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THE EFFECTS OF STRESS, CREATIVITY AND  
GENDER ON ANAGRAM PERFORMANCE

A Thesis

by

CYNTHIA DAWN THOMAS

Submitted to the Graduate School

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GENDER ON ANAGRAM PERFORMANCE

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## ABSTRACT

THE EFFECTS OF STRESS, CREATIVITY AND  
GENDER ON ANAGRAM PERFORMANCE

(October 1981)

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Stress, gender and creativity were factorially combined to assess their effect on anagram performance. Stress was induced by informing subjects that the experimental task was selected for them due to their poor performance on past intelligence tests. Subjects were divided into low and high creativity groups based on Barron-Welsh Art Scale scores. Results indicated that stressful instructions facilitated anagram performance for high creatives and that nonstressful instructions facilitated performance for low creatives. For high creative subjects, females performed better than males and for low creative subjects, males performed better than females on the anagram task. No other factors were found to be significant.

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## INTRODUCTION

The variables under investigation in the present study are stress, creativity, and gender. These variables were chosen in an attempt to replicate a study by Sempowski (1973) with one minor alteration in the design.

Sempowski (1973) hypothesized that high creative individuals would perform cognitive tasks better than low creatives while both were under stress. Levels of creativity were assessed by the Barron Welsh Art Scale. Stress was manipulated through stress inducing instructions related to the intelligence level of the subject. The cognitive task performed was the Watson-Glazer Critical Thinking Test. Sempowski's results confirmed the hypothesis that high creatives can perform a cognitive task significantly better than low creatives while both are under stress.

The modification of the Sempowski (1973) design was simply to include gender as a third factor. The inclusion of gender did not actually alter the experimental manipulation, but it did change the analysis to a 2 X 2 X 2 factorial design.

The relevant literature in each of the three major areas of stress, creativity, and gender are reviewed in the upcoming sections of this paper.

### Anxiety and Stress

Anxiety is a universally experienced phenomenon and one that is defined in diverse ways. Freud (1924) described anxiety as a feeling, a negative emotional condition. Lader (1975) referred to anxiety as a complex psychological process comprising either a relatively stable

personality trait or a transitory emotional state. He employed the term trait anxiety to describe anxiety as a relatively enduring personality characteristic. State anxiety, on the other hand, was employed to describe a transitory emotional phenomenon in response to a specific situation: State anxiety was said to consist of a "complex sequence of cognitive, affective, and behavioral events that are evoked by some form of stress" (Speilberger, 1975). This psychological process may be initiated by either internal, physiological or stressful external stimuli. State anxiety, rather than trait, will serve as the focus of this paper.

Two major theories of emotion have influenced the design of anxiety research. The James-Lange theory (James, 1894) postulated that physiological changes must precede the conscious experience of anxiety. The Cannon-Bard theory (Cannon, 1931), however, maintained that physiological changes are activated simultaneously with the conscious experience of emotion. The experience of emotion actually mediates the change in the behavior. The physiological changes and behavioral effects implied by both theories are perceived as immediate consequences of environmental stress. Anxiety research has been influenced by these theories since physiological changes within a person have served as indices of the presence or absence of anxiety.

Anxiety is typically thought of as a response to stress. (Lader, 1975; Speilberger, 1975). Stress, on the other hand, has been empirically defined as either a response or a stimulus. Seyle (1956) defined stress as "the nonspecific response of the body to any demand made upon it." Coffey and Appley (1964) defined stress as the response of a person when it is perceived that the individual's well-being is endangered.

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Stress was described by Appley and Trumbull (1975) as a new, intense, rapidly changing, sudden or unexpected situation which acts as a stimulus. Appley and Trumbull (1975) also classified "stimuli leading to cognitive misperception, stimuli susceptible to hallucination, and stimuli calling for conflict responses" as stressful stimuli.

Stress has frequently been manipulated to assess its effects on task performance and its effect in producing anxiety (Katkin, 1964, 1965; Hodges & Spielberger, 1966). Anxiety as a response to stress has been evaluated through a variety of paper and pencil assessment devices such as the Multiple Affective Adjective Checklist or through the collection of physiological data. The focus of this paper will be on stress as a manipulated stimulus which will be assumed to mediate anxiety and affect task performance. The manner in which anxiety and task performance are mediated by stress is through the relationship between anxiety and motivation, and the relationship between motivation and task performance.

The relationship between task performance and motivation is a non-monotonic one (McClelland, 1951). Therefore, highest performance is achieved by persons with an intermediate amount of drive or motivation. Performance is lower for those with low or high motivation. More difficult tasks are performed best by persons with lower drive and worst for persons with higher drive (McClelland, 1951). A common method used to manipulate motivation is stress induction.

#### Stress Induction

Although a specific stimulus may not be perceived as threatening to everyone exposed to it (Hodges; 1966, 1968), many researchers have manipulated stress through stress inducing instructions (Katkin, 1964, 1965;

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Hodges & Spielberger, 1966; Hodges, 1966, 1968; Montgomery, 1977; Bidell, 1972). Stress induction has typically involved either a threat to one's physical well-being or to one's integrity.

In order to induce threat to physical well-being of subjects, Katkin (1964, 1965) first obtained baseline GSR measures while subjects were relaxing. As the control subjects continued to relax, subjects in the stress condition were asked questions about their health. They were told that they would receive strong electric shocks and that if they were healthy, the procedure would be safe. During this pre-experimental phase, a marked increase in GSR occurred for the stress group over the non-stress group.

Hodges (1966, 1968) compared the effects of both physical and psychological stress to a nonstress condition. Physical stress was induced by telling subjects that they were going to receive one or more electric shocks while performing a task. Psychological stress was comparably induced by telling subjects that they were not doing badly, but that others in the past had responded to the task quicker (failure-threat condition). The stress inducing instructions were given after the subjects had completed parts of the Wechsler Adult Intelligence Scale, taken a rest period, and completed the Affective Adjective Checklist (AACL). Following the inductions, subjects were asked to repeat six different series of digits. The procedure was the same for the control group but with no stress induction. Heart rate was monitored continuously and the AACL was readministered following completion of the digit span task. Results indicated that the two stress conditions produced increases

in both heart rate and AACL scores. The failure-threat instructions produced the greatest increase in AACL scores and in heart rate.

Describing a task as a measure of intelligence is another commonly used technique for stress induction. Montgomery (1977) manipulated stress by telling subjects that their performance on the anagram task they were about to complete was related to intelligence. Differences between the stress and the no stress condition were found when comparing heart rate and scores on the Multiple Affective Adjective Checklist (MAACL) with the stress group scoring higher on both measures.

Bidell (1972) used a similar induction by telling subjects that the Wide Range Achievement Test (WRAT) they were about to complete measured their verbal ability. Subjects were also told that their scores would be used by teachers for grading purposes. Differences in WRAT scores were found between the stress and the no stress groups.

McGrath (1977) characterized stress induction strategies with respect to three themes: the cognitive appraisal theme, the prior experience theme, and the negative experience theme. Research on cognitive appraisal as a source of stress induction suggests that stress is in the eye of the beholder and that emotional experiences are in part, a function of the perceptions, expectations, or cognitive appraisal which the individual makes of the stressing situation (Fritz, 1957). Similarly, research with respect to the experience theme implies that prior experience with the task, the stressor and/or the situation, increases the effect of stress (McGrath, 1977). The theme of negative experience suggests that the experience of failure on a task is stressful in itself

and affects performance on later tasks in a negative fashion (McGrath, 1977). Experimental manipulations have been successfully employed to induce stress in accordance with each one and all combinations of these themes (McGrath, 1977). In the present study the method of stress induction was derived from a combination of the theme of cognitive appraisal and the theme of negative experience. Subjects were told that a task was selected for them due to their low intelligence scores obtained from past test performance.

### Creativity

Creativity research has focused primarily on the personality characteristics of a creative person. A pioneer in creativity research, Roe (1946, 1953), observed that creative people were willing to work harder and longer hours than less creative people. Roe implied that this willingness to work was a sign that creative individuals were more motivated, in general, than their less creative peers.

The results of various studies by Guilford (1950) indicated that creative people have more fluency, flexibility and originality in their thought. In a follow-up of his work, Guilford, et.al. (1957) observed that creative people have greater tolerance of ambiguity, a stronger need for adventure, and are more impulsive and confident.

Asch (1955) found that highly creative subjects were more independent in their judgment. Subjects were asked to make comparisons of line lengths. Each subject was placed in a room with a group of confederates who made intentional mistakes on the line comparisons. The less creative subjects tended to agree with the confederates while the high creatives kept their initial independent judgments.

Barron (1963) found many differences between high and low creative subjects on a self-description task (Gough Adjective Checklist). High creatives tended to report being gloomy, pessimistic, pleasure-seeking, aloof, demanding and anxious. Low creatives reported being contented, gentle, serious, stable, modest and responsible. Based on staff evaluations, Barron suggested that high creatives were intensely expressive, expansive and fluent in their speech. They were more original, used artistic expression and excelled in esthetic judgment. Highly creative individuals were more internally controlled and were usually social nonconformists.

In a study using the Welsh Anxiety Index of the MMPI (Barron, 1963), results indicated that creative people had higher anxiety scores (trait anxiety) and a higher tolerance of anxiety (state anxiety).

Sempowski (1973) supported Barron's findings that high creatives have a greater tolerance of anxiety. On the Watson-Glazer Critical Thinking Test, subjects rated as high creatives scored the same under the stress and no stress conditions. Subjects rated as low creatives scored significantly lower on the test under stress induction than they did under no stress induction. High creative subjects scored significantly higher than low creative subjects under the stress condition and there was no significant difference between groups under the no stress condition.

Trentham (1972) obtained data which conflicted with the anxiety research of Barron. Trentham found that subjects who scored lowest on the originality aspect of the Torrance Test of Creativity were those with

high test anxiety (state anxiety) as measured by Sarason's Test Anxiety Questionnaire. The inverse was true for those scoring highest on the originality aspect.

The question of whether intelligence is a characteristic found more in highly creative individuals than lower creative individuals is one that is still being investigated. When comparing the parents and environmental backgrounds of children with high intelligence (HI) and those of high creative children (HC), Getzels and Jackson (1962) found many differences. The HI parents tended to have a higher educational status than HC parents. They also possessed a greater sense of insecurity. HI parents were less satisfied with the child's school. The reading interests in the HI family conformed more to conventional standards and were representative of greater child-centeredness. Results also indicated that qualities found and expected in HI children were that the children should be more open to experience, have high values and have an interest and enthusiasm for life. From these results, it appears that the HC child was able to develop more on his/her own than the HI child with less expectations from parents. Consistent with Barron (1963), HC children appear to be more internally controlled and more independent in their judgment (Asch, 1955).

#### Tests of Creativity

Research has indicated that the degree of relationship found between creativity and intelligence appears to depend on the creativity assessment device used. Creativity tests found to correlate highly with intelligence measures were the Remote Associates Test (Day & Langevin, 1969) and the Torrance Test of Creativity (Yamamoto, 1965). A low

correlation was obtained between responses to the Barron Welsh Art Scale (BWAS) and the Wechsler Adult Intelligence Scale (Sechrest and Jackson, 1961).

Barron and Welsh (1952) developed a test of creativity, the Barron Welsh Art Scale (BWAS), which was found to be relatively independent of intelligence as indicated by Sechrest and Jackson (1961). The test consists of a series of eighty-six black and white drawings, sixty of which are used in calculating a score. It is easily administered with self-explanatory instructions on the cover of the booklet. The subject is asked to indicate which figures are most pleasing to the eye. A high score is achieved by endorsing asymmetrical, unbalanced and ambiguous figures. Barron (1952) validated the test by comparing artists to non-artists in which case scores discriminated between those who had expressed creative ability (artists) and those who had not (nonartists). Rosen (1955) reported similar findings when using the same two validation groups (artists and nonartists). Wrightsman and Cook (1964) and Barron (1965) demonstrated the reliability of the BWAS through test-retest procedures.

Sechrest and Jackson (1961) correlated BWAS scores with academic intelligence as measured by the WAIS resulting in a very weak correlation of  $r = -.07$ . The BWAS was the test chosen for the present study to alleviate the confounding factor of intelligence with creativity.

The Remote Associates Test (RAT) consists of a list of thirty groups of words with common associations. The object of the test is to choose a fourth word for each set which is associated with the other three words. A total score is obtained by summing the number of correct

associations. A correlation of  $r = .43$  resulted between RAT scores and Lorge-Thorndike scores (Day & Langevin, 1969). Day and Langevin (1969) found a similar degree of relationship ( $r = .55$ ) between RAT scores and scores on the Wechsler Intelligence Scale for Children. The Torrance Test of Creativity (TTC), which includes a variety of problem solving tasks, correlated .88 with intelligence as measured by Lorge-Thorndike test scores (Yamamoto, 1965).

#### Gender Differences

The effects of personality characteristics, task complexity and their interaction with gender have been widely researched in the past few decades. Many of the previously mentioned variables associated with stress and performance interact with gender.

Gender and Anxiety: Research has indicated that females generally possess greater trait anxiety than males. Sarason and his colleagues (1960) concluded that girls consistently scored higher than boys on the Test Anxiety Scale for Children (TASC) and on the General Anxiety Scale for Children (GASC). Scores were higher on the GASC than on the TASC for girls. Sarason reported that this pattern of differences was obtained in both England and the United States. When using an older sample of subjects, eighteen to twenty-one-year-old males and females, Mendelsohn and Griswold's (1967) results supported Sarason's findings. Mendelsohn and Griswold (1967) found that women scored significantly higher than men on the anxiety scale of the MMPI. A similar result was obtained by MacDonald (1970) with the same aged subjects. Spielberger (1975) suggested that individuals with high anxiety levels were inhibited when



performing complex tasks such as solving anagrams or taking a test. This was supported in his findings that females scored lower than males on an anagram task.

Gender and Need to Achieve: The need to achieve, to strive for success, is a learned drive that affects task performance in an unusual manner.

High need to achieve individuals prefer either an easy or a difficult task over an intermediate level task (Atkinson, 1957). The need to achieve acts as a motive to perform and varies as a function of the strength of the fear of failure and strength of need to achieve.

McClelland (1951) tapped the person's hope for success and Atkinson (1964) tapped the fear of failure or avoidance tendencies. In terms of McClelland, low need achievers choose an easy task because the hope for success is more easily obtained. Atkinson would argue that it is because the fear of failure is lessened. The superiority of Atkinson's theory is pronounced when dealing with preference for difficult tasks. McClelland did not adequately explain this preference, but Atkinson argued that the fear of failure is less because the person does not expect to succeed and can explain one's failure. The manner in which need achievement affects performance varies as a function of the ease of the task being performed.

The need to achieve also affects the persistence of an individual on a task. Generally, the higher the need to achieve, the greater the motive to perform well (Atkinson, 1957). With respect to persistence, high need achievers are more likely to continue with easy tasks whereas low need achievers are more likely to follow through with more difficult tasks (Feather, 1961). While some researchers, Monday et.al. (1966,

1967), suggested that need achievement was more prominent in females, the majority of the research suggests the notion that need achievement is more prominent in males (McManis, 1965; McClelland, 1951).

Statement of the Problem

In order to assess the effects of stress, creativity and gender on task performance, female and male college subjects were assigned to the cells of a 2 X 2 X 2 factorial design. Since Barron (1958) observed that highly creative subjects were able to solve anagrams more quickly than low creatives, an anagram task was chosen for the present study. In conjunction with Barron's findings, it was hypothesized that a main effect of creativity would be found with high creatives performing better than low creatives.

Consistent with the findings of Spielberger (1975) a stress main effect was anticipated. It was further hypothesized that the effects of stress would interact with the variable of creativity. Because high creatives are more tolerant of anxiety (Sempowski, 1973), it was hypothesized that the performance on the anagram task by high creatives would be facilitated under the stress condition or be at least equal to that under the nonstress condition. This hypothesis is similar to the previously confirmed hypothesis by Sempowski (1973) that high creatives performed better under stress and nonstress conditions. It was predicted that scores on the anagram task for low creatives would be lower for the stress condition than the nonstress condition.

There were no hypotheses made about differential responding between males and females since the cognitive task used was a simple task. The focus of the literature in this area is on complex tasks, not simple ones.

There were no hypotheses made about the interaction between gender and creativity since the research in this area does not clearly indicate how the combination of the two variables affect task performance.

## Method

### Subjects

The subjects were 138 college students enrolled in five introductory and educational psychology classes at Appalachian State University. Seventy-seven of the subjects were female and sixty-one were male. The five classes were tested within the context of single class meetings.

### Materials

The Barron-Welsh Art Scale (BWAS), a portion of the Welsh Figure Preference Test, was used to assess creativity. SAT scores, obtained from the Registrar's office with permission of each individual student, were used as a measure of intelligence.

The efficacy of stress induction was measured by an anxiety questionnaire developed by the author. The questionnaire (Table I) consisted of eight statements related to anxiety which were rated on a five-point likert scale.

The cognitive task consisted of a list of 20 anagrams selected from Mayzner and Tresselt's (1966) list of 134 solutions words and 378 associated anagrams. Anagrams were randomly chosen with a difficulty of normative solution times ranging from three seconds to seventeen seconds. Anagrams with short solution times were chosen for experimental efficiency. Table II lists the anagrams, solution words and normative solution times.

### Procedure

A 2 X 2 X 2 between subjects factorial design was used to study the effects of creativity, stress, and gender on ability to perform a cognitive task. Table III presents the conceptual arrangement of the experimental design.

Subjects were assigned to the experimental conditions in the following manner. Names were written on envelopes in alphabetical order. An anagram task (B) and an anxiety questionnaire (C) was placed in each. Subjects were then randomly assigned to the stress or nonstress conditions by grouping the envelopes according to gender and then shuffling each group to alter the previous alphabetical order. Stress and nonstress instructions were inserted in the envelopes in alternating order.

At the beginning of each psychology class, the experimenter was introduced as a graduate student conducting research. The experimenter explained that a number of tasks would be administered and that feedback would be given at a later date in order to provide a learning experience. The experimenter informed the students that if they did not wish to participate they could leave (none left) and that at any time during the experiment when they felt uncomfortable about the task they were completing they could stop (none quit). The students were told that if they had any questions they should be asked in private.

The BWAS was administered according to the instructions listed on the cover. No time limit was imposed but the students were asked to work as quickly as possible.

Upon completion and collection of the BWAS the experimenter read the following instructions:

General Instructions

"I am about to hand each of you an envelope which contains information about yourself. When I call your name raise your hand and upon receiving the envelope please wait until all the envelopes have been distributed before you open them.

----- Pass out envelope -----  
 You may now open your envelopes and take out the small slip of paper but do not discuss the contents of this paper with anyone."

The small slip of paper contained the stress or the nonstress instructions.

Stress Instructions

The following task was selected for you on the basis of your poor performance on past intelligence tests. Now take out the paper labeled B and begin solving your task as quickly as possible when the experimenter tells you to begin.

Nonstress Instructions

The following task was randomly selected for you to complete. Now take out the paper labeled B and begin solving your task as quickly as possible when the experimenter tells you to begin.

Upon receiving the command to begin the students commenced to solve the anagrams. When two minutes had elapsed (two-thirds the normative solution time) the students were asked to stop. The time was clocked on a Premier stopwatch. The next instructions were "Now take out the paper labeled C and answer the questions according to the directions at the top of the page." When all subjects had completed the task they were asked to place all three pieces of paper in their envelopes and pass them to the front of the classroom.

The experimenter immediately read the debriefing instructions and answered questions concerning the experiment.

Debriefing Instructions

"The purpose of this experiment was to study the effects of stress in relation to creativity and gender. Your performance on the task you have just completed has no direct relationship to your intelligence as you were randomly assigned to the stress or the nonstress group. The stress condition was telling you that your task was selected for you because of your poor past performance on intelligence tests and the nonstress condition was telling you that the task was randomly selected for you. You were only given two-thirds the amount of time necessary to solve the anagrams so very few people would obtain a perfect score. When performing any of these tasks in an experimental situation there is no relationship to real life situations. Everyone exhibits some type of anxiety in a situation such as this one, so do not worry about your performance. Thank you for your participation. Any questions?"

Finally, in order to gain access to the subjects' SAT scores, the instructor circulated a permission sheet to be signed by the students. The SAT scores were collected to find out how they varied as a function of task performance.

### Results

A median split on BWAS scores was used to define high (HC) and low (LC) creativity groups. The median was 24.84. For the high creativity group, the mean BWAS score was 34.42 with a standard deviation of 7.37. For the low creativity group, the mean BWAS score was 15.25 with a standard deviation of 5.25. The cell means are presented in Table IV.

A Pearson product-moment correlation was performed to assess the relationship between SAT scores and BWAS scores. A low correlation of  $r = .208$  was significant ( $p < .05$ ). To determine equality of SAT scores (intellectual aptitude) between groups, a  $2 \times 2 \times 2$  analysis of variance was conducted between the eight groups with SAT scores as the dependent measure. There were no significant differences between groups ( $F(1, 130) = 3.24, p > .05$ ).

Figure I illustrates the interactions between stress, creativity, and gender. From the graph it appears that there are interactions between the stress conditions and creativity, and between creativity and gender. The graph indicates that under the stress condition high creatives performed better than low creatives and the opposite was true under the nonstress condition. The graph also demonstrated that high creative females performed better than high creative males, and low creative males performed better than low creative females.

The statistics presented in Table V support the graphical impressions described above. To assess differences between groups on anagram performance a  $2 \times 2 \times 2$  analysis of variance was conducted between the groups with number of anagrams correctly solved as the dependent measure. Although analyses yielded no significant main effects, the interactions

between stress condition and creativity ( $F(1, 130) = 3.97, p < .05$ ) and between gender and creativity ( $F(1, 130) = 4.09, p < .05$ ) were significant.)

Table VI shows the anxiety questionnaire items and the corresponding Hotelling T-square F values obtained through comparisons of the responses by the two stress groups. Significant F values for questions three, four, five, seven and eight were obtained. Items two and five were related to the success that the subject was having when solving the anagrams. Items one, six, and eight dealt generally with state anxiety. Item six referred to the subject's patience.

The stress induction was evaluated most specifically by items three, four, and seven. All of these items refer to the subjects' knowledge of their past performance on intelligence tests.

### Discussion

The results of the present study supported only one of the hypotheses; that high creativity subjects would perform the same or better under the stress condition in comparison to the nonstress condition. The confirmation of this hypothesis is consistent with the findings of Sempowski (1973). A possible explanation is that since the high creativity group ( $\bar{X} = 34.42$ ) did not score as high as the normative group ( $\bar{X} = 48.6$ ) on the BWAS, some unknown variable that differentiates between males and females may have created the differential responding.

It is possible that self-concept or self-esteem may have influenced this differential responding. Jacobson et.al. (1969) showed no gender differences on either of these measures so it is doubtful that self-concept or self-esteem were the extraneous variables affecting the outcome differences between males and females. Future research in this area might be done investigating these variables or others such as need to achieve, test (state) or trait anxiety and locus of control and their effect with respect to gender on task performance.

The results of this study did not support the hypotheses that 1) high creative subjects would generate more anagram solutions than low creative subjects, and 2) the stress group would perform differently than the nonstress group.

The fact that neither of these hypotheses were confirmed may be interpreted in several ways. Perhaps no differences actually existed. As stated earlier, the high creative group was lower than the normative group on BWAS scores (Barron, 1956) which may have inhibited a creativity

main effect. Another interpretation would be that the procedure and data recording techniques were not adequate. The stress inductions did not actually produce significant differences between the two stress groups as measured by the anxiety questionnaire. An alternative explanation for the lack of main effects could be that unequal cell frequencies was a critical factor. The lack of statistical balance was due partly to the lack of control over student attendance and partly to the design of the study. A suggestion to help reduce student attrition and resulting imbalance is to choose an instructor who requires class attendance with a limited amount of absences. Another suggestion to improve the method is to administer the BWAS in a session prior to conducting the remainder of the experiment. If one does this, an equal number of males and females may be assigned to each level of the stress condition and groups may also be created on the basis of BWAS scores.

The major problem with the study was that the anxiety questionnaire was not a previously validated assessment device. The responses to items one and eight of the anxiety questionnaire were inconsistent. The difference between groups on responses to item one (I felt relaxed...) were not significant yet the difference between groups on responses to item eight (I did not feel nervous...) were significant. Also, the items that dealt specifically with the stress induction were worded such that the nonstress group had no real choice in their responses to these items since they had no idea of what performance on past intelligence tests scores referred to. However, if no effect existed the mean responses on all items would have been equal and they were not. A general trait and a state anxiety measure with prior validation is suggested for future research.

Although the results of this study are difficult to interpret in light of the problems with the assessment devices used and the low scores on the BWAS by the high creativity group, they do indicate the need for research in this area. Most specifically, the fact that the interaction of creativity and stress facilitated the high creative group's performance, may say something to both parents and teachers. If high creative students are more likely to perform better on cognitive tasks than low creative students in a condition of experimentally induced stress, creative abilities should be facilitated so that persons will not be adversely affected in their performance when subjected to stress. It follows then that since today's society involves a lot of stress, both teachers and parents should not hamper a child's creativity, instead, classes and homelife should be focused on bringing it to the surface.

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## APPENDICES

TABLE I  
ANXIETY QUESTIONNAIRE

Name \_\_\_\_\_  
Soc. Sec. # \_\_\_\_\_

Directions: Answer the following questions according to the scale listed below. Place the number which corresponds to your response in the space provided next to the appropriate question number. Your response should be based on the way you feel right now.

Scale

- 1 I disagree strongly
- 2 I disagree somewhat
- 3 Not applicable
- 4 I agree somewhat
- 5 I agree strongly

- \_\_\_\_\_ 1. I felt relaxed while solving the anagrams.
- \_\_\_\_\_ 2. I feel distressed about my ability to solve the anagrams.
- \_\_\_\_\_ 3. I was concerned about my poor performance on past intelligence tests.
- \_\_\_\_\_ 4. Knowing about my past performance did not affect my ability to solve the anagrams.
- \_\_\_\_\_ 5. I feel enthusiastic about my ability to solve the anagrams.
- \_\_\_\_\_ 6. I felt impatient while solving the anagrams.
- \_\_\_\_\_ 7. Knowing about my past performance on intelligence tests greatly affected my ability to solve the anagrams.
- \_\_\_\_\_ 8. I did not feel nervous while solving the anagrams.

TABLE II  
ANAGRAMS, SOLUTION WORDS AND STANDARD SOLUTION TIMES

Name \_\_\_\_\_  
Soc. Sec. # \_\_\_\_\_

Directions: Write the correct solution word in the space provided next to the appropriate anagram. For example, the anagram dgfeu would have as its solution word, fudge.

Anagram	Solution Word	Time(sec)	Anagram	Solution Word	Time(sec)
EGUJD	<u>JUDGE</u>	3	LCOHT	<u>CLOTH</u>	9
IFNLG	<u>FLING</u>	3.5	HROAC	<u>ROACH</u>	9.5
EOCVI	<u>VOICE</u>	4	AWRLB	<u>BRAWL</u>	10
ODELM	<u>MODEL</u>	4.5	UGARS	<u>SUGAR</u>	10.5
NTRAI	<u>TRAIN</u>	5	RMCAP	<u>CRAMP</u>	12
NTJAU	<u>JAUNT</u>	5	OHTNM	<u>MONTH</u>	13
EUOHS	<u>HOUSE</u>	6	RTYPA	<u>PARTY</u>	14
NRDKI	<u>DRINK</u>	7	IUFTR	<u>FRUIT</u>	15
MILBC	<u>CLIMB</u>	7.5	CAHTB	<u>BATCH</u>	16
IHRCA	<u>CHAIR</u>	8.5	UODNP	<u>POUND</u>	17

TABLE III  
CONCEPTUAL ARRANGEMENT OF THE EXPERIMENTAL DESIGN

Group Number	Stress Condition	Creativity	Gender
1	Stress	LC	M
2			F
3	Stress	HC	M
4			F
1	Nonstress	LC	M
2			F
3	Nonstress	HC	M
4			F

TABLE IV  
CELL MEANS FOR BWAS SCORES

Group	High Creativity	Low Creativity
Stress	Male $\bar{X} = 32.43$ n = 11	Male $\bar{X} = 15.41$ n = 21
	Female $\bar{X} = 38.68$ n = 19	Female $\bar{X} = 15.13$ n = 19
Nonstress	Male $\bar{X} = 31.42$ n = 14	Male $\bar{X} = 15.16$ n = 15
	Female $\bar{X} = 35.14$ n = 22	Female $\bar{X} = 15.29$ n = 17

TABLE V  
ANALYSIS OF VARIANCE

Source	df	SS	MS	F
Stress (A)	1	.217	.217	.02
Creativity (B)	1	13.258	13.258	1.42
Gender (C)	1	8.464	8.464	.91
Interactions				
A X B	1	36.980	36.980	3.97*
A X C	1	34.505	34.505	3.70
B X C	1	38.125	38.125	4.09*
A X B X C	130	1211.948	9.323	

\* p < .05

TABLE VI  
F VALUES FOR THE ANXIETY QUESTIONNAIRE: STRESS VS. NONSTRESS

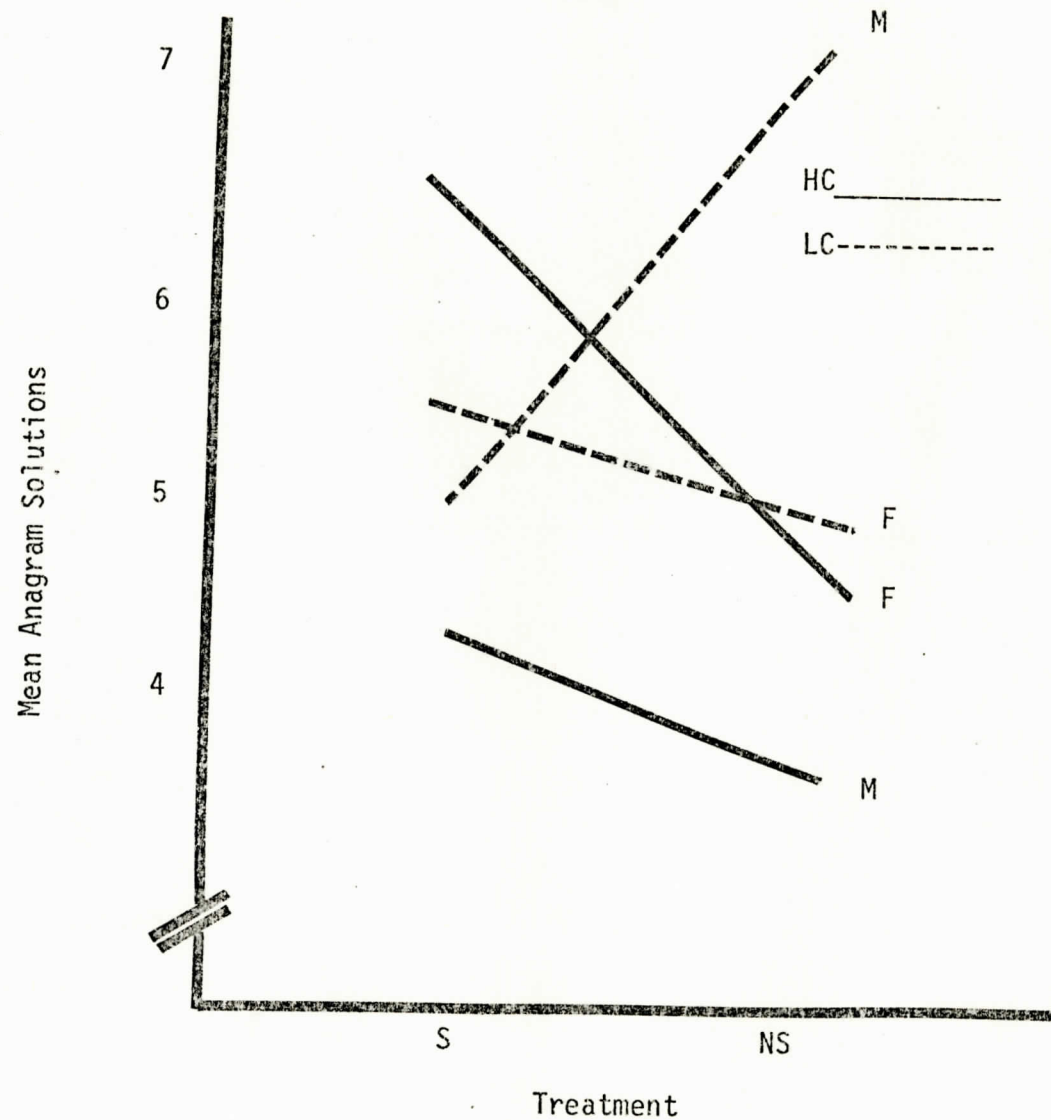
F. Value	Question
1.37	I felt relaxed while solving the anagrams.
1.34	I feel distressed about my ability to solve the anagrams.
*1.77	I was concerned about my poor performance on past intelligence tests.
**2.45	Knowing about my past performance on intelligence tests did not affect my ability to solve the anagrams.
**1.92	I feel enthusiastic about my ability to solve the anagrams.
1.41	I felt impatient while solving the anagrams.
*1.89	Knowing about my past performance on intelligence tests greatly affected my ability to solve the anagrams.
*1.71	I did not feel nervous while solving the anagrams.

\*p < .05

\*\*p < .01

FIGURE I

INTERACTIONS BETWEEN STRESS, CREATIVITY, AND GENDER



## VITA

Cynthia Dawn Thomas was born in Erie, Pennsylvania on December 15, 1956. She attended school in various cities throughout the country and was graduated from McDowell High School in June, 1974. The following September she entered school at West Virginia Wesleyan College, and in May 1978 she received a Bachelor of Arts degree in Psychology. In the fall of 1978 she accepted a teaching assistantship at Appalachian State University and began study toward a Master's degree. This degree was awarded in 1981 in the field of Experimental Psychology.

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