

2008

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### Recommended Citation

Orfus, Shauna (2008) "The Effect Test Anxiety and Time Pressure on Performance," *The Huron University College Journal of Learning and Motivation*: Vol. 46 : Iss. 1 , Article 7.

Available at: <https://ir.lib.uwo.ca/hucjlm/vol46/iss1/7>

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## The Effect Test Anxiety and Time Pressure on Performance

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A study was conducted to investigate the relationship between test anxiety and time pressure as prediction on a performance task. It has been showed that high-test anxiety and time pressure can have an effect on a cognitive task performance. 32 undergraduate students at Western University College were given a math task and the Test Anxiety Scale and classified as having low or high-test anxiety by a median split. Subjects in the time pressure conditioned were told they only had a limited amount of time to complete the task and were constantly reminded of this time pressure. Subjects in the non-timed pressure condition were given as much time as they needed to complete the task. Task performance was measured by number of correctly completed items on a 12-item math task. A 2x2 between subjects ANOVA was performed and a significant main effect of test anxiety was found but an insignificant main effect for time pressure was found. However, a significant interaction was found.

Anxiety is one of the most studied clinician syndromes that appear in psychological literature. Since Freud's initial explanation of anxiety neurosis in 1894 as a discrete clinical syndrome, the study of anxiety has evolved and research has uncovered different types of anxiety. Spielberger (1972) divided anxiety into two domains trait and state. State anxiety is the perception of an emotional situation as unpleasant accompanied by a physiological reaction connected to the autonomic nervous system. Test anxiety is a form of state anxiety. Spielberger and Sarason (1989) define test anxiety as a situation-specific trait that refers to the anxiety states and worry conditions that are experienced during examinations. Test anxiety is a very common in today's society. Throughout life we

are tested on things that have significant outcomes. We are tested in order to drive a car, to practice a trade or profession, and to gain admission into schools. Students are evaluated regularly on course examinations and standardized testing. There is a great deal of importance placed on these tests and student's performances are crucial in order to succeed in the academic world. It is the self-interest of people to aim to perform well on these tests. As a result of the intense time pressure placed on test taking, test anxiety has become a widespread problem throughout the world. Many researchers have focused on the effects of test anxiety since it is affecting such a large proportion of people. Specifically, past literature has discovered that people in time-pressured situations, with high-test anxiety, perform poorer on cognitive tasks.

Eysenck and Calvo (1992) developed the processing efficiency theory. The theory explains the effects of state anxiety on working memory tasks. They suggest that anxiety decreases attentional control and impairs efficient goal orientated functioning. Worry and emotional distress obstructs some of the capacity and resources typically allocated for the working memory system. The potential outcomes of this are that high-test anxious people allow the threat of the impending task to consume more of their resources and processing capabilities than low-test anxious people. In addition, test anxious people increase attention on the anxiety that's occurring. Therefore, the effectiveness of performance decreases since the effort of concentration and processing spent on the task is minimal.

The Yerkes Dodson law (Eysenck & Cavlo, 1992) also explains why high-test anxious people perform worse than low-test anxious people. This law assumes an inverted U-shaped curvilinear relationship between arousal and performance. The law dictates that when arousal becomes too high, performance will decrease. Cognitive tasks

require low to mid levels of arousal for optimal performance. Therefore, the arousal level of test anxious people is typically too high to result in good performance (Eysenck & Calvo, 1992).

Wine (1971) also suggests that people with high levels of test anxiety divide their attention between the task at hand and preoccupations with self-doubt, worry, and other self-criticisms. There is less attention available for the relevant task at hand, which decreases performance.

Sarason (1984), looked at the effect of test anxiety and its relationship with performance and interferences with attentional processes. He conducted three studies. He used a sample of 1,390 undergraduate students. They completed the Test Anxiety Scale (TAS) and the scales of the Reactions to Tests (RTT). In study 2, 385 students were used and completed the Cognitive Interference Questionnaire (CIQ), the TAS, RRT and the WAIS. Finally in study 3, 180 samples were used and completed the RRT and then given challenging anagrams and then the CIQ. The results showed that test anxiety increases self-preoccupying intrusive thinking and this leads to a reduction in task focus.

Time pressure is a component of test anxiety. Time pressure can be defined as a state of being compressed. It's a constraining force or influence that can psychologically persuade some to behave and think differently. While time pressure has been shown to increase the rate of individual or group performance (Kelly & Karau, 1993) performance quality is shown to be less consistent. Typically during examination students are

allocated a limited amount of time to complete the task. Research has shown if students have high levels of test anxiety and are under time pressure the quality of performance will decrease.

A study conducted by Onwuegbuzie, (1995), used a sample of 21 female graduate students enrolled in a statistics course. He wanted to determine if performance on time limited and time unlimited statistic examinations would be associated with test anxiety. The participants were assigned to two conditions. Subjects in the time unlimited group were told they were under no time constraint. The students in the time-limited condition were given 90 minutes to complete the task. A significant interaction effect was found between test anxiety and examination condition. High anxiety people tended to have poorer performance in the time restricted condition than the untimed condition. The study suggests that female students with high test anxiety perform worse on time limited examinations than low test anxious students do.

The present study will examine the effects of test anxiety and time pressure on a cognitive task performance. It is hypothesized that participants with high levels of test anxiety in the timed pressure condition will have poorer performance scores than low test anxious people in the timed pressure condition.

## Method

### *Participants*

The participants in the study were 32 undergraduate students at the University of Western Ontario. The subjects ranged in age from 18-25. The researcher attempted to

have an equal division of sexes in the subject pool. However, the sample consisted of 27 females and 5 males. Therefore, sex difference was not controlled. All subjects were of middle to upper socio economic status and varied in religion and race. The sample is a good representation of the population of interest since students are most affected by test anxiety and time pressures. The participants were recruited randomly on campus based on availability of the participant's time. Participants also included acquaintances of the researcher. Participants were identified as either having low or high-test anxiety based on their score on the Test Anxiety Questionnaire. Subjects were assigned randomly to two conditions. They were either assigned to the time pressured condition or non-time pressured conditioned. The procedures and conditions of the experiment conformed to the standards of research ethics. The participants did not receive any credit for their participation nor were they rewarded at any time.

### *Apparatus*

Each participant received a booklet that included all the material to conduct the study. The booklet consisted of 4 pages. The booklet contained a consent form, the Test Anxiety Inventory (Spielberger, 1980), and a basic math task.

The consent form contained the purpose and goals of the experiment. It stated that the participation was voluntary and the amount of time was needed of the subject to complete the task. The subject was required to sign the consent form in order to participate in the study.

The Test Anxiety Inventory (Spielberger, 1980) is a reliable and valid measure of test anxiety used on students world wide. It consists of 20 items in which measure how frequently one experiences test anxiety before, during and after tests. It consists of statements such as: "I feel confident and relaxed while taking tests" and "I freeze up on my important exams." The participants were instructed to read each statement carefully and answer on a 4-point scale (1 being extremely uncharacteristic of me and 4 being extremely characteristic of me). The score of the TAI ranges from 20 to 80 and measures proneness to anxiety in test situations. The higher the score the more one is prone to test anxiety before, during and after examinations. The scale is also comprised of two subscales that measure worry and emotionality. The measure has a high degree internal consistency and test retest reliability. Test –retest reliability was in the range of .80-.81 for the scale. There is also evidence for good convergent construct validity with other test anxiety measures such as the Test Anxiety Scale (TAS) and Libert & Morrii's Worry and Emotionality Questionnaire (WEQ).

The cognitive task in the study took the form of 12 basic math problems constructed by the researcher. The first three problems consisted of adding, followed by three subtraction problems and than followed by another three multiplication and division equations. This task was assumed to be moderate since the problems used multiple numbers but yet it employed basic mathematical skill. A high level of concentration was needed in order to complete the task. (Appendix B)

*Procedure*

Subjects were chosen randomly and were required to read and sign a consent form before agreeing to take part in the study. Each participant was either put in the time-pressured condition or the non-timed pressure condition. Both groups consisted of 16 subjects.

*Non-Timed Pressured group.* The participants in this group were initially asked to fill out the math task. The researcher emphasized they had an unlimited time to do so and conveyed to the subjects they should be relaxed since there is no rush.

*Time-Pressured group.* The subjects in this group were also asked to fill out the math task first. The researcher then emphasized the fact they only had limited time to do so in order to create a time pressure. However, the participants did not know they would be given as much time needed to complete the math task. The researcher would notify the subject every 30 seconds to hurry up and that time was running out.

The participants were told to complete the task but the researcher accepted if some items on the task were incomplete. Once the math task was handed to the researcher the subjects were required to fill out the Test Anxiety Inventory measure. Once finished, the subjects were thanked for their participation and were debriefed about the nature of the study.



Once all 32 participants had been tested, and their scores has been recorded the experimenter implemented a median split in order to determine the high and low-test anxiety groups. Any score above 51 was considered to be high and any score below 51 was considered low. The experimenter than analyzed the data.

### Results

A 2 x 2 between subjects ANOVA was performed to examine the interaction and main effects of test anxiety and time pressure on cognitive performance (math task). Cell means are presented in Figure 1 and a summary can be found in Appendix A.

A median split was conducted to classify anxiety scores as high or low. The sample consisted of 16 scores above 51 which was classified as high-test anxiety and 16 scores below the score of 51 which was classified as low anxiety.

The test of the main effect of test anxiety showed that the mean performance scores of the low anxiety group ( $M = 7.88$ ,  $SD = 2.84$ ) did differ significantly from the mean of high test anxiety ( $M = 6.63$ ,  $SD = 2.09$ ). ( $F(1, 28) = 1.70$ ,  $p < .05$ ).

The test of the main effect of time pressure was found to be insignificant ( $F(1, 28) = .677$ , n.s.). The mean of the non timed pressured group the ( $M = 8.63$ ,  $SD = 2.63$ ) was not significantly higher than the mean of time pressured group ( $M = 5.5$ ,  $SD = 2.07$ ).

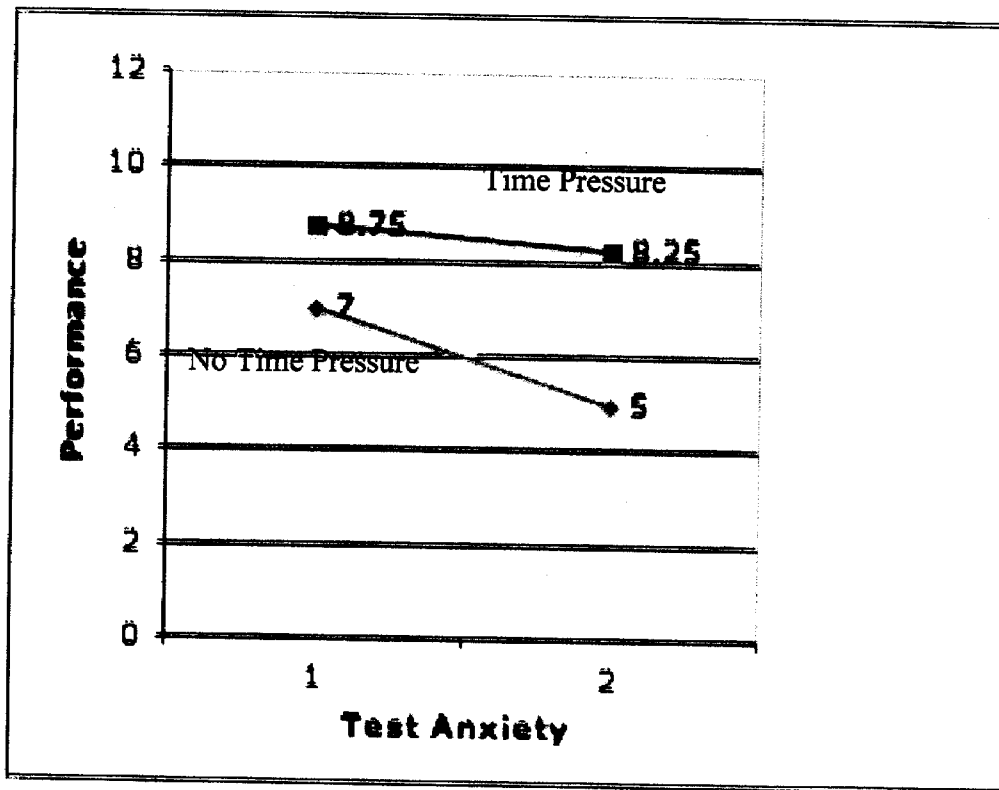


Figure 1: Effect of Test Anxiety and Time Pressure on 12-item math task Performance.  
 Group 1- low test anxiety and Group 2- high test anxiety

The test of the interaction effect was found to be significant. ( $F(1, 28) = .61, p < .05$ ). Refer to Appendix E for raw data.

### Discussion

It was hypothesized that test anxiety level and time pressure would have a debilitating effect on task performance. The results of the current study only partially supported the hypothesis. A significant main effect was found for the effect of test anxiety on performance and a significant interaction was found. However, an insignificant main effect was found for time pressure.

The results demonstrated that test anxiety together with time pressure does affect performance on a cognitive task. In both the time pressured condition and non-timed pressure condition, subjects with low-test anxiety performed significantly better on the math task than the participants classified with high-test anxiety.

Although a significant effect was found for test anxiety this may have been due to other external factors. The participants were approached to take part in the study during and before the universities examination period. Many of the participants may have already had feelings of stress and anxiety and this could have caused them to score higher on the test anxiety scale. Therefore, subjects who really have low-test anxiety may have been feeling the pressure of the coming exams and this factor may have resulted in higher scores on the Test Anxiety Inventory than they would normally score. In future studies in

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order to control this factor, subjects should be approached during no major examination periods to ensure no additional stress on the participants.

The insignificant main effect of time pressure may be due in part to the testing procedure used. Time pressure was a difficult variable to construct. The researcher wanted to re create the time pressure some students may feel in an examination setting. However, since the researcher wasn't of someone of authority and the participants were approached outside of a classroom setting this may have affected how serious the participants took the time pressure variable into account. Despite the fact the researcher reminded the subjects there was only limited time left to complete the task, it did not affect the participant's performance on the math task. In future studies, ensuring the subjects are given the math task in a setting that resembles an examination may increase the chances of finding significant results. In addition, maybe the researcher should have asked if the subjects felt time pressured once the task was completed to see if feelings of time pressure were induced.

Other aspects of the study should be improved upon in the future. It was not possible to determine if the subjects involved in this study took their task seriously. The experimenter was a young female student who looked the same age as most of the subjects. Even tough the researcher told the participants they should answer everything carefully many of the participants filled out the 4 page booklet given to them as fast as possible. Since most of the samples were approached on campus, they were typically going to or coming from class, the library and leaving from school. Many of the

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participants did not take the time to answer everything carefully since the feeling of seriousness was not induced. In order to make sure subjects take this study seriously, the task would have to include something of importance to them and be given to them while off of campus. In addition, if the subjects were told they would be graded on the math task and it was part of a course credit, they may have taken it more seriously and more feelings of time pressure may have been aroused.

Another factor that may have affected the study was the fact the experimenter assumed that the math task was easy because of the simple mathematical principles it involved. Most participants were unable to complete the task in the time allocated. Many of the participants gave up after a couple minutes and left many items on the test unanswered. This task was difficult since most participants were social science or arts majors who did not use basic math on a daily basis. This may have altered the performance scores. A different type of cognitive task like a word search may have been better since it requires no mathematical ability and would ensure the participants would complete the task.

The participants used in this study may have had past experiences involving time pressure. This may have led to insignificant main effect for time pressure variable. Since all of the subjects were students they have all had good experience with time pressure. This may have interrupted the time pressure variable that was created in the study. The samples could have interpreted the time pressure variable in the current study as not as intense as the time pressure in real life examination experiences they have had.

Therefore, these subjects were not as affected by the time pressure variable. In future studies more than 32 samples of different ages, educational status's and economic classes should be used in order to prevent this from happening. A broader range of participants should ensure more significant results.

The measurement for test anxiety used in this study did not hinder results. The Test Anxiety Inventory is a known reliable and valid measure to test for test anxiety. However, the math task was assumed to be a simple cognitive task proved to be not. Majority of subjects could not complete the task and let the researcher know it was difficult.

The significant interaction between the effect of test anxiety and time pressure on performance has important implications for today's world. Specifically, this has imperative implications for educational settings. Children who have high-test anxiety are likely to perform worse on class examinations especially under a time pressure condition. School boards and teachers should recognize this and offer other methods of testing which would alleviate students test anxiety levels and other effects of time pressure. Giving extra time to students would maybe reduce the effects of test anxiety and time pressure since students would not feel as pressured.

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## Appendix A

## Math Test:

Please solve the following math problems. Try to complete as many as you can.

**Addition/ Subtraction**

1. 
$$\begin{array}{r} 1455+ \\ \underline{3466} = \end{array}$$

2. 
$$\begin{array}{r} 567890+ \\ \underline{456734} = \end{array}$$

3. 
$$\begin{array}{r} 106422445+ \\ \underline{569302029} = \end{array}$$

4. 
$$\begin{array}{r} 5678- \\ \underline{2346} = \end{array}$$

5. 
$$\begin{array}{r} 897645- \\ \underline{34652} = \end{array}$$

6. 
$$\begin{array}{r} 985637388- \\ \underline{874526212} = \end{array}$$

**Multiplication/ Division**

7. 
$$\begin{array}{r} 36x \\ \underline{18} = \end{array}$$

8. 
$$\begin{array}{r} 4567x \\ \underline{456} = \end{array}$$

9. 
$$\begin{array}{r} 7834x \\ \underline{3} = \end{array}$$

10.  $24/6 =$

11.  $225/5 =$

12.  $88/11 =$



## Appendix B

Table 1.

*ANOVA Summary Table*

| Source        | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | <i>p</i> |
|---------------|-----------|-----------|-----------|----------|----------|
| Test anxiety  | 9.38      | 1         | 9.375     | 1.70*    | .204     |
| Time Pressure | 37.50     | 1         | 37.50     | 6.77*    | .015     |
| Test x Time   | 3.38      | 1         | 3.38      | .610*    | .441     |
| Error         | 155.0     | 28        | 5.54      |          |          |

Note: The value enclosed in parentheses represents mean square error. \* $p < .05$