of factors: parents socio-economic or educational level, cooperation of parents or children, anxiety level of parents or children, achievement level of children. All replied in the negative, some expressing surprise at many of the refusals and some of the acceptances.

Of the 148 potential subjects, 18 children were utilized in the pilot study, 1 moved, and two were absent for prolonged periods of time during the course of the study, leaving 127 subjects on whom complete data was obtained.

Instrumentation and Apparatus

Test Anxiety Scale for Children

One measure of anxiety used was the Test Anxiety Scale for Children (Sarason, Davidson, Lighthall & Waite, 1958b). This measure, specific to the situation under study, was selected because it has been demonstrated by a number of researchers (Endler & Hunt, 1963, Kendall, 1978, I. Sarason, 1957, 1963, Alpert & Haber, 1960) that an anxiety scale more similar in content to the specific situation has better predictive validity for that situation than a measure of general anxiety.

The Test Anxiety Scale for Children was developed as part of a longitudinal research study concerned with the development of anxiety in children, and was intended for use with children in grades one through six (Sarason, Davidson, Lighthall & Waite, 1958b). It was initially made up of 43 items concerned with "attitudes toward and experiences in test and test-like situation" (Sarason, et al, 1958b, p. 105). The items were based on Freud's three criteria of the anxious reactions: unpleasantness, phsyiological concomitants and conscious awareness of anxiety.

Test-retest reliability over a two month interval was determined to be .71 over all grades. Grades 2, 4 and 5 had reliability figures on test-retest of .76 to .82.

Grade 3 reliability was .44, lowering the average over all grades to .71 as a result of one subject whose score (test = 1, retest = 41) skewed the mean of the 54 subjects considerably. Split half reliability, corrected by the Spearman-Brown formula, is from .820 to .899 for grades 2 through 5 (Sarason, et al, 1958b).

The Test Anxiety Scale for Children has been factor analyzed by Feld and Lewis (1967) using second grade children as subjects, and Dunn (1965) using fourth, fifth, seventh and ninth grade subjects. The four factors isolated by these two investigations were test anxiety, somatic signs of anxiety, negative self-evaluation, and remote school concerns.

Cross cultural study of anxiety among American and English school children (Sarnoff, Lighthall, Waite, Davidson & Sarason, 1958) confirmed that test anxiety, and not general anxiety, increased as grade level increased. This is encouraging evidence for the difference in type of anxiety measured by the Test Anxiety and the General Anxiety scales, and is also encouraging as a measure of the validity of the test anxiety construct.

Research on the test anxiety construct has also demonstrated that it correlates positively with teacher ratings (S.B. Sarason, et al, 1958b) and that both IQ and achievement are negatively correlated with test anxiety (Gaudry & Spielberger, 1971, Spielberger, 1962, Spielberger & Katzenmeyer, 1959, Hill and S.B. Sarason, 1966, Lunneborg, 1964, S.B. Sarason, Davidson, Lighthall, Waite & Ruebush, 1960, S.B. Sarason, Hill and Zimbardo, 1964), lending additional support to the conclusion that test anxiety is both a measurable and a meaningful variable.

The shortened form of the Test Anxiety Scale, consisting of 30 questions plus 11 Lie Scale questions was used (See Appendix A for test and instructions). The authors have indicated that there are no differences between the longer and shorter form in the direction or degree of correlation with various criteria (S.B. Sarason, et al, 1960).

The only changes on the Test Anxiety Scale for Children in this administration were those referring to the sex of the teacher as female. Since this reference was both inaccurate (approximately half of the grade 5 and 6 teachers were male) and outdated, the female pronouns were changed to he/she, her/him when referring to the teacher. It is believed that the meaning of the questions remained intact.

Although the true-false paper and pencil test has likely been used so heavily because of its convenience, reservations about these anxiety scales has been expressed by many researchers using them including I.G. Sarason (1960) and S.B. Sarason (1966). I.G. Sarason notes that these scales measure, "the extent to which an individual is willing to admit to experiencing anxiety in certain situations", but that high scores may also be obtained because of tendencies to be particularly frank, particularly perceptive of one's own reactions, or particularly willing to attribute "bad" characteristics to oneself (I. Sarason, 1960, p. 409). Low scores, Sarason notes, may be obtained because of defensiveness, test-taking attitudes, and tentency to respond in a socially desirable direction, as well as because of low anxiety.

On the other hand, recent comprehensive reviews of personality assessment by Mischel (1968, 1971) have compared self reports by persons with projective tests and expert's clinical judgments and generally found no evidence for superior validity of projective measures or clinical judgement when the self report measures were administered with attention to encouraging truthfulness on the part of the self reporter.

Additionally the Test Anxiety Scale for Children has been found to correlate significantly with teacher ratings

in a study of over 2,000 second to fifth grade children in two school systems in Connecticut (Sarason, et al., 1960).

Children's Manifest Anxiety Scale

The Children's Manifest Anxiety Scale, developed by Castaneda, McCandless, and Palermo (1956), an adaptation of the Taylor Manifest Anxiety Scale (Taylor, 1953) intended for use with upper elementary school children was also administered (Appendix B). The Children's Manifest Anxiety Scale has been included along with the Test Anxiety Scale for Children to test the possibility raised by Horowitz and Armentrout (1965) that there may be more affiliative items on the Manifest Anxiety Scale than on the Test Anxiety Scale and therefore the former may distinguish as high anxious those children who exhibit more need for reassurance, thus accounting for the correlation between anxiety and personal reinforcement found in their study.

Like the Taylor scale the Children's Manifest Anxiety Scale is a trait anxiety measure, and has been grouped by Phillips (1971) into five categories which roughly agree with the categories of the Taylor scale, that is "(1) physiological disorders, (2) general emotionality, (3) the direct admission of worry or nervousness, (4) physiological stress, and (5) self-consciousness and self-confidence" (Phillips, 1971, p. 20).

The scale consists of 42 items on anxiety and 11 items which are intended to provide an index of childrens' tendency to deny or falsify anxious feelings.

Worry-Emotionality Questionnaire

In the several factor analyses of Mandler and Sarason's Test Anxiety Questionnaire by various techniques, two classes of factors have seemed to emerge. Liebert and Morris categorized these two factors as Worry and Emotionality. Worry is that component of anxiety dealing with cognitive concern about one's performance, lack of confidence in, and concern about the negative consequences of one's performance, while Emotionality refers to the physiological and affective(autonomic) components related to the stress of the testing situation.

Employing this worry-emotionality distinction, Liebert and Morris devised a 10 item scale (5 worry items, 5 emotionality items) based on items from the Test Anxiety Questionnaire. Items were classifed Worry (cognitive concern) or Emotionality (autonomic arousal) separately by the authors and only those items on which they agreed were considered for inclusion. Subjects responded to the 10 items on a 5 point scale of intensity. The two subscales (Worry and Emotionality) are scored separately.

Several studies of the relationship of worry and emotionality to test performance under varied conditions confirmed the authors' hypotheses that worry is more highly negatively related to intellectual performance than emotionality and that worry varies inversely with expectancy but

emotionality is unrelated to expectancy (Morris & Liebert, 1969, 1970, 1973).

Morris and Fulmer (1976) note that while the prime value of this brief scale is its easy application during actual testing situations, it appears also to have "moderately high reliability (coefficient alpha = .79-.99)" (Morris & Fulmer, 1976, p. 819).

The Worry-Emotionality Questionnaire was administered as a state anxiety check following administration of instructions but prior to experimental task performance. This was intended to serve two purposes: to check on the effectiveness of stress instructions, and to allow for examination of the difference between this state anxiety measure and the more trait like measures (Test Anxiety Scale for Children and Children's Manifest Anxiety Scale) in relationship to a learning task. Appendix C includes a copy of this scale.

Experimental Task

The experimental task chosen was a concept identification task similar to that used by Ruble and Nakamura (1972). The subject's task was to figure out which square was correct for each of three blocks of trials. A new block of trials began upon reaching a criterion of five correct responses in a row. Color, size and position of the squares varied over trials. The same color or size did not appear in the same position more than twice in a row. In the first block of trials, both a social cue and a task stimulus dimension (the size of the square) were redundant. The second block was either the social cue block or the task cue block. The social cue consisted of the experimenter repeatedly looking at and leaning very slightly toward the card containing the correct square.

During the first block of trials (the redundant cue condition) the largest square was correct. The subject, could be successful by either attending to the task dimension (size) or to the social cue. However, during the social cue block of trials the correct answer was randomized over the size of the squares, therefore only the social cue was relevant in determining the correct response. During the task cue block of trials there was no relevant social cue and the subject had to pay attention to the task dimension only in order to select the correct answer.

A pilot study was conducted in two parts. 18 subjects, drawn from the same population were utilized. Although 10 subjects were initially planned, results from the first 8 completing the Worry-Emotionality Scale and the three cue conditions indicated that too large a percentage of subjects did not obtain the concept (especially in the social cue condition which appeared to be the most difficult) in 20 trials, the number of trials used by Ruble and Nakamura (1972) as their upper limit and initially proposed for this study. It appeared as if the addition of the equipment for responding and feedback contributed to the difficulty level of the task. It was, therefore, decided to incrase the maximum number of trials to criterion from 20 to unlimited. Changes were also made in instructions to try to simplify the task. In switching from one cue block to another, the children were informed "Now we shall play the game with different rules." To further suggest the difference among the three blocks, a new set of cards was used for each block. This new set, although identical in all aspects salient to the concept formation, i.e. size, position and color of the squares, differed in the background color on which the squares were placed. 10 subjects were then run under the revised conditions. The results suggested that the tasks were different from each other and that the changes from the initial instructions to the final ones were more appropriate for this research.

Experimental Task Apparatus

In the original Ruble and Nakamura (1972) task the students were informed of the correctness of their response by verbal feedback from the experimenter. Since it was felt that feedback from the experimenter might be a form of reinforcement differing in effectiveness across the range of anxiety scores and hence not allow for clear interpretation of the results, it was decided to provide feedback that minimized interpersonal elements.

The equipment consisted of three boxes and a foot pedal control. The three boxes were visible to the subject, the control was not. The only box with which the child had direct contact was the selector box, which had three buttons labeled 1, 2, 3, one of which the subject pressed each trial to indicate which card was guessed as being correct.

A second box, the feedback box, contained three sets of two small lights, red and green, also labeled 1, 2, 3. These lights informed the subject whether or not the selected response was correct (green) or incorrect (red).

The third piece of the equipment, placed further away from the subject, though in view, housed electronic parts facilitating the necessary operation of the equipment. Although it clicked periodically, it was unnecessary for the child to attend to it to complete the task.

The fourth part of the system was a series of 3 foot pedals, placed under the desk, hidden from view of the subject by the wooden skirt of the desk. This allowed the experimenter to determine which feedback light would be displayed in response to the child's answer without the child being aware of the experimenter's control of the feedback. With practice the experimenter could smoothly and inconspicuously operate the foot pedals. No child voiced suspicion that the feedback to their response came from other than the machine. In fact, several commented on the "computer" that had the answers.

Procedure

The two anxiety scales (Test Anxiety Scale for Children, Children's Manifest Anxiety Scale) were administered as a group test by the experimenter several weeks prior to the individual administration of the concept formation task. Children completed the questionnaires in groups of 25 to 30.

In order to enlist cooperation and encourage truthfulness, a brief discussion of scientific research and the general nature of this study preceeded the administration of the two anxiety scales. The children were then told that no one "not your teacher, your parents, your principal or your friends" would see your answers to these questions" and that answers would not be recorded anywhere "not on your school record or report card." They were further assured that when their scores were tallied, each paper would be given only an identification number and that their names would be removed. The children were additionally informed that the interest of this research was primarily in how children learn, to see if children, "not you individually, but most children who think and feel a certain way learn more like others who feel that way."

The experimental task was administered several weeks after this by two assistant experimenters, both female college students who were trained by the senior experimenter. For the first day they alternated administering the experi-

mental task and observing each other, attempting to perform their role as similarly as possible. These experimenters were uninformed of the children's IQ and scores obtained on the group administered anxiety scales.

For the concept formation (experimental) task, all subjects were called for at their classroom by one of the assistant experimenters who then brought them to the experimental room where they were seated at a small table adjacent to a desk at which the experimenter sat facing them. The walk to the room and the procedure were conducted with a minimum of other interaction with the child. Maintenance of a netural, detached, though not unpleasant manner was attempted and extraneous conversation was discouraged.

In order to further minimize possible inter-experimenter differences, the following precautions were taken: alternation by both experimenters of stress and non-stress conditions, subjects seen in alternating order by grade level and sex, and the sequence of administration of task and social cues was also alternated by each experimenter. Additionally experimentation at one school continued until completed and then began at the second school with approximately half of the subjects at each school being tested by each experimenter.

Concern that children already tested might discuss features of the task with those yet to be tested appears

not to have been a factor since trials to criterion did not decrease for later subjects from the beginning of testing in one class or building to the completion.

After the subjects were brought to the room and seated they were shown the cards for the experimental task. These cards were in three piles of 20 each. The directions to the student were modeled after those of Ruble and Nakamura (1972) but differed primarily in that those researchers used a verbal type of feedback, the word "right" rather than the lights. Directions were as follows:

> Here are three squares. Each time I show you the squares, one is right and the other two are wrong. Your job is to figure out which one is right. Each time I show you the squares you are to press the light above the number of the square which is right (the presser lights in front of the child were pointed to by the experimenter).
> If you are correct, the light on this box (the feedback box was pointed to by the experimenter) will be green (this was demonstrated by having the child press a designated button). If you make a wrong choice, the light on this box will be red (also demonstrated in the same way). You may push only 1 button each time. Do you understand?

If the child gave indication of not understanding, the directions were repeated.

The Liebert-Morris Worry-Emotionality Scale was administered at this point for the non-stress subjects. The experimenter placed the completed scale face down after completion so as to remain blind to the anxiety level indicated by this scale until after the completion of the task.

For the stress condition, the following instructions were added pre task:

> Children who do well on this test usually do well in Junior High School, and I will be able to tell from your scores if you are likely to do well in Junior High School. So pay close attention and try your very hardest.

A timer was then set for a time somewhat beyond the time necessary for task completion. This fact was not known, however, by the subject, who only noted the existence of a timer which was set to add to the stress experienced by the subject.

The Liebert Morris Worry-Emotionality Scale was administered for the stress group at this time, and the same task procedure was then followed.

The cards for the experimental task were then shown to the subject three at a time, each set of three representing the three sizes of squares. They were in three piles of 20 each and were turned over one at a time across the three piles. When more than 20 trials were necessary for the concept to be obtained, the cards were repeated from the beginning. As noted earlier, to further suggest that the three conditions were different from each other, the colors of the background of the cards were different in each condition.

At the end of the task children were thanked for their cooperation: those in the stress condition were told that they had done very well.

At the completion of the experimental procedures for all children, the experimenter visited the classes involved and explained the hypotheses being tested, the procedures involved, and answered questions raised by the students, promissing to share the results in the fall.

CHAPTER IV

Results

The results will include the findings from multiple regression analyses testing the three formal hypotheses. In addition, the results of a multivariate regression analysis and several supplementary data analyses will be presented. These will be preceded by descriptive data.

Table 1 presents the means and standard deviations of all variables by treatment condition (stress or non-stress). Because sex frequently proved to be a mediating variable in prior anxiety research, Table 2 presents the means and standard deviations of all variables by sex within the treatment conditions. Table 3 presents the correlations among anxiety scales and between anxiety scales and dependent variables. An overall intercorrelation matrix is included in Appendix E. Intercorrelations between the anxiety measures and each of the dependent tasks by sex and stress condition are included in Appendix F.

Table 1

Means and Standard Deviations by Stress Condition on a Number of Variables

Variables	All Subjects (N=127, females = 57)		Stress (N=65, females=29)		Non-Stress (N=62, females = 27)	
	Mean	Stand. Dev.	Mean	Stand. Dev.	Mean	Stand. Dev.
IQ(1)	110.45	11.96	111.44	12.01	109.4	11.92
Test Anxiety Scale for Children(2)	11.39	6.97	11.37	7.51	11.42	6.42
Test Anxiety Lie Scale(3)	2.56	2.19	2.51	2.41	2.61	1.97
Children's Manifest Anxiety Scale (4)	19.17	8.3	19.91	9.15	18.4	7.30
Children's Manifest Anxiety Lie Scale(3)	2.18	2.19	2.12	2.13	2.24	2.27
Worry	10.17	3.88	11.66	3.71	9.71	3.83
Emotionality	8.58	3.94	9.45	4.58	7.68	2.90
Redundant Cues(4)	19.66	19.05	20.9	20.26	18.37	17.78
Social Cues(4)	34.42	30.75	31.4	29.01	37.63	32.41
Task Cues(4)	21.5	22.65	20.7	20.08	22.32	25.21

(1)Obtained from group Otis Lennon administered in grade 5.

(2)Raw score - number of anxious responses.

(3)Raw score - number of universal anxiety responses denied.

(4)Number of trials to criterion (the lower the score the better the performance).

Table 2

Means and Standard Deviations by Sex and Stress on a Number of Variables

Variables	Female Stress (N=29)		Female Non-Stress (N=27)		Male Stress (N=36)		Male Non-Stress (N=35)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
I.Q.	113.41	12.83	113.78	12.61	109.86	11.24	106.03	10.31
TASC [1]	12.97	7.86	10.81	6.44	10.08	7.06	11.89	6.46
TASCLIE [2]	2.41	2.64	3.04	2.14	2.58	2.23	2.29	1.79
Worry	11.17	3.70	9.26	2.81	12.06	3.73	10.06	4.47
Emotionality	8.79	4.00	7.04	2.31	9.97	4.99	8.17	3.22
CMAS [3]	20.86	10.60	17.59	7.86	19.14	7.86	19.03	6.90
CMASLIE [4]	2.34	2.33	2.26	2.73	1.94	1.96	2.23	1.90
Redundant Cues	19.28	19.53	15.41	11.96	22.19	21.00	20.66	21.10
Social Cues	21.38	22.05	32.96	32.32	39.39	31.64	41.23	32.48
Task Cues	20.69	19.99	28.26	31.67	20.72	20.43	17.74	18.00

[1] Test Anxiety Scale for Children

[2] Test Anxiety Scale for Children Lie Scale

[3] Children's Manifest Anxiety Scale

[4] Children's Manifest Anxiety Scale Lie Scale

Table 3

Correlations among Anxiety Scales and Between Anxiety Scales and Dependent Variables

Variables	TASC	CMAS	Worry	Emotionality	Redundant Cues	Social Cues	Task Cues
TASC[1]	1.0	.71	.34	.41	.12	.04	-.02
CMAS[2]		1.0	.34	.37	.09	.16	.01
Worry			1.0	.54	.27	-.04	.10
Emotionality				1.0	.24	-.01	.07

[1]Test Anxiety Scale for Children

[2]Children's Manifest Anxiety Scale

Some descriptive data

Anxiety scores for this sample were similar to those reported in other studies (See Appendix D), although contrary to frequent findings in other anxiety research, female anxiety scores were not higher in this sample. While there were no significant differences between the sexes on any of the four anxiety measures administered, on the trait anxiety measures (Test Anxiety Scale for Children and Children's Manifest Anxiety Scale) females reported slightly higher anxiety than males, and on the state anxiety measures (Worry and Emotionality), males reported slightly higher anxiety levels.

Since the results will show that anxiety level was generally a stronger predictor of performance for females than for males, it is important to note both that the mean levels of anxiety for males and females were not significantly different and that IQ did not correlate significantly with performance or anxiety.

The mean IQ of the subjects in this study was 110, with a range from 86 to 147. Males obtained a slightly lower mean IQ 108, than females, 114, although the difference was not significant. This is a somewhat higher mean than the national mean of 100, but not surprising in a suburban community. It is also not unusual to obtain slightly higher IQ scores for elementary school age females than for males

of that age. The range and standard deviation (12) were similar for males and females; the standard deviation of 12 is lower than the national 15, but in a rather homogeneous population with respect to socio-economic and educational levels, this too, is not surprising.

Multiple Regression Analysis Procedure

The relationships between the performance variables (redundant cues, social cues and task cues) and the anxiety variables (Test Anxiety Scale for Children, Children's Manifest Anxiety Scale and the Worry-Emotionality Scale and stress condition) were analyzed using multiple linear regression analysis. In the technique employed (Cohen, 1968), the unique or independent variance contributed by each variable was first tested for significance. Since independent variables in a regression analysis tend to be correlated, the technique of successive partialing of the independent variables was employed.

A subject's group membership in the stress or non-stress condition was represented by a binary vector: stress was coded 1 and non-stress 0. Anxiety, I.Q. and the dependent performance measures were analyzed in raw score form. Interaction vectors between experimental variables and assigned variables were the simple products of the component vectors. Since prior research has often reported interactions between sex and anxiety, a binary sex vector was added, females being coded 0 and males 1.

In order to test for a curvilinear relationship between anxiety and performance, a quadratic term, anxiety scores squared, and the quadratic interaction term were added to the analyses. Since the quadratic terms did not

contribute significant additional variance, they were subsequently excluded from the analyses.

The signficance of performance differences attributable to experimenter or to sequence of task administration (redundant cues, task cues, social cues or redundant cues, social cues, task cues) were tested early in the procedure and found to be insignificant. These variables were, therefore, dropped from future analyses. The effect of IQ on task performance was also examined, individually and in interaction with each anxiety measure, for each of the three cue conditions and failed to contribute significant variance. This variable was, therefore, also dropped from later analyses.

Correlations among cue conditions were computed to determine if the task solutions called for different psychological processes for solution. Appendix G presents the intercorrelations among cue conditions. Appropriately both social cues and task cues had a low but positive correlation with redundant cues (.28 and .27 respectively) since there were elements of each of these cues in the redundant cue condition. Social cues and task cues correlated -.10 with each other, suggesting that they called upon different solution strategies by the learner.

Stress and Non-Stress Groups

Before examining the results of the individual hypotheses it is necessary to consider whether there was, in fact, a difference between the stress and non-stress conditions as perceived by the subjects. This was assessed by the state anxiety Worry-Emotionality Scale administered after the instructions for the task were given but prior to the subject's performance on these tasks. Regressing worry and emotionality on condition indicated a significant difference on each scale between the stress and non-stress group (WOrry, $F=8.51$, $p=.005$; Emotionality, $F=6.99$, $p=.01$). As seen in Table 1, the stress group had a mean worry scale of 11.66 as compared to the non-stress group mean of 9.71 and a mean of 9.45 on the Emotionality section as compared to the lower 7.68 mean for the non-stress group. It is clear, then, that the stress and non-stress groups were significantly different from each other with respect to Worry and Emotionality.

Selection of a Prime Measure of Anxiety

The Worry score was selected as the prime anxiety measure in testing the hypotheses. An examination of the relationship between the four anxiety measures and the three cue conditions by sex and stress reveals that neither of the trait measures (Test Anxiety Scale for Children, Children's Manifest Anxiety Scale) related significantly to any of the performance measures (See Appendix E,H,I,J,K for regression and correlation tables). The two state measures significantly predicated performance in a limited number of situations. Worry was a stronger predictor than Emotionality.

Spielberger (1972) supports the use of state measures by noting that a number of studies have found that while measures of trait anxiety provide information as to the likelihood of arousal of state anxiety, the arousal of anxiety in any particular learning situation has been better determined by state anxiety measures, and these measures have been more closely related to performance than the trait measures.

Where the other three anxiety measures provide useful information, they will be reported in a supplemental analysis.

Reliability of State Anxiety Scales

Reliability analyses of the Worry and Emotionality Scales were conducted using Cronbach's (1951) Coefficient Alpha procedure which examines the internal consistency of the scales. The coefficient alpha for Worry in this sample was .66 and for Emotionality .80. Morris and Fulmer (1976) report coefficient alpha correlations for the scales of .79 to .99.

Further, because one of the Emotionality items, upon reading, appeared to relate more closely to the Worry items than to the other Emotionality items, an item analysis of the two scales was also undertaken. The results of this analysis indicated that the most effective grouping of items was the one presented by its authors.

Hypothesis 1

Hypothesis 1 predicted that under the stress condition high anxious students would perform more effectively than those lower in anxiety where only social cues were relevant to task solution. This hypothesis was not confirmed. Table 4 presents the results of the multiple linear regression analysis of the effect of anxiety (Worry), stress condition and sex on performance with social cues. As can be seen from the table, none of the variables, singly or in interaction, accounted for a significant percent of the variance of social cues performance.

Table 4

Results of Multiple Linear Regression Analysis of the Effect of Anxiety (Worry) Stress and Sex on Performance with Social Cues

Source	r[1]	Regression Weight(2)	%Variance[3]	F
Worry	-.04	1.18	.002	.31
Stress	-.10	12.65	.002	.21
Sex	.22	28.36	.01	1.38
Worry x Stress	-	-2.37	.006	.81
Worry x Sex	-	-2.09	.006	.75
Stress x Sex	-	-30.65	.006	.77
Worry x Stress x Sex	-	3.86	.01	1.47

[1] correlation with performance on social cues

[2] constant = 22.06

[3] independent variance accounted for by effect

Hypothesis 2

Hypothesis 2 predicted that under the stress condition low anxious students would outperform their high anxious counterparts when only task cues were relevant. This hypothesis was confirmed. Table 5 presents the results of the multiple linear regression analysis of anxiety (worry), stress and sex on performance with task cues. Figure 2 depicts the nature of the worry x stress interaction, supporting the hypothesis that higher anxiety under stress would result in poorer performance on task cues. In all figures, the regression lines for the independent variables-anxiety measures - were generated by utilizing the mean anxiety score and one standard deviation above and below the mean as the three reference points for plotting the data. A negative result in testing for curvilinear relationships justifies the linear assumption and therefore this convention for plotting the regression lines.

Examination of figures 3, 4 and Table 6 indicate that male performance changed little with stress or degree of worry, while female performance was radically affected by those variables. Under stress females required more trials to solve the task as their level of worry increased (as hypothesized) while under non-stress conditions, the increase in level of worry corresponded to fewer trials required for task solution.

Table 5

Results of Multiple Linear Regression Analysis of the Effect of Anxiety (Worry), Stress and Sex on Performance with Task Cues

Source	r(1)	Regression Weight(2)	%Variance(3)	F
Worry	.10	-2.06	.01	1.81
Stress	-.04	-64.37	.08	10.57**
Sex	-.11	-35.63	.03	4.17
Worry x Stress	-	5.44	.06	8.21**
Worry x Sex	-	2.66	.02	2.32
Stress x Sex	-	71.63	.06	8.08**
Worry x Stress x Sex	-	-5.89	.05	6.55**

(1) correlation with performance on task cues

(2) constant = 47.33

(3) independent variance accounted for by effect

*p= < .05

**p= < .01

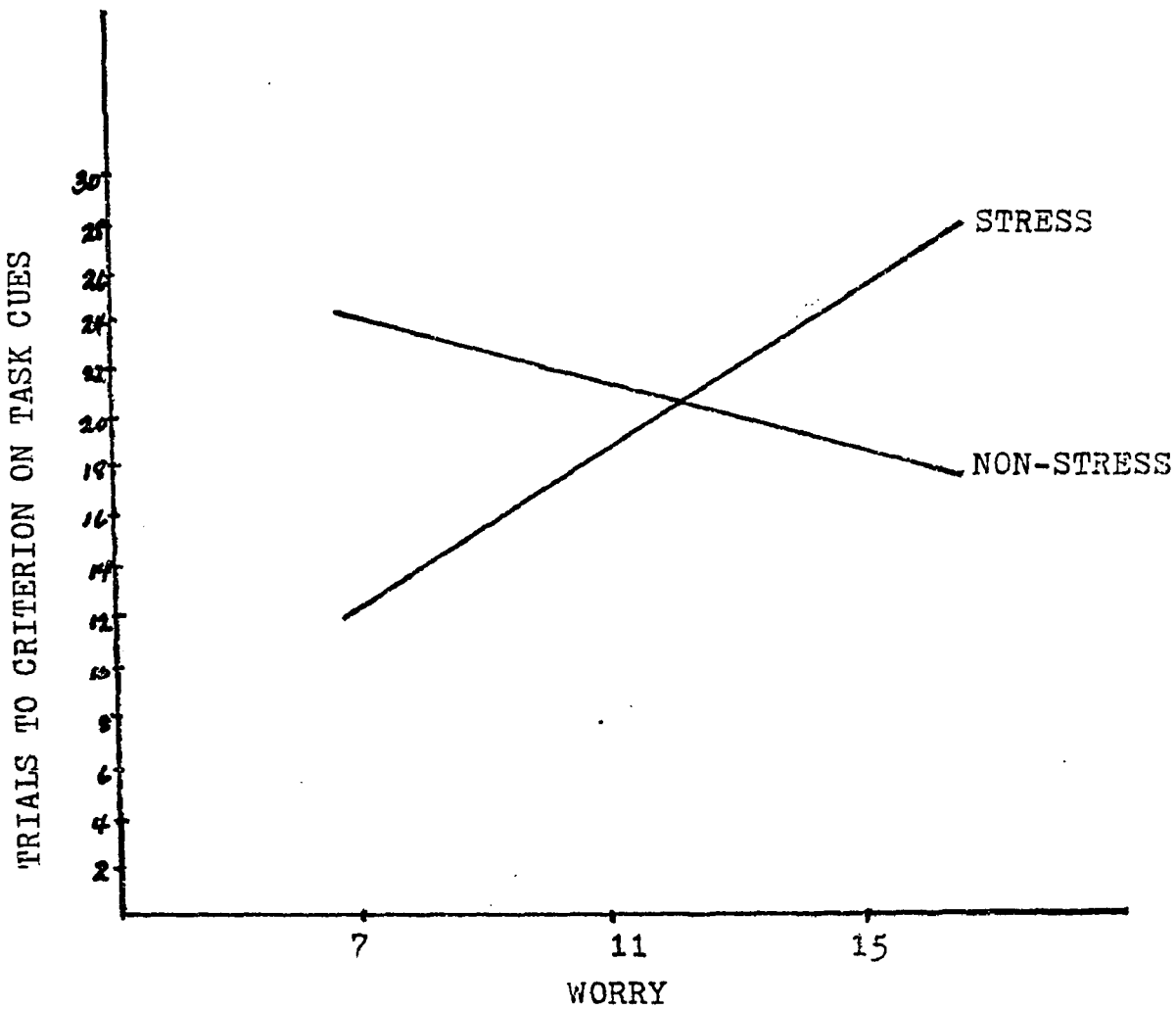


Figure 2. Interaction between Worry and stress on task cue performance.

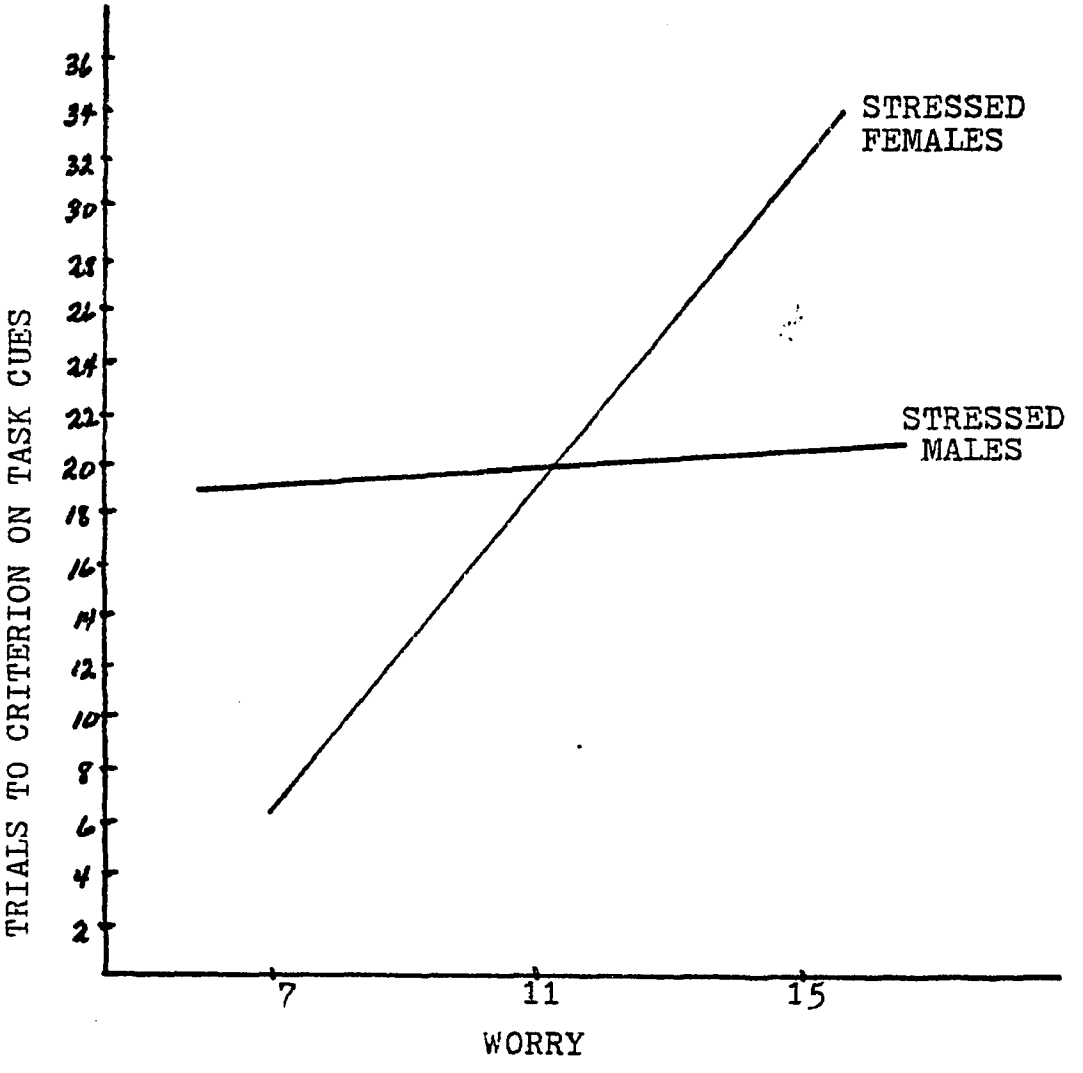


Figure 3. Interaction between Worry and sex on task cue performance under stress.

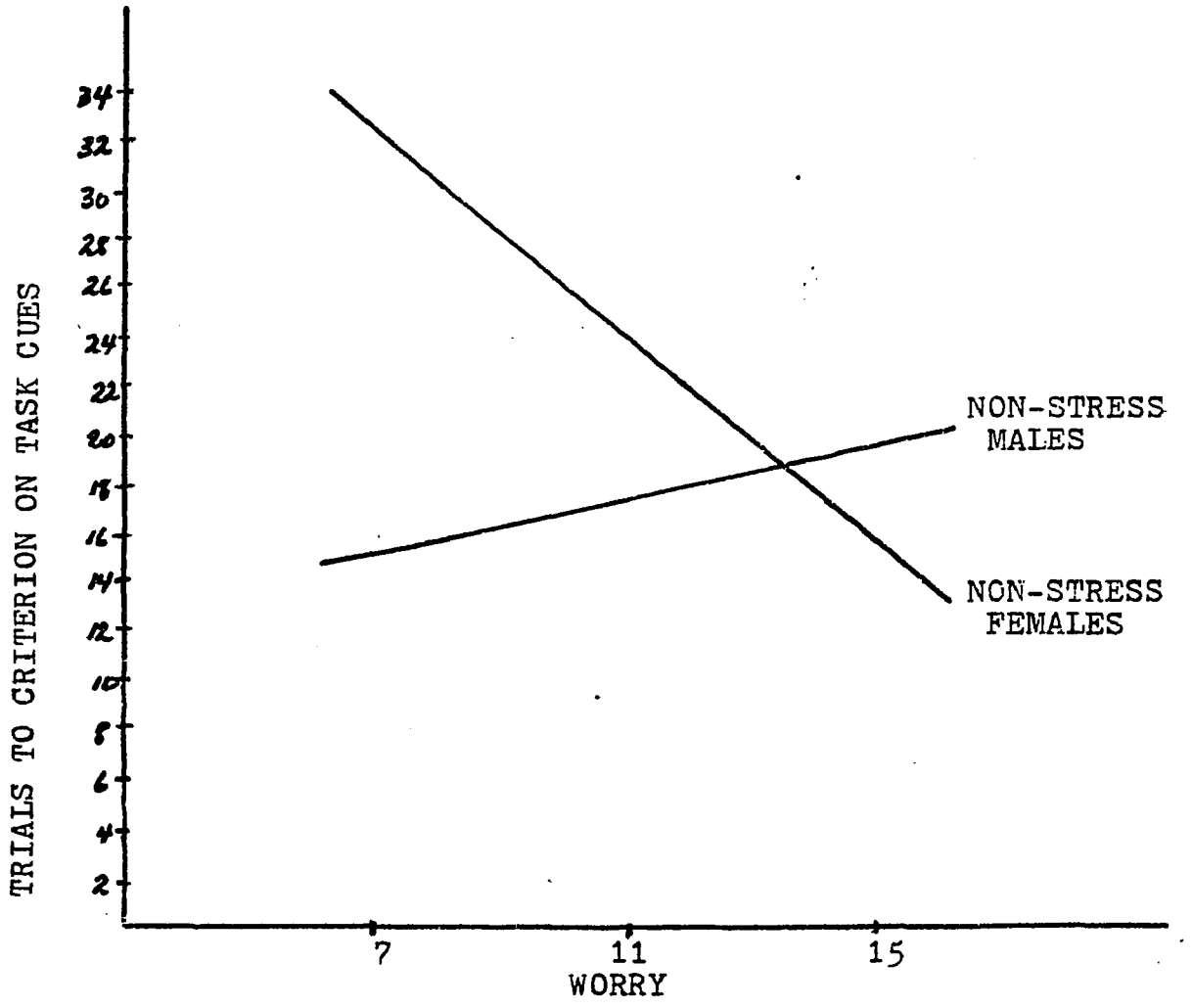


Figure 4. Interaction between Worry and sex on task cue performance under non-stress conditions.

Table 6

Correlations between Each of the Anxiety Scales and Task Cue Performance by Sex and Stress

Variable	All Stress Subjects (N=65)	All Non-Stress Subjects (N=62)	Female Stress (N=29)	Female Non-Stress (N=27)	Male Stress (N=36)	Male Non-Stress (N=35)
Worry	.29*	-.02	.63**	-.18	.03	.15
Emotionality	.21	-.09	.37*	-.19	.12	.08
TASC[1]	.09	-.12	.24	-.02	-.05	-.23
CMAS[2]	.19	-.17	.23	-.11	.15	-.23

[1] Test Anxiety Scale for Children

[2] Children's Manifest Anxiety Scale

*p= < .05

**p= < .01

The only independent variable, additionally, to reach significance in predicting task cue performance under stress was, unsurprisingly, grade level. 6th grade students outperformed their 5th grade schoolmates ($F=4.9$, $p=.03$).

Hypothesis 3

Hypothesis 3 predicted that without stress no difference in performance would be expected as a result of anxiety level. The results of the multiple regression analyses on each of the three performance variables will be examined separately.

Redundant Cue Performance

As hypothesized for non-stressed subjects, irrespective of sex, anxiety did not significantly predict redundant cue performance. Table 7 presents the results of the regression analysis testing this hypothesis. The significant worry x stress interaction is clarified by an examination of figure 5 where it can be seen that, irrespective of sex, performance in the non-stress condition did not vary significantly as a result of worry, while under stress, as worry increased, performance become poorer. While redundant cue performance was similar for stressed males and females, without stress females showed a greater improvement in performance than males as worry increased. Figure 6 depicts the tendency of females to do better and males to do worse as anxiety increased under non-stress ($F=3.3$, $p=.07$).

Table 7

Results of Multiple Linear Regression Analysis of the Effect of Anxiety (Worry) Stress and Sex on Performance with Redundant Cues

Source	r[1]	Regression Weight[2]	%Variance[3]	F
Worry	.27	-1.31	.008	1.04
Stress	.07	-30.37	.03	3.34
Sex	.11	-20.49	.02	1.96
Worry x Stress	-	3.29	.03	4.27*
Worry x Sex	-	2.66	.02	3.30
Stress x Sex	-	24.51	.01	1.34
Worry x Stress x Sex	-	-2.90	.02	2.25

[1] correlation with performance on redundant cues

[2] constant = 27.51

[3] independent variance accounted for by effect

*p= < .05

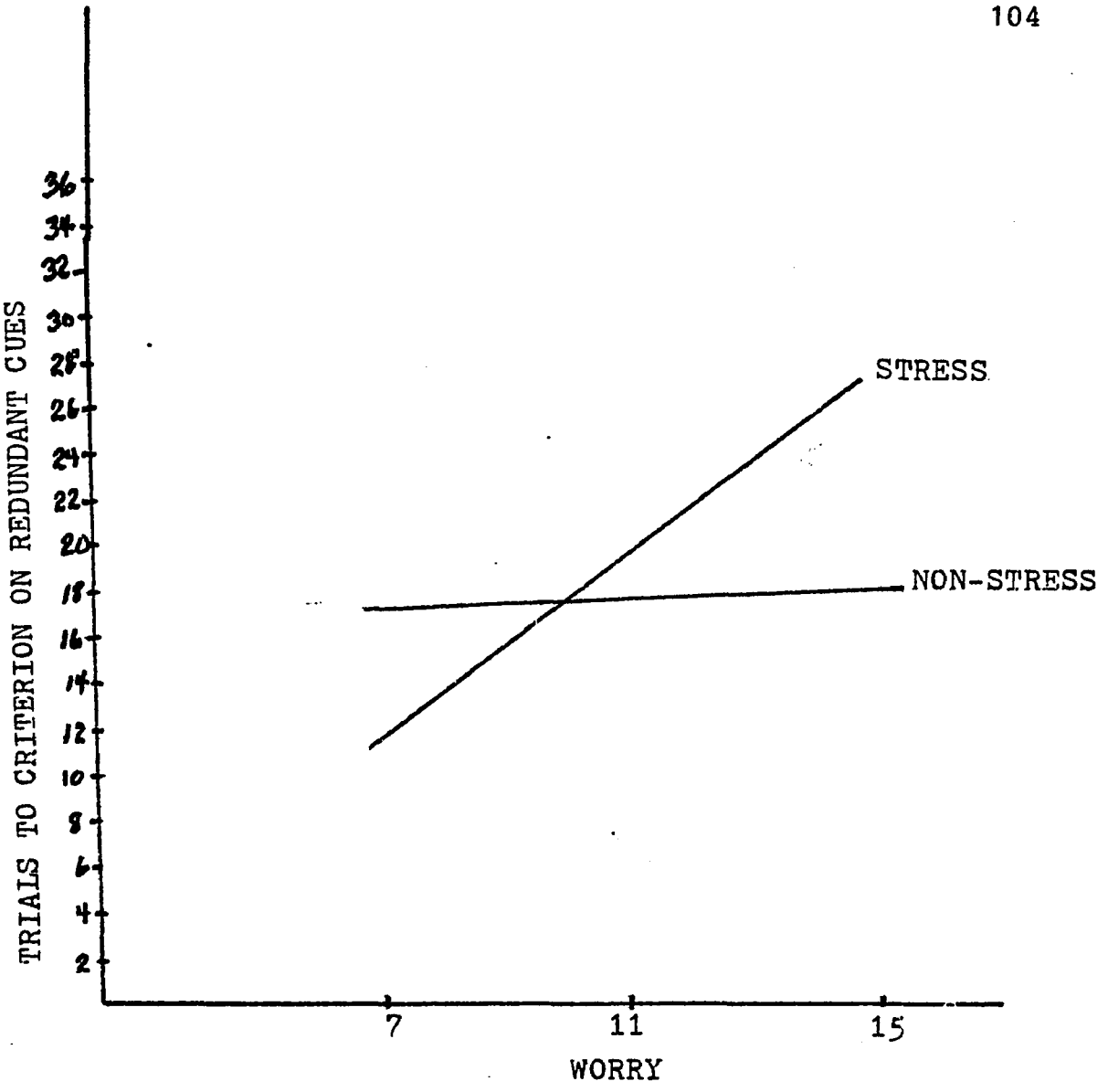


Figure 5 Interaction between Worry and stress condition on redundant cue performance.

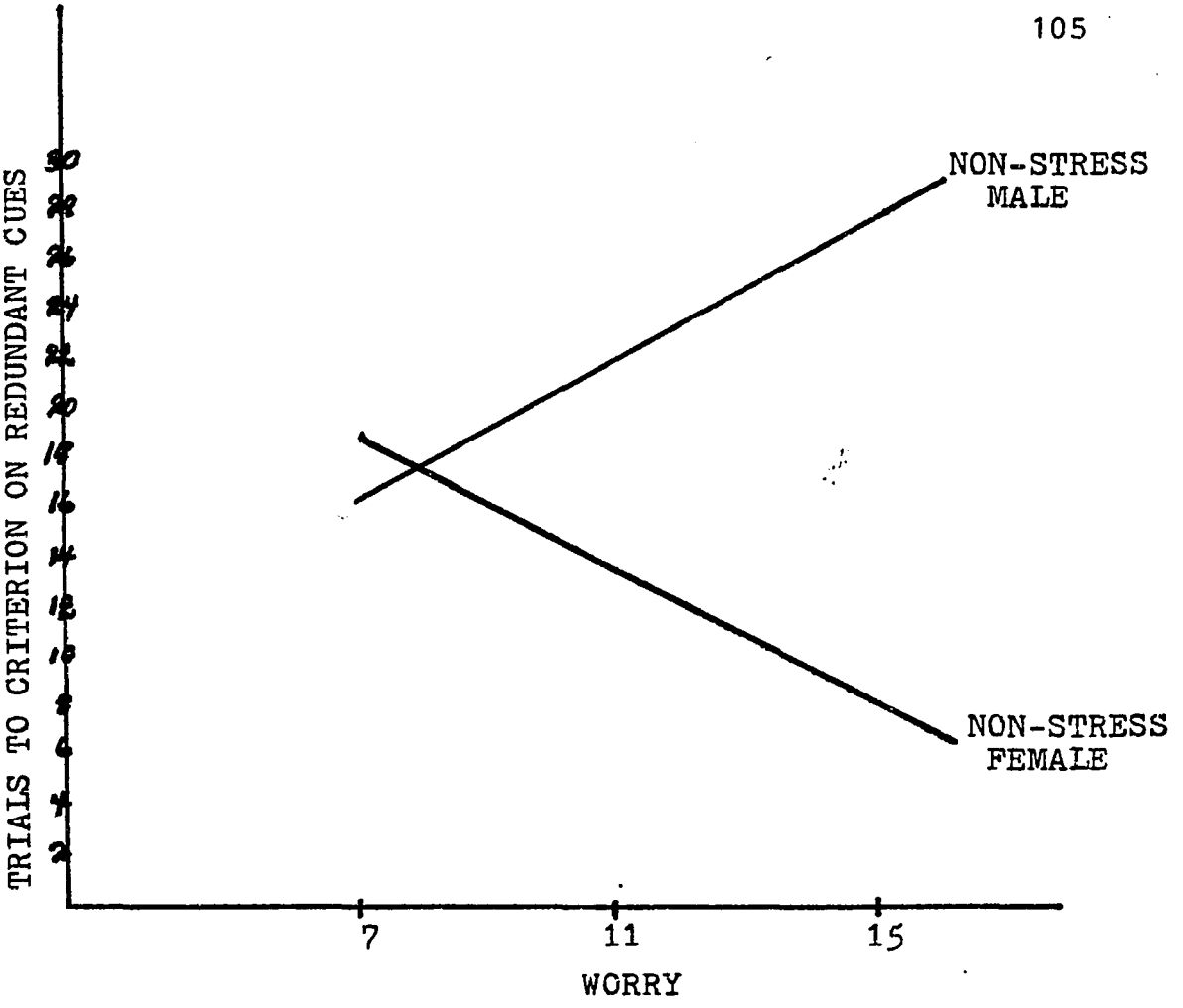


Figure 6. Interaction between Worry and sex on redundant cue performance under non-stress conditions. This interaction is only of borderline significance (see table 5, p. 97).

Social Cue Performance

As hypothesized, under non-stress conditions anxiety level did not predict performance on social cues. Again, however, sex differences were found. Table 8 clarifies the lack of significance found in the regression analysis (Table 4). As noted on Table 8, for non-stressed males and females anxiety level related differently to concept formation with social cues. As depicted in Figure 7, while higher levels of anxiety improved male performance, it led to debilitated performance for females under non-stress conditions.

Table 8

Correlations by Sex between each of the Anxiety Scales and Social Cues Under Non-Stress Conditions

Anxiety Measures	All Non-Stress Subjects (N=62)	Non-Stressed Females (N=27)	Non-Stressed Males (N=35)
Worry	-.04	-.13	.10
Emotionality	.04	-.11	.22
TASC[1]	.13	.23	-.01
CMAS[2]	.17	.26	.05

[1] Test Anxiety Scale for Children.

[2] Children's Manifest Anxiety Scale.

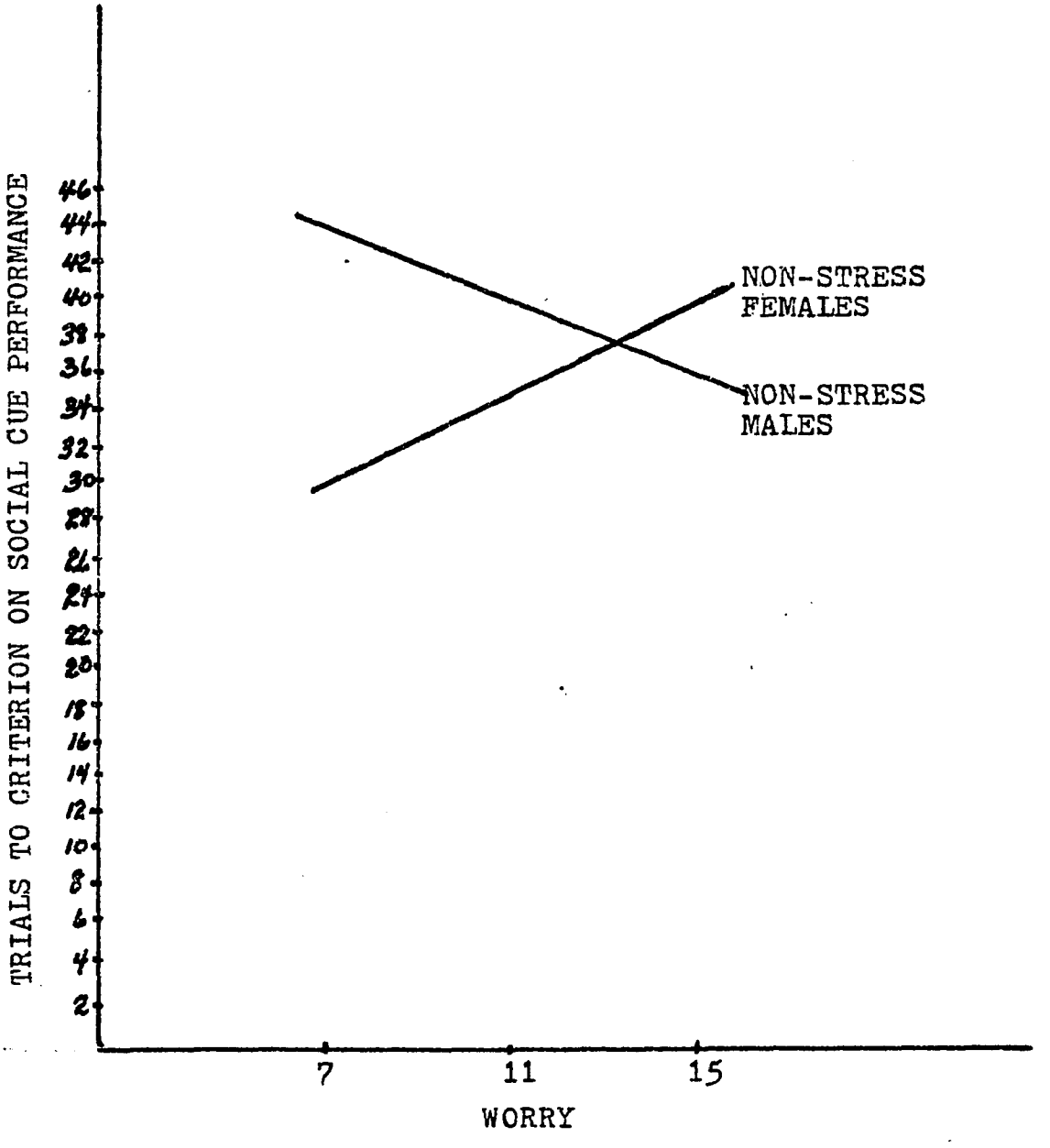


Figure 7. Interaction between Worry and sex on social cue performance under non-stress conditions. These results are non-significant.

Task Cue Performance

As hypothesized, for all subjects under non-stress conditions, no significant difference on task cue performance due to anxiety level was found. Table 5, presented earlier, outlined the regression results for the strongest anxiety predictor of task cue performance, Worry. The effect due to stress indicated by that table is clarified by the correlations in Table 9. It was under stress conditions, rather than non-stress conditions, that anxiety level had an effect on task cue performance.

There was a disordinal interaction between sex and the state anxiety measure, Worry, under non-stress conditions affecting task cue performance. Figure 4 presented earlier, depicts the nature of this interaction. As females' levels of state anxiety rose, they performed better on task cues; males with higher state anxiety levels performed more poorly than their lower state anxious counterparts.

In summary, the third hypothesis, that without stress no difference in performance would be expected as a result of anxiety level, was generally confirmed for all three cue conditions. However, sex x worry interactions, under non-stress conditions, indicated that for females increased anxiety led to improved performance with redundant and task cues and poorer performance with social cues. In each case the opposite was true for males.

Table 9

Correlations by Sex between each of the Anxiety Scales and Task Cue Performance

Anxiety Measures	All Non-Stressed Subjects (N=62)	All Stressed Subjects (N=65)	Non-Stressed Females (N=27)	Stressed Females (N=29)	Non-Stressed Males (N=35)	Stressed Males (N=36)
Worry	-.02	.29*	-.18	.63**	.15	.03
Emotionality	-.09	.21	-.19	.37*	.08	.12
TASC[1]	-.12	.09	-.02	.24	-.23	-.05
CMAS[2]	-.17	.19	-.11	.23	-.23	.15

[1] Test Anxiety Scale for Children

[2] Children's Manifest Anxiety Scale

*p= < .05

**p= < .01

Supplementary Analyses

While Worry was the strongest anxiety predictor of performance, and therefore utilized as the prime measure for these analyses, a brief presentation of Emotionality and the trait measures' relationships to performance will follow.

Emotionality and Performance

Emotionality, the other state measure of anxiety, was closest to the Worry measure in its predictions. Table 10 presents the regression results of Emotionality, stress and sex on task cue performance. Stress, and the interaction of stress and sex, predicted performance on task cues. Figure 8 depicts the stress x non-stress interaction across sex and Figure 9 depicts the sex interaction without stress present. While males performed similarly as emotionality increased under both stress and non-stress condition (See Table 9), females did not. Females responded to increases in level of emotionality under stress with debilitated performance, but elevations of anxiety when no stress was present led to improved performance (See Figure 10). (Note: the interaction between Emotionality and stress, presented in figure 8, is not significant, but is included to extend the information pictured in Figures 9 and 10.)

Table 10

Results of Multiple Linear Regression Analysis of the Effect of Anxiety (Emotionality), Stress and Sex Performance with Task Cues

Source	[1] r	Regression Weight [2]	%Variance [3]	F
Emotionality	.07	-2.65	.02	1.94
Stress	-.04	-42.55	.05	5.98*
Sex	-.11	-32.77	.03	3.48
Emotionality x Stress	-	4.51	.00	1.29
Emotionality x Sex	-	3.09	.02	1.89
Stress x Sex	-	44.36	.03	4.06*
Emotionality x Stress x Sex	-	4.47	.02	2.95

[1] correlation with performance on Task cues.

[2] constant = 46.94

[3] independent variance accounted for by effect

*p= < .05

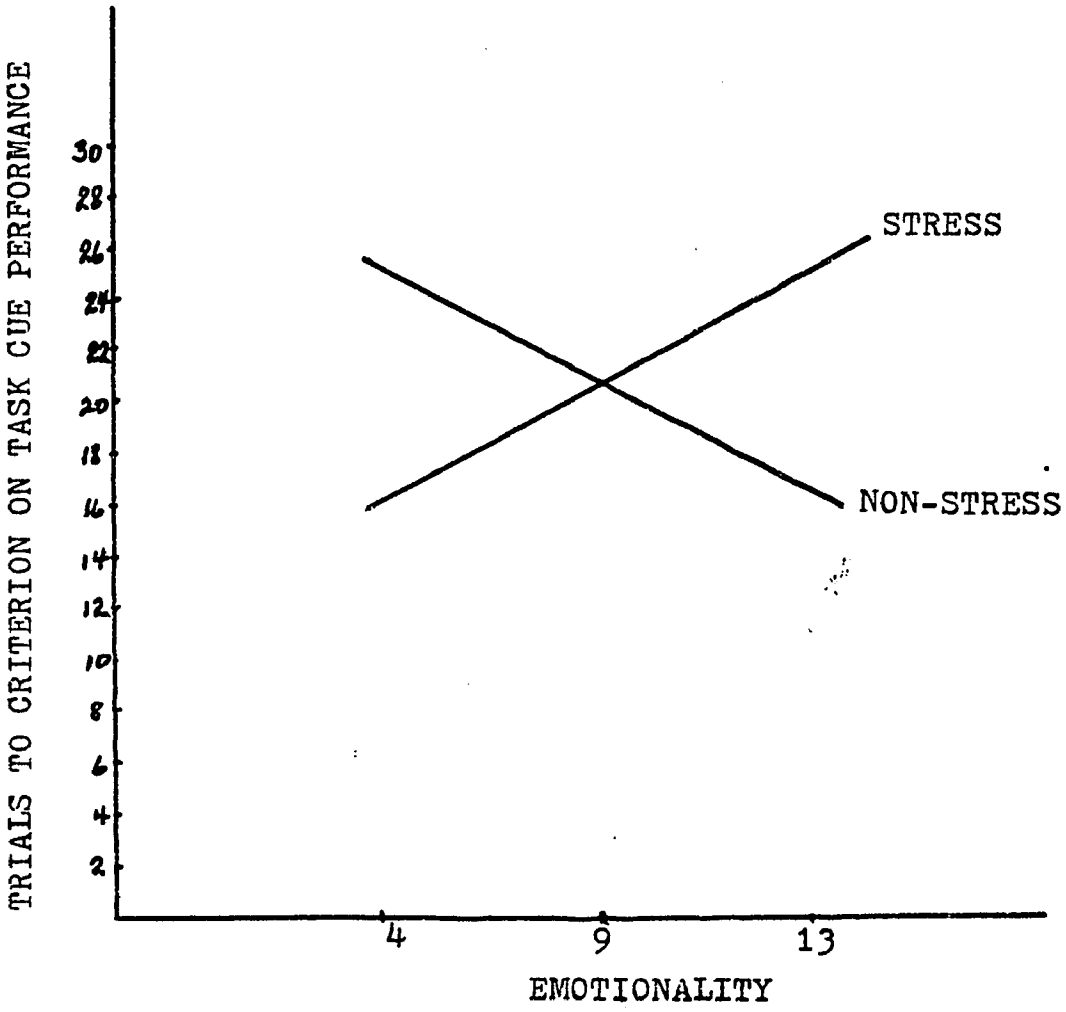


Figure 8. Interaction between Emotionality and stress on task cue performance. This interaction is not significant.

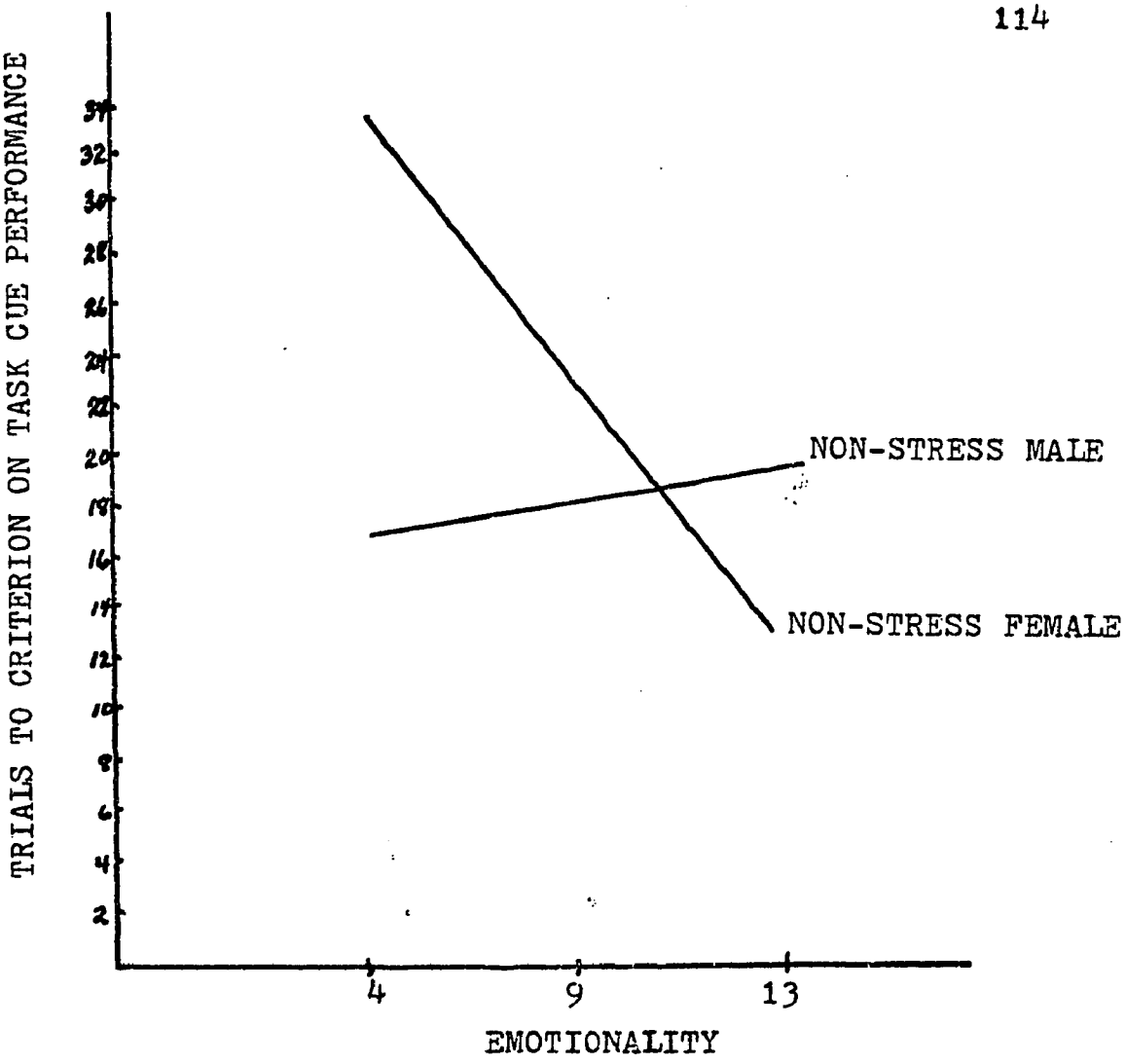


Figure 9. Interaction between Emotionality and sex on task cue performance under non-stress conditions.

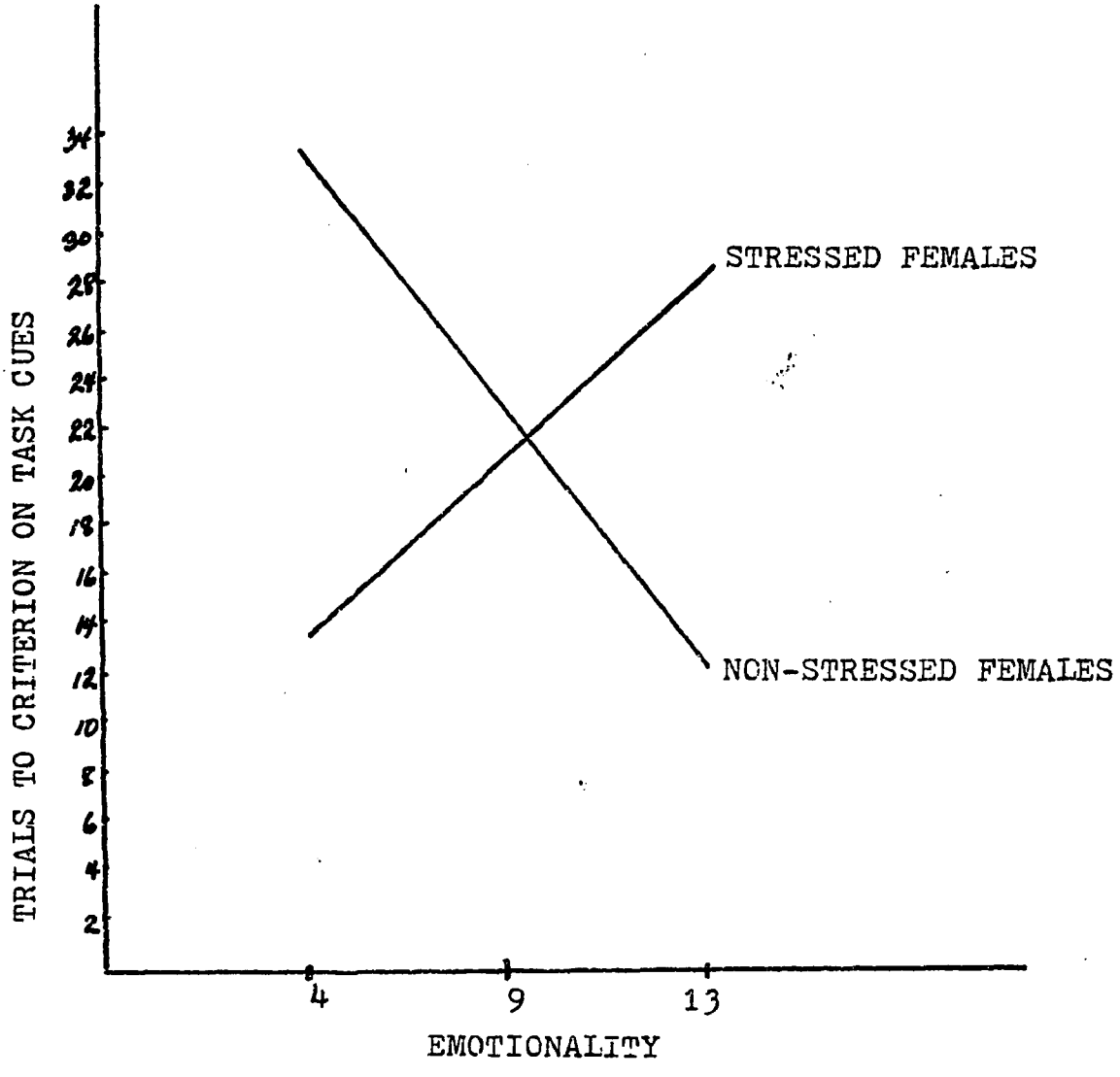


Figure 10. Interaction between Emotionality and stress on task cue performance for females.

Trait Anxiety Measures and Performance

Neither the Test Anxiety Scale for Children nor the Children's Manifest Anxiety Scale significantly predicted performance with either social or task cues. There were also no interactions of anxiety, as measured by either trait measure, and the assigned variables. Results of these regression analyses are included in Appendices H through K.

Multivariate Regression Analysis

A multivariate general linear model was run, the results of which appear in Appendices M-P. This analysis indicated that there were a number of highly significant double interactions. The triple interaction was significant also, as were some of the main effects. However, since this multivariate procedure was run by obtaining an optimally weighted vector of the three dependent variables, it was difficult to ascertain whether the interactions confirmed the prediction of opposite direction between the social cues and the task cues. For that reason it was decided to compute a univariate regression analysis of the difference between dependent variable performance under social cues and task cues. This difference was obtained by subtracting the task cues raw score from the social cues raw score for each subject, thus creating a new dependent variable, social cues minus task cues. The regression analysis, conducted with worry, sex, stress and the interactions of these as the independent variables and difference between number of trials to criterion on social cues and task cues as the dependent variable, is shown on Table 11, and indicates that, in fact, stress and several of the interactions were siginficant as predicted. These interactions are graphed on Figures 11, 12 and 13. Figure 11 shows that the difference between social cues and task cues

Table 11

Results of Multiple Linear Regression Analysis of the Effect of Anxiety (Worry), Stress and Sex on Social Cues Performance Minus Task Cues Performance

Source	Regression Weight[1]	F
Worry	3.25	1.43
Stress	77.15	4.86*
Sex	64.08	4.31*
Worry x Stress	-7.82	5.44*
Worry x Sex	-4.76	2.37
Sex x Stress	-102.44	5.29*
Worry x stress x Sex	9.77	5.76*

[1] constant = -25.34

*p= < .05

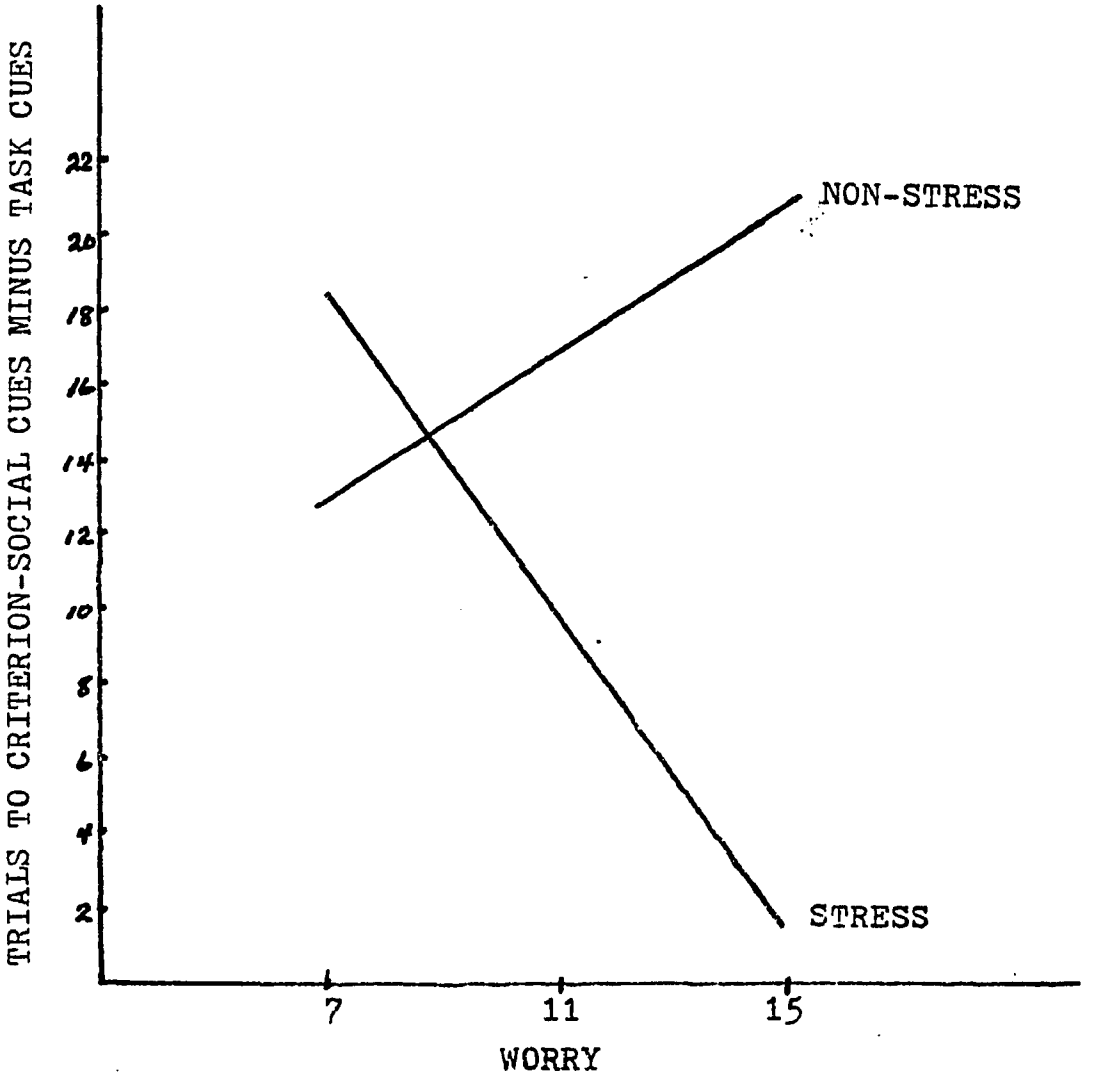


Figure 11. Interaction of Worry and stress on social cues minus task cues performance.

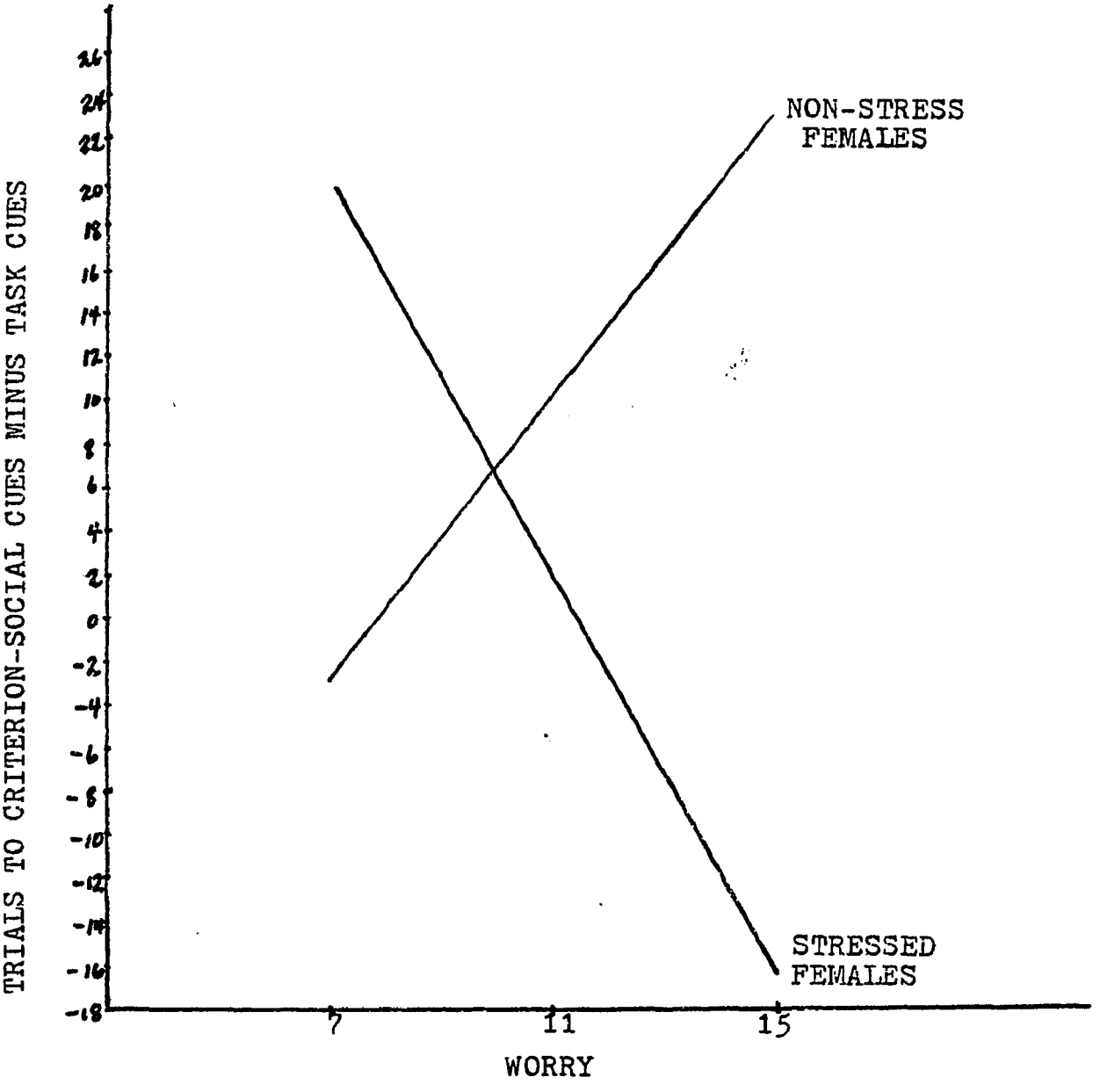


Figure 12. Interaction of Worry and stress on social cues minus task cues performance for females.

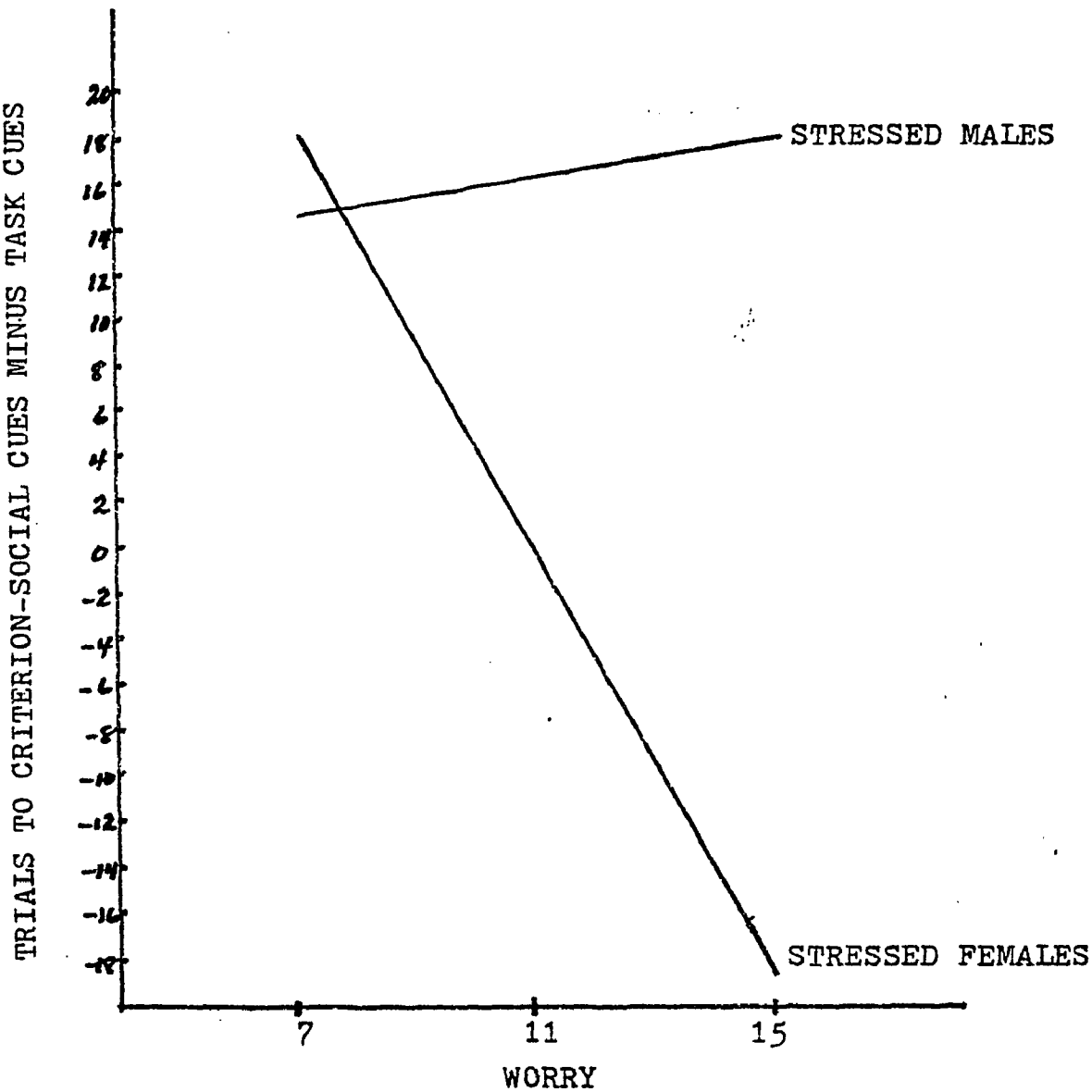


Figure 13. Interaction of Worry and sex on social cues minus task cues performance under stress.

is exactly as predicted in the stress group, that is, as anxiety increased, the difference between social and task cues resulted in a decrease in the number of trials to criterion. (The picture is even more striking for females. See figures 12 and 13). Such an effect was probably due to the fact that for task cues in the stress group, as anxiety increased, performance decreased. That effect, as seen in the figure on page 98 was highly significant. The correlations between performance with social cues and worry are essentially zero, being .01 and -.04. That means that as anxiety increased, performance under social cues was unaffected within the stress group. One can, therefore, assume that the significant interaction of the difference between the social and task cues is largely attributable to the fact that performance under task cues decreased as anxiety went up for the stress group while performance under social cues stayed essentially the same. Therefore, the hypothesis that performance under social cues for high anxious students would be facilitated was essentially <u>not</u> supported, whereas the hypothesis that under task cues anxiety would be debilitating was supported.

Alternate Procedures for Evaluating Trait Anxiety Results

One procedure for examining the relationship of the Test Anxiety Scale score to the dependent variables was to compute an adjusted Test Anxiety score according to a procedure developed by O'Reilly and Wightman (1971). In order to determine a "truer" estimate of the anxiety score, these researchers suggested giving equal weight to the anxiety and the lie scale score. This equal weighting was accomplished by converting both the Test Anxiety Scale score and the Lie Scale score to standard (z) scores and then summing anxiety and lie scale scores to make a composite termed the "adjusted Test Anxiety Scale Score" (TASCADJ). Correlations of the uncorrected and adjusted anxiety scores with the three dependent variables in this study are reported in Table 12. It can be seen that none of the correlations between either of these state anxiety measures and any of the three dependent variables was significant. The adjusted scores did not predict performance significantly differently from the raw scores.

Table 12

Correlations between Cue Condition, Lie Scales and Adjusted Lie Scales using O'Reilly & Wightman Adjustment Formula

Cue Condition	TASC	TASCADJ	CMAS	CMASADJ
Redundant Cues	.12	.08	.09	.13
Social Cues	.04	-.06	.16	.14
Task Cues	-.02	.02	.01	.05

Although there was no precedent for a similar procedure for adjusting the Children's Manifest Anxiety scale score in relation to its lie scale, the same procedure was followed for this anxiety measure. The correlations, as seen in Table 12, do not support the hypothesis of better prediction from adjusted scores on either scale.

Another procedure for examining the relationship of the trait anxiety measures to the dependent variables was to use Sarason's procedure (Phillips, 1971), and drop those subjects obtaining high lie scale scores on each of the two trait anxiety measures from the analysis of the relationship of that anxiety scale score to the dependent variables.

The range of the Lie Scale of the Test Anxiety Scale for Children was from 0 to 9, mean 2.56, and standard deviation 2.2. The range of the Children's Manifest Anxiety Lie Scale was from 0 to 8 with a mean of 2.18 and a standard deviation of 2.19. Subjects with scores of 5 or above (approximately one standard deviation above the mean) were dropped from each of these analyses separately. In each case this dropped 24 subjects from the analysis, leaving an N of 103 on which the new statistics were computed. Table 13 presents the means and standard deviations of relevant variables when the anxiety scales were considered this way.

Table 13

Means and Standard Deviations of Relevant Variables when Trait Anxiety Scores were Computed in 3 Ways

Variable	All Subjects (N=127) M.	S.D.	High TASCLIE Subjects dropped (N=103) M.	S.D.	High CMASLIE Subjects dropped (N=103) M.	S.D.
Redundant Cues	19.66	19.05	20.38	19.61	19.49	19.38
Social Cues	34.43	30.75	37.14	31.54	35.29	31.09
Task Cues	21.50	22.65	20.79	21.01	21.32	22.96
Test Anxiety Scale	11.39	6.97	12.72	6.84	11.72	6.78
Children's Manifest Anxiety Scale	19.17	8.3	20.99	7.87	19.94	8.05
Worry	10.17	3.88	10.96	3.89	10.86	3.71
Emotionality	8.58	3.94	8.91	4.02	8.63	3.91
IQ	110	11.96	110	12.05	111	11.93
TASC Lie Scale	2.56	2.20	1.71	1.33	2.11	1.90
CMAS Lie Scale	2.18	2.19	1.98	2.06	1.30	1.24

Not unexpectedly, dropping the 24 subjects with the highest Test Anxiety Lie Scale scores also lowered the mean Lie Scale score of the Children's Manifest Anxiety Scale. Similarly, dropping the 24 subjects with Lie Scale scores of 5 and above from the Children's Manifest Anxiety Lie Scale measure also lowered the mean lie scale scores of the Test Anxiety Scale for Children.

Dropping high Test Anxiety Lie Scale scorers raised slightly the mean scores of both of these trait anxiety measures and the state measures (Worry and Emotionality), though not to a degree significantly different from the original means of all 127 subjects. The same was true for dropping the Children's Manifest Anxiety high Lie Scale scorers from the analysis. The difference in mean number of trials to criterion for each of the three dependent measures was also not significantly different whether the anxiety score was computed for all 127 subjects or only for those with low Lie Scale scores on each of the two trait anxiety measures.

As neither the adjusted scores obtained by weighting the anxiety and lie scale scores or by dropping subjects with high lie scale scores gave any better prediction of performance on the learning tasks than conducting analyses with anxiety scores as originally obtained for all subjects, all other analyses were conducted with the original anxiety scores of all subjects.

Summary of Results

Hypothesis 1, that a higher level of anxiety under stress would lead to better performance with social cues, was not confirmed. While both state anxiety measures correlated negatively with trials to criterion for stressed females and one of the two state anxiety measures correlated negatively with number of trials for stressed males, these correlations were not significant. The trait anxiety measures correlated positively, that is opposite to the direction predicted, or not at all, and were also non-significant predictors.

Hypothesis 2, that a lower level of anxiety under stress would lead to better performance on task cues, was supported when anxiety was assessed by either of the state measures (Worry and Emotionality). Correlations in the same direction, approaching significance, were obtained using the trait measures of anxiety, but only for stressed females.

Under non-stress conditions there was no significant difference in social cue or task cue performance related to anxiety level as measured by either state or trait measures. Hypothesis 3, that there would be no differences due to level of anxiety under non-stress conditions, was therefore confirmed. Sex x worry interactions, however, suggest that type of task and anxiety level are related to performance differently for males and females.

CHAPTER V

Discussion

This experiment was designed to investigate the hypothesis that high anxious persons attend more to social aspects of the learning environment while low anxious persons attend more to the specific cues inherent in the task. The off-task behavior of high anxious learners, noted by many researchers, was conceived of as a sort of searching for cues or reassurance which, in turn, could lower anxiety. For high anxious persons these cues were hypothesized to be interpersonal ones.

The results of the first hypothesis were disappointing in that level of anxiety did not relate significantly to performance on a concept formation task with social cues only present. Stressed subjects with higher anxiety were expected to make more use of social cues than those with lower anxiety. Instead, females performed better than males when social cues only were present with stressed females utilizing social cues most effectively.

The second hypothesis, that lower anxious learners would be more successful at task cue solution under stress, was confirmed only for the state measures of anxiety. Although both trait anxiety measures indicated effects in

the predicted direction, these effects were not significant. (See Appendices H through K). All four measures of anxiety, however, predicted task cue performance under stress more strongly for females than for males, although in some instances non-significantly.

Without stress, no difference in either social or task cue performance was expected as a result of anxiety level, and this hypothesis was supported by the results obtained.

This chapter is divided into two parts. The first part will discuss possible explanations for these experimental results. The limitations of this study for investigating these questions are also noted and discussed. The findings will be discussed in the context of theory and prior research. The second part of the chapter will consider the implications for future research and for educational practice.

Interference due to Experimental Equipment

The dependent measures used in this study were adapted from Ruble and Nakamura (1972). In their study, subjects pointed to the card they selected and feedback was given via the experimenter's utterance of "right" when a correct response was selected by the subject. The addition in this study of equipment involving selector buttons to be pushed by the subject and two different colored lights on a different box to indicate correct or incorrect responses appeared to divert student attention from the experimenter. Subjects tended to look more at the equipment than the experimenter. In a pilot study examining the difficulty level of the tasks, it was noted that the 20 trials maximum utilized by Ruble and Nakamura (1972) with second and third grade subjects was not adequate to test these fifth and sixth grade subjects, some students requiring two to three times that number of trials to reach a criterion of five consecutive successful guesses when only social cues were available. The means that Ruble and Nakamura report for social cue performance ranged from 12 to 18, for task cue performance from 16-18. Since the current sample involved children that were older and should have been at least as bright, and the dependent tasks were comparable in all ways except for the addition of equipment for respond-

ing and feedback, it appears as if this factor contributed to poorer performance likely due to the probable diversion of student attention in all three cue conditions. The difference between the means in this study and those reported by Ruble and Nakamura are greatest in the social cue and redundant cue conditions. This might indicate that the disruption of attention was greatest when the need for attention involved focusing on the experimenter. While attention was also likely diverted from task cues to equipment, it appeared to be somewhat less debilitating in this instance. Since hypothesis 1 hinged on subjects' attention to the experimenter, the procedures of this experiment apparently prevented a fair test of this hypothesis.

It is also possible that the use of equipment was not only distracting, but raised anxiety level for some students during learning. While this equipment is not the same as computer equipment, research reviewed by Hedl and O'Neil (1977) on computer assisted instructional programs, prior terminal experience and computer testing suggest that high trait anxious students unfamiliar with the computer responded to computer testing situations in general with higher levels of state anxiety that did low trait anxious students. It could be that there was higher anxiety in this study due to use of equipment than in Ruble and

Nakamura's (1972) study and that this, in turn, led to a higher mean number of trials to criterion on the performance measures.

State-Trait Differences

The failure of some of the predicted interactions between anxiety and performance in this research and in prior research may be related to the differences in underlying conceptions of anxiety upon which the various anxiety measures are based. Spielberger (1966, 1972) has attempted to clear up some ambiguity in anxiety research with the distinction between trait and state anxiety. Trait anxiety, Spielberger defines as anxiety proneness, a relatively stable individual difference, not necessarily manifested in behavior. The high trait anxious person may experience his world as more threatening in general than the low trait anxious one and a person high on trait anxiety will more frequently exhibit state anxiety than would one low on trait anxiety. State anxiety is described by Spielberger as the temporary anxiety experience "anxious now". Spielberger (1972) points to the need to define anxiety as an emotional process, referring to "cognitive, affective and behavioral responses that occur as a reaction to some form of stress (Spielberger, 1972, p. 484). This cognitive appraisal of danger is followed by an anxiety state reaction, that is an increment in the level of intensity of A-state.

In general, state anxiety measures appear to be more sensitive measures of experimental stress than trait

scales. Spielberger has noted (1972) that this is especially so for females. These prior findings may have contributed to the results of this study. The higher correlations of the Worry measure with performance likely suggest that the Test Anxiety Scale, and even more so the Children's Manifest Anxiety Scale, were weaker measures of anxiety in the actual experimental situation than the state scale, even though the Test Anxiety Scale frequently predicted in the same direction as the state measure.

A further explanation of the better prediction by the state measures of performance may be due to the differences in specificity of these particular state and trait measures. The shorter 10 item Worry and Emotionality Scale has 5 questions whose content is very general about anxiety feelings. The much longer trait scales utilized questions that required finer discriminations of the anxiety feelings. Snyder, Schulz and Jones (1974) point out that the unreliability of rating measures in the affective domain may be due to the difficulties people have in discriminating moderate emotional differences.

Additionally 12 of the 30 items on the Test Anxiety Scale refer directly to test taking. Despite the instructions preceeding these items which more generally define "test" as "anytime the teacher asks you to do something to find out how much you know or how much you have learned",

these "test" questions might be perceived by many subjects as referring to stereotyped, test-like, paper and pencil tests. The dependent measure tasks in this study may not have been perceived of as "tests" in the same traditional sense. This may also have contributed to decreasing the relationship between the Test Anxiety Scale and the dependent measures.

Some Questions Regarding the Measures and Performance on Them

While the alpha reliability of .80 obtained for this sample on the Emotionality scale was at the lower end of the .79 to .99 range reported by Morris and Fulmer (1976), the .66 correlation obtained for the Worry measure, which was the prime measure of anxiety used in these analyses, is somewhat lower than might be desired. The degree of confidence once can have in the results of the relationship of anxiety and the dependent measures is obviously affected by the room for error that the .66 correlation leaves.

It is important to consider that measurement problems may not be limited only to the independent measures in this study but may extend also to the method of task performance. As has been frequently documented, both dispositional person differences and situational features contribute to prediction of performance outcome. The question as to which is a more potent factor in influencing the outcome of performance goes beyond the scope of this study, however, it does need to be acknowledged that there is a complex interaction between the two documented in anxiety research by Sarason, Smith and Diener (1975) in their review of the components of various attributes of the person and the situation. The use of equipment may not only have diverted subject attention from the experimenter, but as

Hedl and O'Neil (1977) note, subject unfamiliarity with the computer mode of responding (and this may extend also to this type of equipment) appears to affect high anxious subjects more than low anxious ones. A change in the situational variable of mode of response might provide a different pattern of results in state anxiety measures and/or on performance measures.

Additionally, while anxious persons may respond more strongly to stress that threatens the self-esteem, this response may result in either enhanced or impaired performance depending on other person characteristics such as style of defense (Grimes and Allinsmith, 1963) or on past record of success or failure in similar tasks (Gaudry, 1977). These areas were not considered in this research.

Sex and Problem Solving Ability

Past research has reported mixed results when considering sex differences in cognitive style and problem solving ability. Because cognitive style and problem solving ability are rather complex terms conceptually, mixed results might be expected. It has been reported, however, that males tend to try new approaches in problem solving more often than do females and that males are also generally more field independent, that is, freer of the effects of the context in which the problem is placed. Males are reported, too, to be more likely to focus on common task features and to ignore irrelevant features of the task more than do females (Maccoby, 1966, Maccoby & Jacklin, 1972). It has been noted, however, that when the problem solving task involves the area of human relations, females' performance usually exceeds that of males (Garai & Scheinfeld, 1968).

These factors might account for the sex differences in performance found in this study. Table 14 shows that in social cue performance, clearly a more human relations kind of problem solving task, females did indeed perform better than males.

Table 14

Means and Standard Deviations on Dependent Variables by Sex

Variable	Males (N=71)		Females (N=56)	
	M.	S.D.	M.	S.D.
Redundant Cues	21.44	20.92	17.41	16.30
Social Cues	40.30	31.84	26.96	27.84
Task Cues	19.25	19.19	24.34	26.31

Ruble and Nakamura (1972) reported that with only social cues relevant to task solution girls performed better than boys, the best performance on this task being by field dependent girls. Field dependent boys performed better with social cues than field independent ones, but boys overall did not perform as well as girls when social cues were relevant.

While it is difficult to compare the results of this study with Ruble and Nakamura's because of the complications of stress and non-stress conditions, girls in this study also performed better than boys with social cues present. Although the superiority of girls' performance over boys was more pronounced with social cues in the Ruble and Nakamura study, girls in that study also performed better than boys, though not significantly so, when only task cues were available. In the present study with only task cues available, males performed more effectively.

The difference in redundant cues performance cannot easily be examined because it is not possible to separate out the kind of cue to which students were attending. Since the difference between male and female performance was smallest when redundant cues were present, it seems likely that both males and females attended to whatever cue was more salient for them in task solution.

Additional limitations of this study

Only one measure of state anxiety was administered during this study -- pre task but post instructions and exposure to the task materials and equipment. State anxiety and its effects may vary dependent upon the state of learning. Cronbach and Snow (1977) report that state anxiety, even under stressful conditions, decreases with continuation of instruction.

The present study utilized a short treatment. While a measure of mid and post treatment anxiety may have revealed some additional information on the course of anxiety from pre to post treatment, utilization of a longer learning task might have yielded predictions more typical of school learning. Cronbach and Snow (1977), Campbell and Stanley (1959) and numerous others in discussing research which would hopefully be applicable to schooling, stress the need for longitudinal or long continued experimental conditions in order to obtain truly meaningful results. As Cronbach and Snow point out, although in a different context - the discussion of meaningless learning - "educators are interested in retainable learning, not trials to criterion" (Cronbach and Snow, 1977, p. 425).

Suggestions for Future Research

It appears that there were procedural problems in this current study which prevented finding full support for the hypotheses.

In this study cue was narrowly conceived of as a hint specific to the solution of the particular trial in which the subject was engaged. Cue, more broadly conceived of, would not necessarily come only before solution of a particular trial but could be considered any hint during the learning process. Personal feedback or reinforcement is really a social cue and could have been included as part of a broader hypothesis of high anxious learners' relying more on the interpersonal aspects of the learning situation. Gallagher (1970), in an unpublished report cited by Cronbach and Snow (1977), found that high anxious learners in a computer assisted learning situation performed better with personal feedback while low anxious learners performed better with computer feedback supporting the broader hypothesized ATI between anxiety level and social/personal cues. Conceiving of cue more broadly may produce the correlation hypothesized between anxiety and social cues.

For future research this study could be rerun with several possible changes. One way would be to rerun it with the experimenter obviously controlling the reinforcement as Ruble and Nakamura (1972) did by having the child

point to the chosen card and experimenter say "right" for each correct response. Another possibility would be to compare two groups, one in which the equipment indicated the correctness of the response and the other in which a person indicated whether or not the answer chosen was correct or not. It would be hypothesized here, as in Gallagher's (1970) study, that high anxious children would learn better with a person controlling the reinforcment and low anxious children would learn beter with machine reinforcement. This would be reminiscent of the Horowitz and Armentrout (1964) study cited earlier, but although these researchers found trends in the predicted direction, their findings were not significant at the usual .05 level. A third way to look at whether high anxious persons will learn better through some interpersonal method might be to utilize tasks administered by a person where the task solution is self evident. Again, two tasks could be administered, one with social cues, and one with cues inherent only in the task. Since there would be no need for reinforcement by either experimenter or machine if the task solution was self evident, the hypothesis might have a cleaner test this way.

In each of these studies additional measures of state anxiety should be utilized, spaced at several points, pre, during and post task.

Implications for Education

Wittrock (1979), in discussing the cognitive movement in instruction, noted that a cognitive approach to learning from instruction stresses the understanding of "relations or interactions between the learners' cognitive processes and aptitudes.....and the characteristics of instructional treatments" (Wittrock, 1979, p. 5). He noted that the "art of instruction begins with an understanding and a diagnosis of the cognitive and affective processes and aptitudes of the learners" from which one could then design "different treatments for different students in different situations" (p. 5). In discussing research with adjunct or embedded questions he concludes that a cognitive model "implies the more interesting explanatory relationships will not be found between the questions and the behavior, but between the questions, the different ways people process information in response to inserted questions, and their behavior." (Wittrock, 1979, p. 6). This can be extended to examination of the ways anxiety interacts with cognitive processes in various types of performance. It appears from the different directions of the correlations between anxiety measured by different instruments and the various tasks performed that something cognitive is going on that differentially affects perfor-

mance. Finer grained instruments, both dependent and independent measures, may be necessary to pick up the evasive explanations.

APPENDICES

APPENDIX A

TASC

1. Do you worry when the teacher says that she/he is going to ask you questions to find out how much you know? YES NO

2. Do you worry about being promoted, that is, moving from this grade to the next grade at the end of the year? YES NO

3. When the teacher asks you to get up in front of the class and read aloud, are you afraid that you are going to make some bad mistakes? YES NO

4. When the teacher says that she/he is going to call upon some boys and girls in the class to do arithmetic problems, do you hope that she/he will call upon someone else and not on you? YES NO

5. Do you sometimes dream at night that you are in school and cannot answer the teacher's questions? YES NO

6. When the teacher says that she/he is going to find out how much you have learned, does your heart begin to beat faster? YES NO

7. When the teacher is teaching you about arithmetic, do you feel that other children in the class understand better than you? YES NO

8. When you are in bed at night, do you sometimes worry about how you are going to do in class the next day? YES NO

9. When the teacher asks you to write on the blackboard in front of the class, does the hand you write with sometimes shake a little? YES NO

10. When the teacher is teaching you about reading, do you feel that other children in class understand better than you? YES NO

11. Do you think you worry more about school than other children? YES NO

L. 12. Do you ever worry about knowing your lessons? YES NO

L. 13. Do you ever worry about what other people think of you? YES NO

L. 14. Do you ever worry that you won't be able to do something you want to do? YES NO

15. Do you think you worry more about school than other children? YES NO

16. When you are at home and you are thinking about your arithmetic lesson for the next day, do you become afraid that you will get the answers wrong when the teacher calls upon you? YES NO

17. If you are sick and miss school, do you worry that you will do more poorly in your

schoolwork than other children when you return to school? YES NO

L. 18. When you were younger, were you ever scared of anything? YES NO

19. Do you sometimes dream at night that other boys and girls in your class can do things you cannot do? YES NO

20. When you are home and you are thinking about reading your lesson for the next day, do you worry that you will do poorly on the lesson? YES NO

L. 21. Have you ever been afraid of getting hurt? YES NO

22. When the teacher says that she/he is going to find out how much you have learned, do you get a funny feeling in your stomach? YES NO

23. If you did very poorly when the teacher called on you, would you probably feel like crying even though you would try not to cry? YES NO

L. 24. Has anyone ever been able to scare you? YES NO

25. Do you sometimes dream at night that the teacher is angry because you do not know your lessons? YES NO

26. Are you afraid of school tests? YES NO

L. 27. Do you ever worry about something bad happening to someone you know? YES NO

L. 28. Are you ever unhappy? YES NO

29. Do you worry a lot before you take a test? YES NO

L. 30. Do you every worry about what is going to happen? YES NO

31. Do you worry a lot while you are taking a test? YES NO

32. Do you sometimes dream at night that you did poorly on a test you had in school that day? YES NO

L. 33. Have you ever had a scary dream? YES NO

34. When you are taking a test, does the hand you write with shake a little? YES NO

35. When the teacher says that she/he is going to give the class a test, do you become afraid that you will do poorly? YES NO

L. 36. Do you ever worry? YES NO

37. When you are taking a hard test, do you forget some things you knew very well before you started taking the test? YES NO

38. Do you wish a lot of times that you didn't worry so much about tests? YES NO

39. When the teacher says that she/he is going to give the class a test, do you get a nervous or funny feeling? YES NO

40. While you are taking a test do you usually think you are doing poorly? YES NO

41. While you are on your way to school, do you sometimes worry that the teacher may give the class a test? YES NO

L = Lie Scale Questions (No indication appeared on the questionnaire completed by the children.)

APPENDIX B

CMAS

Read each question carefully. Put a circle around the word YES if you think it is true about you. Put a circle around the word NO if you think it is not true about you.

	1.	It is hard for me to keep my mind on anything.....	YES NO
	2.	I get nervous when someone watches me work.....	YES NO
	3.	I feel I have to be best in everything	YES NO
	4.	I blush easily.....	YES NO
L.	5.	I like everyone I know.....	YES NO
	6.	I notice my heart beats very fast sometimes.....	YES NO
	7.	At times I feel like shouting.....	YES NO
	8.	I wish I could be very far from here..	YES NO
	9.	Others seem to do things easier than I can.....	YES NO
L.	10.	I would rather win than lose in a game	YES NO
	11.	I am secretly afraid of a lot of things	YES NO
	12.	I feel that others do not like the way I do things.....	YES NO
	13.	I feel alone even when there are people around me.....	YES NO
	14.	I have trouble making up my mind.....	YES NO
	15.	I get nervous when things do not go the right way for me.....	YES NO
	16.	I worry most of the time.....	YES NO
L.	17.	I am always kind.....	YES NO

	18.	I worry about what my parents will say to me.....	YES	NO
	19.	Often I have trouble getting my breath	YES	NO
	20.	I get angry easily.....	YES	NO
L.	21.	I always have good manners.....	YES	NO
	22.	My hands feel sweaty.....	YES	NO
	23.	I have to go to the toilet more than most people.....	YES	NO
	24.	Other children are happier than I.....	YES	NO
	25.	I worry about what other people think of me.....	YES	NO
	26.	I have trouble swallowing.....	YES	NO
	27.	I have worried about things that did not really make any difference later.....	YES	NO
	28.	My feelings get hurt easily.....	YES	NO
	29.	I worry about doing the right things..	YES	NO
L.	30.	I am always good.....	YES	NO
	31.	I worry about what is going to happen.	YES	NO
	32.	It is hard for me to go to sleep at night.....	YES	NO
	33.	I worry about how well I am doing in school.....	YES	NO
L.	34.	I am always nice to everyone.....	YES	NO
	35.	My feelings get hurt easily when I am scolded.....	YES	NO
L.	36.	I tell the truth every single time....	YES	NO
	37.	I often get lonesome when I am with people.....	YES	NO
	38.	I feel someone will tell me I do things the wrong way.....	YES	NO
	39.	I am afraid of the dark.....	YES	NO

	40.	It is hard for me to keep my mind on my school work.....	YES	NO
L.	41.	I never get angry.....	YES	NO
	42.	Often I feel sick in my stomach.....	YES	NO
	43.	I worry when I go to bed at night.....	YES	NO
	44.	I often do things I wish I had never done.....	YES	NO
	45.	I get headaches.....	YES	NO
	46.	I often worry about what could hapen to my parents.....	YES	NO
L.	47.	I never say things I shouldn't.....	YES	NO
	48.	I get tired easily.....	YES	NO
L.	49.	It is good to get high grades in school	YES	NO
	50.	I have bad dreams.....	YES	NO
	51.	I am nervous.....	YES	NO
L.	52.	I never lie.....	YES	NO
	53.	I often worry about something bad happening to me.....	YES	NO

L = Lie Scale Questions. (No indication appeared on the questionnaire completed by the children.)

APPENDIX C

For each sentence below circle the number that shows best how you feel right now

1. not at all
2. barely so
3. moderately so
4. strongly so
5. very strongly so

1.	I do not feel very confident about my performance on this test	1 2 3 4 5
2.	I am worrying a great deal about this test	1 2 3 4 5
3.	I find myself thinking of how much brighter the other students are than I	1 2 3 4 5
4.	I am thinking of the consequences of failing this test	1 2 3 4 5
5.	I feel I may not be as well prepared for this test as I should be	1 2 3 4 5
6.	I am so nervous that I cannot remember facts which I really know	1 2 3 4 5
7.	I feel my heart beating fast	1 2 3 4 5
8.	I am so tense that my stomach is upset	1 2 3 4 5
9.	I have an uneasy upset feeling	1 2 3 4 5
10.	I feel very panicky about taking this test	1 2 3 4 5

On the scale of 1 to 10 below indicate your best guess of whether you will do as well on this test as you would like.

0 1 2 3 4 5 6 7 8 9 10

surely wont — may — surely will

Appendix D

Means and Standard Deviations on Anxiety Measures in this Study and Others[1]

TASC	This Study mean 11.39 S.D. 6.97 boys' mean 10.97 girls' mean 11.93	O'Reilly & Wightman (1971) mean 12.44 S.D. 2.12	Sarason, et al (1958) median 12-13	Warren, et al (1976) upper 28%ile 15 S.D. Pre treatment 3.53 S.D. Post treatment 6.85	Campeau (1968) upper 27%ile boys 16-26 girls 17-29 lower 27%ile boys 0-5 girls 0-8	Gaudry (1977) upper level of attainment 11.14 lower level of attainment 13.44 mean 12.99
CMAS	This Study mean 19.17 S.D. 8.3 boys mean 19.08 girls mean 19.29	Feldhusen & Klausmeier (1962) boys mean 13.8 girls mean 17.5	Castaneda, Palermo & McCandless (1956) range 3 to 33 above 18=high below 17= low	Castaneda, McCandless & Palermo (1956) 5th grade boys' mean 16.24, S.D. 7.43 5th grade girls' mean 17.75, S.D. 9.23 6th grade boys' mean 16.58, S.D. 7.39 6th grade girls' mean 18.50, S.D. 7,82		
WORRY	This Study boys' mean 11.07, S.D. 4.20 girls' mean 10.25, S.D. 3.41	Morris, et al (1976) boys' mean 11.22, S.D. 4.05 girls' mean 12.86, S.D. 4.03				
EMO-TION-ALITY	This Study boys' mean 9.08, S.D. 4.28 girls' mean 7.95, S.D. 3.39	Morris, et al (1976) boys' mean 8.78, S.D. 3.68 girls' mean 10.22, S.D. 4.13				

[1] Since most studies do not report comparable statistics or utilize extreme scorers or median splits in ANOVA designs rather than all scores in regression designs, whatever comparable information was available is reported. Where sex differences were available, they are reported.

APPENDIX E

Overall Intercorrelation Matrix

	Sex	IQ	TASC	TASCLIE	Worry	Emot.	CMAS	CMASLIE	Redundant Cues	Social Cues	Task Cues
Sex-All Ss	1.0	-.23	-.07	-.06	.11	.14	-.01	-.05	.11	.22	-.11
Stress Group	1.0	-.15	-.19	.04	.12	.13	-.09	-.09	.07	.31	.00
NonStress Group	1.0	-.33	-.08	-.19	.10	.20	-.10	-.01	.15	.13	-.21
IQ-All Ss		1.0	-.26	-.03	-.10	-.12	-.06	-.20	-.11	-.01	.01
Stress Group		1.0	-.29	-.06	-.12	-.18	-.16	-.09	-.05	.03	-.08
NonStress Group		1.0	-.23	-.14	-.13	-.10	-.06	-.30	-.20	-.03	.09
TASC-All Ss			1.00	-.52	.34	.41	.71	-.09	.12	.04	-.02
Stress Group			1.00	-.62	.42	.41	.77	-.21	.12	-.05	.09
NonStress Group			1.00	-.36	.28	.43	.64	.04	.12	.13	-.12
TASCLIE All Ss				1.0	-.14	-.20	-.51	.43	-.05	-.09	.04
Stress Group				1.0	-.22	-.27	-.56	.45	-.11	-.08	-.09
NonStress Group				1.0	-.03	-.08	-.43	.41	.05	-.12	.17
WORRY-All Ss					1.0	.54	-.32	-.08	.27	-.04	.10
Stress Group					1.0	.52	.40	-.12	.34	.01	.29
Nonstress Group					1.0	.54	.20	-.03	.17	-.04	-.02
EMOT-All Ss						1.0	.37	.01	.24	-.01	.07
Stress Group						1.0	.42	-.07	.23	-.01	.21
NonStress Group						1.0	.23	.14	.25	.04	-.09
CMAS-All Ss							1.0	-.21	.09	.16	.01
Stress Group							1.0	-.29	.08	.17	.19
NonStress Group							1.0	-.12	.10	.17	-.17
CMASLIE-All Ss								1.0	.07	.01	.05
Stress Group								1.0	.14	.06	.18
Nonstress Group								1.0	.01	-.04	-.05
Redundant Cues-All Ss									1.0	.28	.27
Stress Group									1.0	.26	.34
Non-Stress Group									1.0	.31	.19
Social Cues											
All Ss										1.0	-.10
Stress Group										1.0	-.03
NonStress Group										1.0	-.16
Task Cue All Ss											1.0
Stress Group											1.0
NonStress Group											1.0

Appendix F
Correlations between 4 anxiety measures and cue conditions
by sex and stress

	REDUNDANT CUES					SOCIAL CUES					TASK CUES				
	ALL	STRESS		NON-STRESS		ALL	STRESS		NON-STRESS		ALL	STRESS		NON-STRESS	
Anxiety Measure	Ss (N=127)	Male (N=36)	Female (N=29)	Male (N=35)	Female (N=27)	Ss	Male	Female	Male	Female	Ss	Male	Female	Male	Female
TASC	.12	.06	.24	.14	.05	.04	.00	.03	.23	-.01	-.02	-.05	.24	-.23	-.02
CMAS	.09	.07	.11	.14	-.02	.16	.23	.22	.26	.05	.01	.15	.23	-.23	-.11
Worry	.27**	.31	.38*	.29	-.31	-.04	.07	-.20	-.13	.10	.10	.03	.63**	.15	-.18
Emotionality	.24**	.34*	.03	.21	.30	-.01	-.03	-.09	-.11	.22	.07	.12	.37*	.08	-.19

**p = $\leq$ .01
*p = $\leq$ .05

Appendix G

Correlations among the dependent variables (three cue conditions)

	Redundant Cues	Social Cues	Task Cues
Redundant Cues	1.0	.28	.27
Social Cues		1.0	-.10
Task Cues			1.0

Appendix H

Results of Multiple Linear Regression Analysis of the Effect of Test Anxiety (TASC), Stress and Sex on Performance with Social Cues

Source	r[1]	Regression Weight[2]	%Variance[3]	F
Anxiety	.04	-.07	.00	.006
Stress	-.10	-13.37	.005	.70
Sex	.22	-6.29	.001	.16
Anxiety x Stress	--	.15	.00	.02
Anxiety x Sex	--	1.23	.008	1.01
Stress x Sex	--	25.50	.01	1.43
Anxiety x Stress x Sex	--	-1.33	.005	.69

[1] correlation with performance on social cues

[2] constant = 33.74

[3] independent variance accounted for by effect

Appendix I

Results of Multiple Linear Regression Analysis of the Effect of Test Anxiety (TASC), Stress Condition and Sex on Performance with Task Cues

Source	r[1]	Regression Weight[2]	%Variance[3]	F
Anxiety	-.02	-.10	.00	.02
Stress	-.04	-16.68	.02	1.94
Sex	-.11	-4.01	.001	.11
Anxiety x Stress	--	.72	.005	.66
Anxiety x Sex	--	-.54	.003	.34
Stress x Sex	--	13.38	.006	.70
Anxiety x Stress x Sex	--	-.21	.00	.03

[1] correlation with performance on task cues

[2] constant = 29.39

[3] independent variance accounted for by effect

Appendix J

Results of Multiple Linear Regression Analysis of the Effect of Manifest Anxiety (CMAS), Stress and Sex on Performance with Social Cues

Source	[1] r	[2] Regression Weight	[3] %Variance	F
Anxiety	.16	-.20	.001	.07
Stress	-.10	-17.53	.006	.85
Sex	.22	-11.25	.002	.29
Anxiety x Stress	--	.25	.001	.08
Anxiety x Sex	--	1.01	.007	.92
Stress x Sex	--	21.25	.004	.59
Anxiety x Stress x Sex	--	-.55	.001	.17

[1] correlation with performance on social cues

[2] constant = 29.38

[3] independent variance accounted for by effect

Appendix K

Results of Multiple Linear Regression Analysis of the Effect of Manifest Anxiety (CMAS), Stress and Sex on Performance with Task Cues

Source	r[1]	Regression Weight[2]	%Variance[3]	F
Anxiety	.008	-.43	.005	.59
Stress	-.04	-24.15	.02	2.82
Sex	-.11	-6.49	.001	.17
Anxiety x Stress	--	.86	.01	1.54
Anxiety x Sex	--	-.18	.00	.05
Stress x Sex		8.07	.001	.15
Anxiety x Stress x Sex		.14	.00	.02

[1] correlation with performance on task cues

[2] constant = 35.88

[3] independent variance accounted for by effect

Appendix L

Results of Multiple Linear Regression Analysis of the Effect of Anxiety (Emotionality), Stress Condition and Sex on Performance with Social Cues

Source	r[1]	Regression Weight[2]	%Variance[3]	F
Emotionality	.01	3.15	.01	1.49
Stress Condition	-.10	15.08	.00	.41
Sex	.22	39.17	.02	2.72
Emot. x Stress	—	-3.66	.01	1.46
Emotionality x Sex	—	-4.22	.02	1.92
Stress x Sex	—	-23.67	.01	.63
Emotionality x Stress x Sex	—	4.53	.01	1.66

[1] correlation with performance on Social cues

[2] constant = 10.81

[3] independent variance accounted for by effect

APPENDIX M

Results of Multivariate Multiple Linear Regression Analysis of the Effect of Anxiety (Worry), Stress and Sex on Overall Performance

Source	Regression Weight[1]	F
Worry	2.16	2.86
Stress	55.24	11.15**
Sex	38.75	7.06**
Worry x Stress	-5.40	11.62***
Worry x Sex	-3.43	5.53*
Sex x Stress	-61.96	8.66*
Worry x Stress x Sex	5.92	9.49**

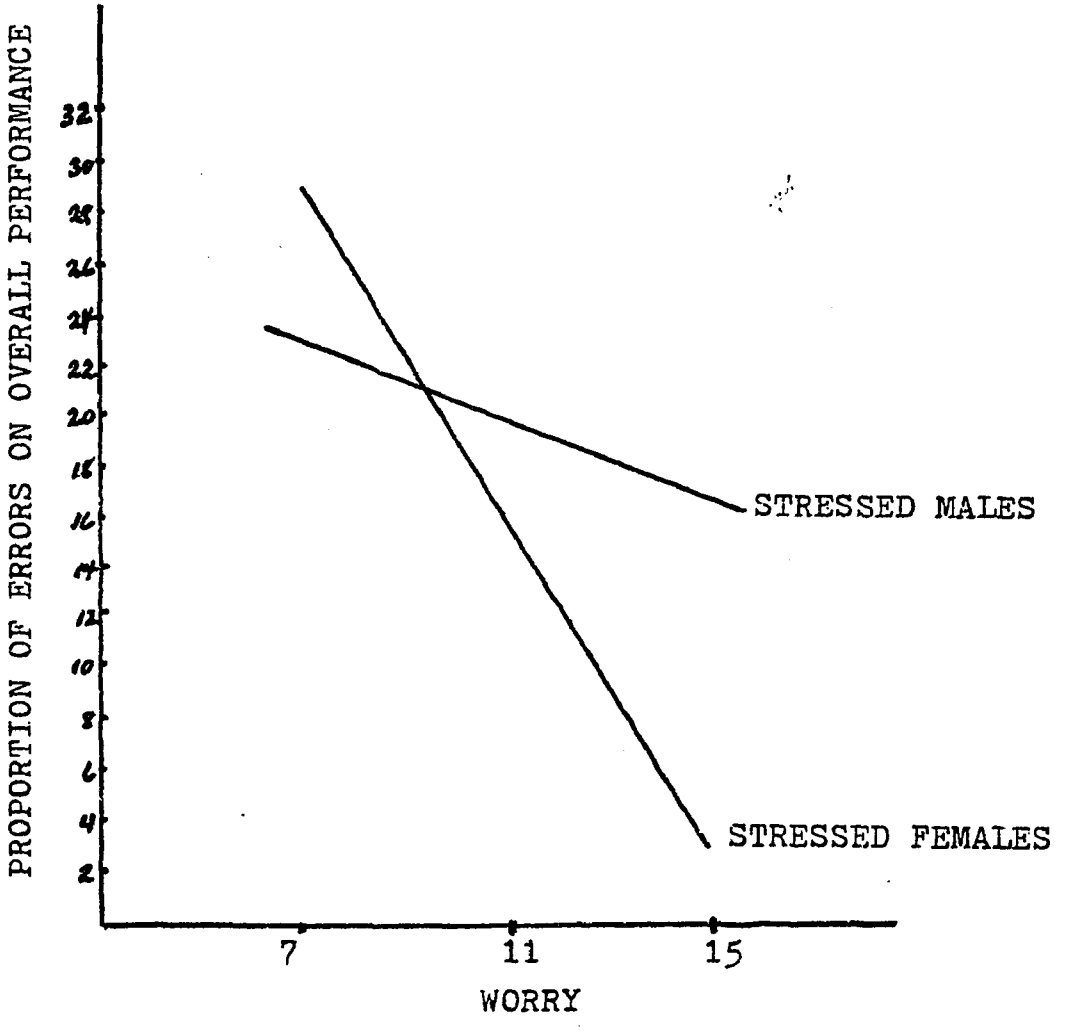
[1] constant = -3.74

*p= < .05

**p= < .01

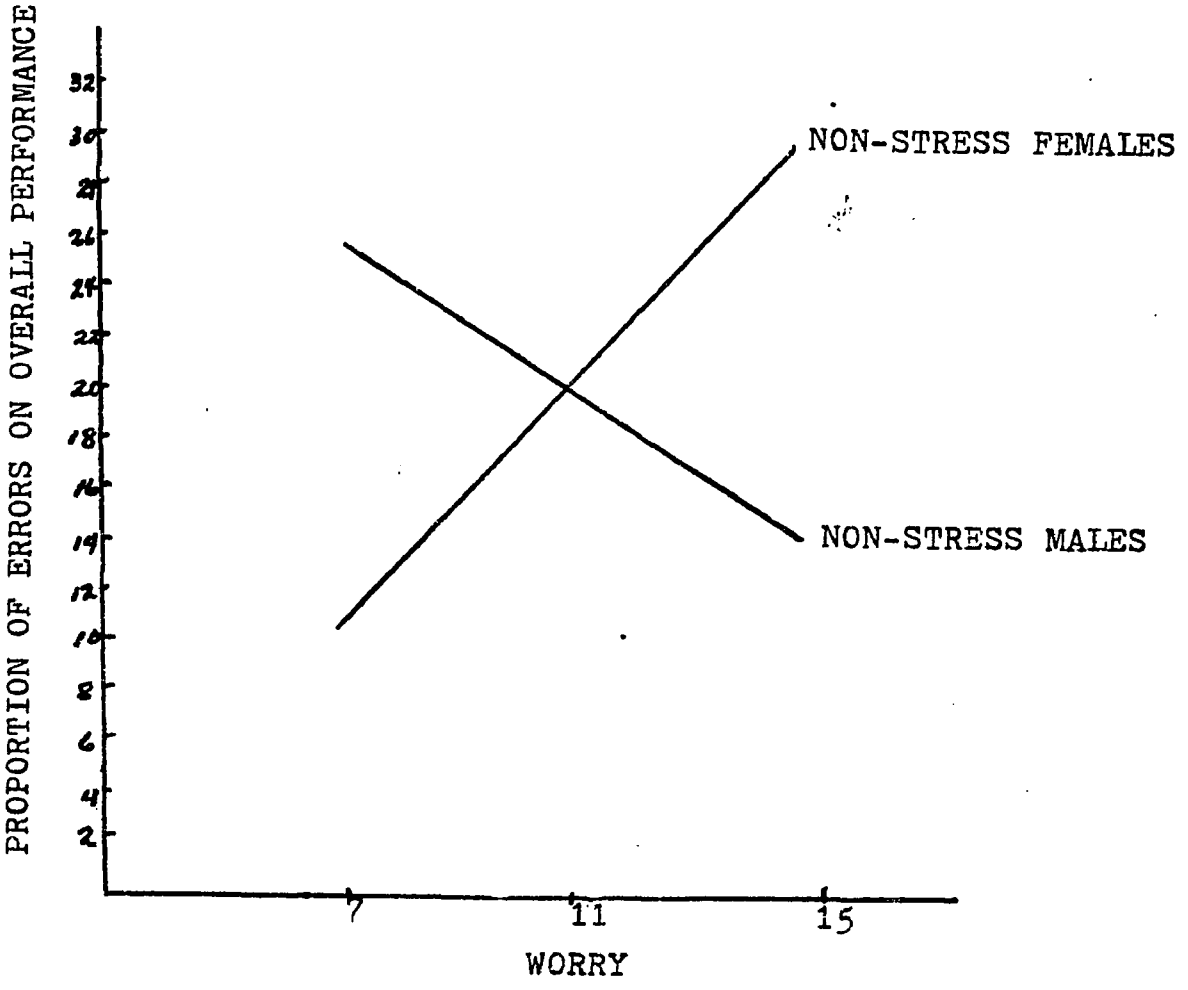
***p= < .001

APPENDIX N



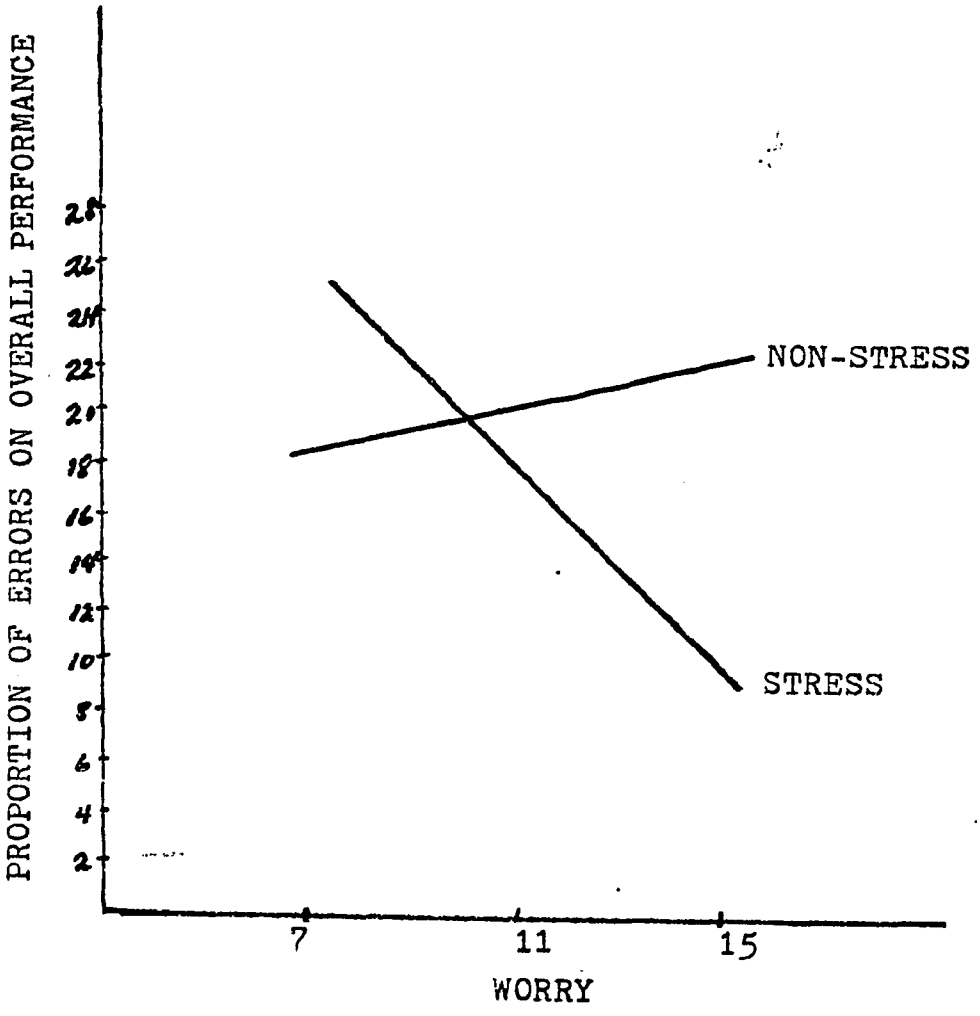
Interaction between Worry and sex on overall performance under stress.

APPENDIX O



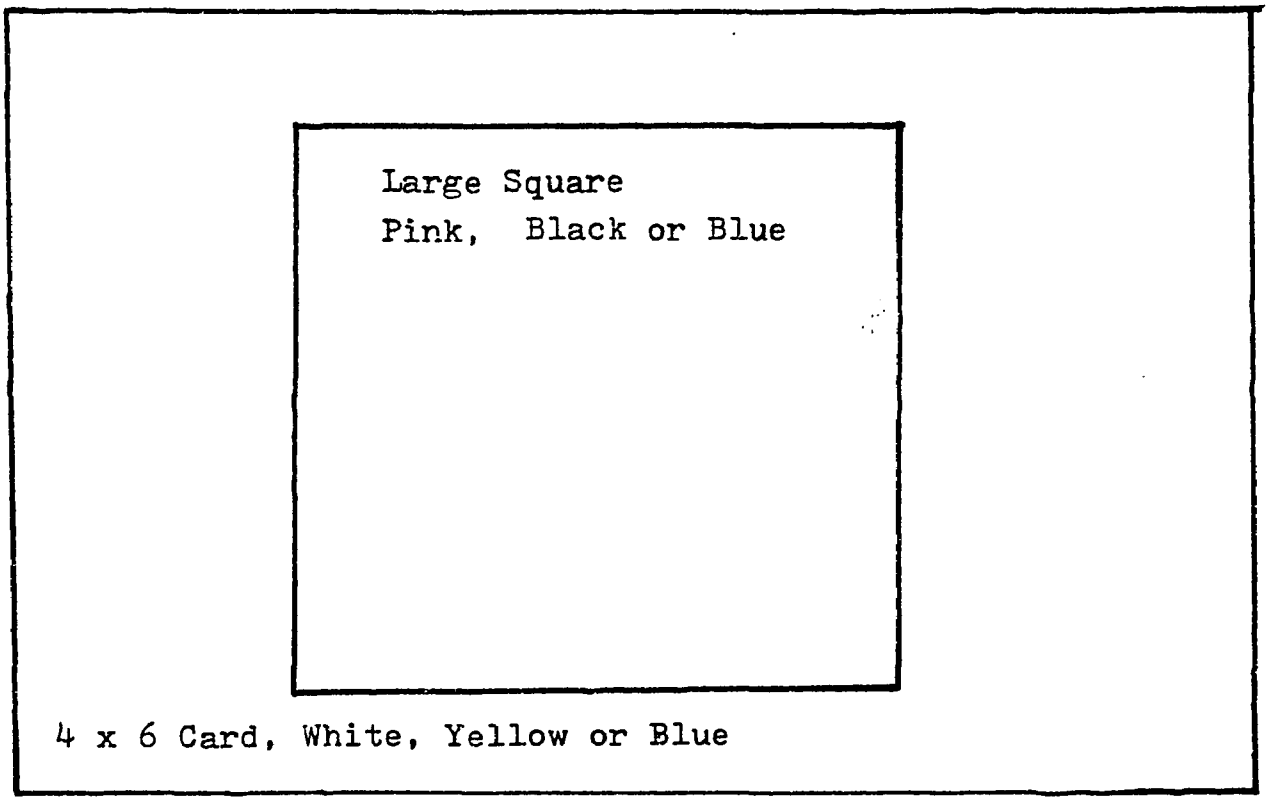
Interaction of Worry and sex on overall performance under non-stress conditions.

APPENDIX P



Interaction between Worry and stress on overall performance.

APPENDIX Q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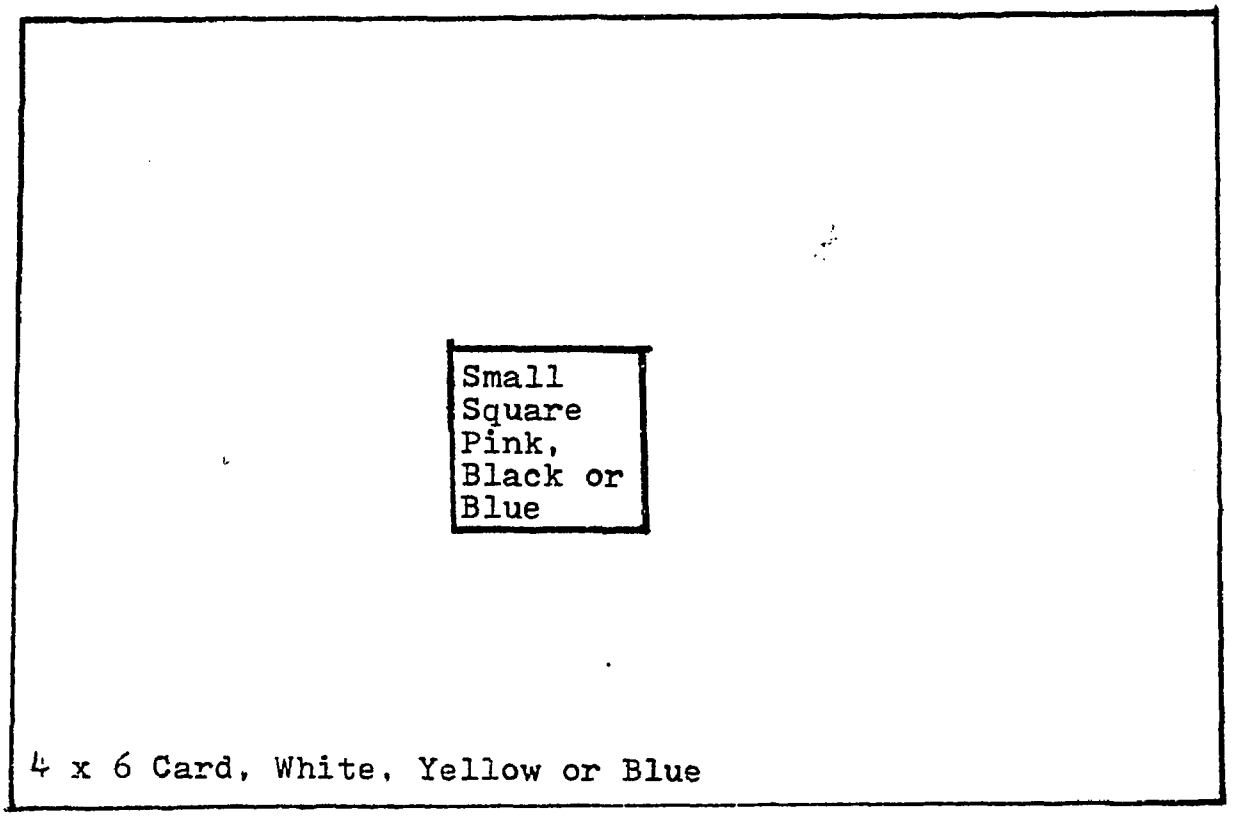
Pink, Black or Blue
4 x 6 Card, White, Yellow or Blue

APPENDIX Q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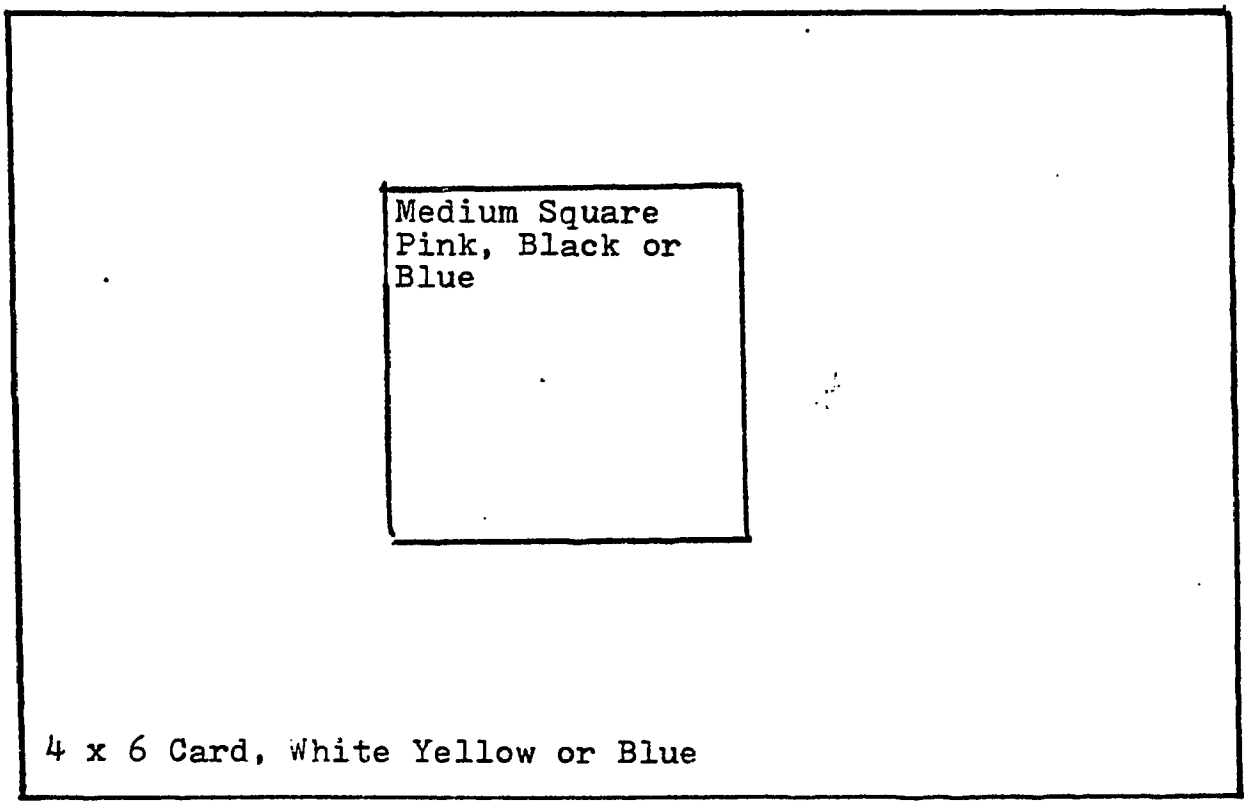
Pink,
Black or
Blue
4 x 6 Card, White, Yellow or Blue

APPENDIX Q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Blue
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