

THE EFFECTS OF PSYCHOLOGICAL STRESS  
ON A MOTOR PERFORMANCE

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by  
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## Chapter 1

### THE PROBLEM

#### Introduction

Research workers in physical education and psychology have long been intrigued by motor performance and the psychological factors acting upon it. Among some of those factors, anxiety has been one that has received a great deal of attention shown by the fact that over 2000 studies have been reported since 1950.

In the area of psychological stress, much of the research has been associated with anxiety, since anxiety has been regarded as a product of stress. A large portion of this literature has been related with motor behavior.

Several of these studies were specifically designed to test predictions from Hullian theory concerning the performance on either simple or complex tasks of groups scoring high and low on anxiety scales.<sup>1</sup>

In relation with this theory, it has been concluded,

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<sup>1</sup>I.G. Sarason, "Empirical Findings and Theoretical Problems in the Use of Anxiety Scales", Psychological Bulletin, 57, (1960), 406.

as reviewed by many authors <sup>2,3,4,5,6</sup>, that high anxious subjects are more sensitive to experimental stress than are low anxious subjects. In this connection however, the level of performance has been closely associated with the difficulty of the task. In a difficult task, low anxious subjects were superior to high anxious subjects, and in a less complex task, high anxious subjects were superior to low anxious subjects. These findings were in accordance with Hullian expectations.

### Statement of the Problem

The purpose of this investigation was to study the effects of a specific psychological stressor on the performance of high anxious, medium anxious and low anxious subjects and to determine the level of arousal of the subjects as measured by heart rate and galvanic skin response.

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<sup>2</sup>M.H. Appley and R. Trumbull (eds.), Psychological Stress (New York: Appleton-Century-Crofts, 1967).

<sup>3</sup>R.S. Lazarus, Psychological Stress and the Coping Process (Toronto: McGraw-Hill Book Co., 1966).

<sup>4</sup>R.S. Lazarus, J. Deese and S.J. Osler, "The Effect of Psychological Stress upon Performance", Psychological Bulletin, 58, (1961), 234-255.

<sup>5</sup>B. Martin, "The Assessment of Anxiety by Physiological Behavioral Measures", Psychological Bulletin, 58, (1961), 234-255.

<sup>6</sup>I.G. Sarason, op.cit., 403-415.

### Scope of the Study

For this study one hundred and twenty male undergraduate university students were selected according to their level of anxiety as measured by the IPAT Anxiety Scale.<sup>7</sup> They were divided into three control groups composed of twenty low anxious, twenty medium anxious and twenty high anxious subjects. Similarly, twenty low anxious, twenty medium anxious and twenty high anxious subjects formed the experimental groups.

Balancing on a stabilometer for twelve trials of thirty seconds in duration was the motor skill utilized. A yellow flood lamp was used as the specific stressing condition.

Heart rate and galvanic skin response were the physiological measurements selected to assess the effects of the stressor on the performance.

### Hypotheses

For statistical purposes the following hypotheses in connection with the Hullian theory were stated in the null form:

1. There is no significant difference between the performance on a specific gross motor task and the level of anxiety of the subjects.

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<sup>7</sup>R.B. Cattell and I.H. Scheir, Handbook for the IPAT Anxiety Scale Questionnaire. (Illinois: Institute for Personality and Ability Testing, 1963).

2. There is no significant difference between the performance and the level of anxiety of the subjects when submitted to a specific psychological stressing condition.

3. There is no significant difference in heart rate and galvanic skin response of subjects differing in level of anxiety.

4. There is no significant difference in heart rate and galvanic skin response of subjects differing in level of anxiety when submitted to a stressing condition.

#### Definition of Terms

In order to clarify the terms to be used the following explanations are given.

Anxiety: a stable personality trait, as measured by the IPAT Anxiety Scale, associated to a state of the organism characterized by a subjective feeling of apprehension and heightened physiological reactivity.<sup>8,9,10</sup>

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<sup>8</sup>R.B. Cattell and I.H. Scheir, The Meaning and Measurement of Neuroticism, (New York: The Ronals Press, 1961).

<sup>9</sup>B.D. Franks and M. Jetté, "Manifest Anxiety and Physical Fitness" (paper read at the 73rd Annual Meeting of the National College Physical Education Association for Men. 1969, Chicago, Illinois).

<sup>10</sup>E.E. Levitt, The Psychology of Anxiety, (New York: The Bobbs-Merrill Company Inc., 1967).

IPAT Self Analysis Form: a forty item self report paper and pencil personality inventory which is used in conjunction with the IPAT Anxiety Scale.

IPAT Anxiety Scale: a valid and reliable scale developed by the Institute for Personality and Ability Testing to determine the level of trait anxiety. This scale provides a score ranging from 0 to 80.<sup>11</sup>

Low Anxious Subjects: all the subjects who obtained a score between 0 and 17 on the IPAT Anxiety Scale.

Medium Anxious Subjects: all the subjects who obtained a score between 18 and 37 on the IPAT Anxiety Scale.

High Anxious Subjects: all the subjects who obtained a score between 38 and 80 on the IPAT Anxiety Scale.

Psychological Stress: a state of heightened emotionality of the organism produced by a stressor condition.<sup>12,13</sup>

Stressor: an experimental condition that was designed by the experimenter to be stressful but which is not necessarily perceived or responded to as such by the subject.<sup>14</sup>

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<sup>11</sup>O. Buros (ed). The Sixth Mental Measurements Yearbook, (New Jersey: The Gryphon Press, 1965).

<sup>12</sup>M.H. Appley and R. Trumbull. op.cit.

<sup>13</sup>R.S. Lazarus, op.cit.

<sup>14</sup>R.S. Lazarus, R.W. Baker, D.M. Broverman and J. Mayer, "Personality and Psychological Stress", Journal of Personality, 25, (1957), 559-567.

Motor Task: the action of balancing on a stabilometer for twelve consecutive trials of a duration of thirty seconds each.

Performance Score: the time in seconds that the platform is held within a range of movement of plus four or minus four degrees from the horizontal during the twelve trials.

### Limitations

This study was limited to the validity and fidelity of the IPAT Anxiety Scale Questionnaire selected to differentiate among levels of anxiety of the subjects. It was also limited to the accuracy of the testing devices utilized.

The subjects were selected among the male undergraduate students registered in the Faculty of Arts, the Faculty of Social Sciences, the Faculty of Sciences and the School of Physical Education and Recreation of the University of Ottawa. They cannot be considered a random sample.

By observation on the part of the experimenter all subjects were physically normal and it was assumed that they were cooperative during the testing period.

### Need of the Study

In sport participation and in physical education the performers are often in the presence of a stressing condition. Such thing as competition, the presence of an audience or change in environment could elicit state



anxiety. Therefore a better understanding of the differences in level of anxiety and the effects of this variable on performance would be most useful in the selection and training of participants in a specific motor behavior situation.

## Chapter 2

### REVIEW OF LITERATURE

In the first chapter the problem was identified in connection with the Hull-Spence drive theory.

The major investigations in the fields of stress, anxiety and performance will be reviewed and analysed in this second chapter.

A final section will be concerned with the physiological indicators of psychological stress.

#### Stress and Performance

Howell<sup>1</sup> investigated the effect of electric shock on reaction time. After the initial performance of a motor task that consisted of hitting a ball, reversing direction to touch a key and then hitting a second ball, the subjects were told that they would receive an electric shock during each performance that was poorer than the previous one. It was noted that shorter reaction time was produced by subjects performing under the electric shock stressor.

Studying reaction time in an experiment where the subjects had to touch a response key at the presentation of

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<sup>1</sup>M.L. Howell, "Influence of Emotional Tension to Speed of Reaction and Movement", Research Quarterly, 24, (1953), 22-32.

a light stimulus, Farber and Spence<sup>2</sup> did not find any significant differences in performance when an electric shock stressor was administered.

Ulrich and Burke<sup>3</sup>, using a bell-motivated stressor to indicate success and a buzzer-motivated stressor to indicate failure, investigated the effects of motivational stress on physical performance. Nine men and nine women were used. All were given a base trial in which they had to pedal a bicycle ergometer for one minute trying to produce as many revolutions as possible. Following this base trial, half of the group was submitted to the bell-motivated stressor for the second trial and then to the buzzer-motivated stressor for the third trial on an identical exercise. For the other half of the group the stressor conditions were in the reverse order. The results indicated that both motivational stressors elicited greater work output although success reports were significantly better (at the 7% level of confidence) than failure reports.

Ryan studied the ability to learn to balance on a stabilometer when the subjects were submitted to a specific

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<sup>2</sup>I.E. Farber and K.W. Spence, "Effects of Anxiety, Stress and Task Variables on Reaction Time", Journal of Personality, 25, (1956), 1-18.

<sup>3</sup>C. Ulrich and K. Burke, "Effects of Motivational Stress upon Physical Performance", Research Quarterly, 28, (1957), 403-412.

stressor which was an electric shock. In his first study<sup>4</sup> he tested the hypothesis that externally induced tension would facilitate performance on an easy task but impair performance on a difficult task. One hundred and twenty male university subjects, divided into six equal groups, were used. Each subject had twelve trials of thirty seconds in duration. The task was made easy for three groups of subjects by placing the platform ten inches below the center of rotation, and made difficult for the other three group by placing the platform ten inches above the pivot. For the easy task one group was told prior to the experiment that they, the subjects, would be receiving electric shocks during their performances. A second group's subjects were informed of the electric shocks after the second trial, and a third group was used as a control group. The same procedure was followed for the three groups assigned to the difficult task. The results confirmed one part of the hypothesis: that tension would impair performance in a difficult task. However, they failed to demonstrate that performance would be facilitated by tension on an easy task. It was felt by the author that the defined easy task might have been too difficult for the subjects used in the experiment.

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<sup>4</sup>E.D. Ryan, "Effects of Stress on Motor Performance and Learning", Research Quarterly, 33, (1962), 111-119.

In a follow up study<sup>5</sup>, the same author, using the above described difficult task, investigated the effects of tension, an electric shock, when introduced early and late in the learning process. His hypothesis was that stress would have a more impairing effect on the performance when introduced early than it would have when introduced late. Forty male university subjects, divided into two groups, participated in this investigation. They were given twelve trials of thirty seconds on the stabilometer every day for five consecutive days. The experimental and control groups underwent identical conditions for four days. The subjects in the experimental group were then told that they would receive a strong unavoidable electric shock. In fact, the shocks were administered during seven of the twelve trials, two being given per trial. For the first four sessions, the results demonstrated no significant differences in the performances of both groups. When these results were composed with those of the previous experiment, it was found that stress had a less disruptive effect when introduced late in the learning process.

To investigate the effects of spectators on a gross motor task, Singer<sup>6</sup> selected sixteen athletes and sixteen

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<sup>5</sup>E.D. Ryan, "Motor Performance under Stress as a Function of the Amount of Practice", Perceptual and Motor Skills, 13, (1961), 103-106.

<sup>6</sup>R.N. Singer, "Effects of Spectators on Athletes and Non-Athletes Performing a Gross Motor Task", Research Quarterly, 36, (1965) 473-482.

non-athletes. On one day all the subjects were given ten thirty second trials to learn how to balance on a stabilometer. The next day they were allowed three trials alone and three trials before a group of spectators. In the presence of spectators non-athletes performed better than athletes on two of the three trials. When the non-athletes performed alone, their results were better than the athletes although the differences were not significant.

Even though these studies attempted to test the Hull-Spence drive theory in whole or in part, the results did not show sufficient support when performance in motor behavior in the presence of stress was analysed.

It was then deemed necessary by the researchers to select subjects according to their level of drive or trait anxiety.

### Stress, Anxiety and Performance

Several studies have attempted to examine the relationship between stress, anxiety and performance.

Lazarus, Deese and Osler<sup>7</sup> reviewed the earlier literature on the effects of psychological stress on performance. Their findings showed that stress results in decrements in performance as well as improvements in performance.

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<sup>7</sup>R.S. Lazarus, J. Deese and S.J. Osler, "The Effect of Psychological Stress upon Performance", Psychological Bulletin, 49, Part I, (1952), 293-317.

Farber and Spence<sup>8</sup> studied the performance of forty high anxious and forty low anxious college students on a stylus maze task. The selection of the subjects was made on the basis of their scores on a modified form of the Taylor Manifest Anxiety Scale. The results on the maze performance showed that the high anxious subjects did significantly poorer than the low anxious subjects.

However, the same authors<sup>9</sup> studied reaction time of high and low anxious subjects as determined by the Taylor Manifest Anxiety Scale and found no significant differences between the two groups.

Using muscular tension as a stress condition to a learning situation, Meyer and Noble<sup>10</sup> found better results with low anxious subjects. But under normal learning conditions the results were reversed.

A study on response time by Grice<sup>11</sup> showed that low anxious subjects performed better than high anxious subjects.

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<sup>8</sup>I.E. Farber and K.W. Spence, "Complex Learning and Conditionning as a Function of Anxiety", Journal of Experimental Psychology, 45, (1953) 120-125.

<sup>9</sup>I.E. Farber and K.W. Spence, "Effects of Anxiety, Stress and Task Variables on Reaction Time", Journal of Personality, 25, (1956), 1-18.

<sup>10</sup>R. Meyer and E. Noble, "Summation of Manifest Anxiety and Muscular Tension", Journal of Experimental Psychology, 55, (1958) 559-602.

<sup>11</sup>G.R. Grice, "Discrimination Reaction Time as a Function of Anxiety and Intelligence", Journal of Abnormal and Social Psychology, 50, (1965), 71-74.

But the author was careful in pointing out that these results could have been attributed to intellectual differences.

Ryan and Lackie<sup>12</sup>, using a ring-peg task, studied the performance of high and low anxious subjects. Initially the subjects performed by themselves in which case the high anxious subjects showed better results. In a competitive situation for the same task, better results were observed with the low anxiety group.

In an experiment in which one hundred and twenty male university students were selected according to their scores on the Taylor Manifest Anxiety Scale, Carron<sup>13,14</sup> and Carron and Morford<sup>15</sup> investigated the effects of a shock stressor on a motor performance. The task consisted of balancing on a stabilometer. The subjects were given seventy trials of twenty seconds in length divided equally over two

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<sup>12</sup>E.D. Ryan and W.L. Lackie, "Competitive and Non-Competitive Performance in Relation to Achievement and Manifest Anxiety", Journal of Personality and Social Psychology, 1, (1965), 342-345.

<sup>13</sup>A.V. Carron, "Complex Motor Skilled Performance under Conditions of Externally Induced Stress" (unpublished Master of Arts Thesis, University of Alberta, 1965).

<sup>14</sup>A.V. Carron, "Motor Performance under Stress", Research Quarterly, 39, (1968), 463-469.

<sup>15</sup>A.V. Carron and W.R. Morford, "Anxiety, Stress and Motor Learning", Perceptual and Motor Skills, 27, (1968) 507-511.



days. A control group formed of twenty high anxious and twenty low anxious subjects was never exposed to the shock stressor. A stress-early group, also formed of twenty high anxious and twenty low anxious subjects was given the shock stressor on trials four, five and six. A stress-late group, similarly formed of twenty high anxious and twenty low anxious subjects, was given the shock stressor on trials sixty-five, sixty-six and sixty-seven.

When the shock stressor was applied early, the performance improvement of the high anxious group was significantly less than that of all the other groups during the stress period. When the shock stressor was applied late, the results showed a significant decrement in amount of performance improvement for both high anxious and low anxious subjects. However, the shock stressor had no effect upon the amount learned in any experimental group.

Martens and Landers<sup>16</sup> administered the Taylor Manifest Anxiety Scale to select forty high anxious and forty low anxious male undergraduate students. The subjects learned and performed a coincident timing task "which requires the acceleration of an implement in a sagittal plane in such a way that the implement arrives simultaneously at the point where a moving object is to be struck."<sup>17</sup> The subjects were

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<sup>16</sup>R. Martens and D.M. Landers, "Effect of Anxiety, Competition and Failure on Performance of a Complex Motor Task", Journal of Motor Behavior, 1, (1969), 1-9.

<sup>17</sup>Ibid., p. 2.

assigned randomly to one of four treatment conditions: success, failure, competitive and non-competitive. The results indicated no significant differences in the performance of high anxious and low anxious subjects under the success and failure conditions. Similarly the stress of competition did not interact with anxiety to affect performance. It was, however, pointed out by the author that the competitive condition might have been an insufficient stressor.

Using the same coincident timing task described in the previous experiment, Martens<sup>18,19</sup> studied the performance of forty-eight high anxious and forty-eight low anxious undergraduate students. The subjects learned and performed alone, and in the presence of an audience. Once the task was well learned, the results indicated that high anxious subjects performed significantly better than low anxious subjects, and the presence of an audience did not affect the performance.

Finally, because of lack of support for the drive theory using motor behaviour performance, Martens and Landers<sup>20</sup> tested the inverted-U hypothesis. Ninety high

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<sup>18</sup>R. Martens, "Effect on Performance of Learning a Complex Motor Task in the Presence of Spectators", Research Quarterly, 40, (1969), 317-323.

<sup>19</sup>R. Martens, "Effect of an Audience on Learning and Performance of a Complex Skill", Journal of Personality and Social Psychology, 12, (1969), 252-260.

<sup>20</sup>R. Martens and D.M. Landers, "Motor Performance under Stress: A Test of the Inverted-U Hypothesis", Journal of Personality and Social Psychology, 16, (1970), 29-37.

school boys were selected according to their scores on the children's form of the Taylor Manifest Anxiety Scale. They were divided into three equal groups of low, moderate and high anxiety. The motor task in this study was to track a ring along a tube without making contact. The subjects were submitted to three levels of psychological stress: a low stress condition where an effort was made to relax the subjects, a moderate stress condition which was the threat of a shock with mild pain, and a high stress condition where it was suggested that the pain of the shock would be very severe. The results supported part of the inverted-U hypothesis where the performance of the low anxiety group was significantly poorer than the moderate anxiety group. There were no significant differences between the low and high anxiety groups and between the moderate and high anxiety groups. The best performance was obtained by the moderate anxiety group.

#### Physiological Indicators of Psychological Stress

Johnson<sup>21</sup> compared the emotional states of fifteen varsity football players with those of five varsity wrestlers. It was found that fear and anxiety do not seem to be prominent factors in football but were of serious importance in wrestling. A rise in heart rate was registered for both groups during the pre-competition period.

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<sup>21</sup>W.R. Johnson, "A Study of Emotion in two Types of Athletic Sports Contests", Research Quarterly, 20, (1949), 72-75.

Harmon and Johnson<sup>22</sup> investigated the emotional reactions of college athletes before and after a game situation. The emotional state was measured by the galvanic skin resistance, blood pressure and pulse rate. The galvanic skin resistance proved to be the best simple indicator of emotional reaction.

Baker and Taylor<sup>23</sup> measured galvanic skin resistance, skin temperature and heart rate before and after exposure to a stress condition. They found a decrease in resistance and an increase in both temperature and pulse rate.

The galvanic skin resistance was also used by Skubic<sup>24</sup> to investigate the emotional reactions of boys participating in baseball. The results did not show any significant differences in the galvanic skin resistance between groups participating in Little League, Middle League and physical education class situations.

Ulrich and Burke<sup>25</sup> also found an increase in both respiration rate and respiration amplitude as a result of

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<sup>22</sup>J.M. Harmon and W.R. Johnson, "The Emotional Reactions of College Athletes", Research Quarterly, 23 (1952), 391-397.

<sup>23</sup>L. Baker and W. Taylor, "The Relationship under Stress between Changes in Skin Temperature, Electric Skin Resistance and Pulse Rate", Journal of Experimental Psychology, 48, (1954) 361-366.

<sup>24</sup>E. Skubic, "Emotional Responses of Boys to Little League and Middle League Competition Baseball", Research Quarterly, 26, (1955), 342-352.

<sup>25</sup>C. Ulrich and K. Burke, op.cit.

motivational stress.

Ryan<sup>26</sup> studied the relationship between arousal as measured by palmar skin conductance and the learning of a motor task which consisted of balancing on a stabilometer for twelve trials. The forty male subjects were dichotomized on the basis of initial conductance, final conductance, total change in conductance, conductance after trial one and changes in conductance from rest to trial one. No significant differences were found in the performances of the groups when the subjects were divided on the basis of initial conductance. But for all other performance measures, the groups showing higher conductance were significantly superior to those showing lower conductance.

Martens<sup>27</sup> and Martens and Landers<sup>28</sup> have used palmar sweat index and heart rate to measure the level of arousal of subjects submitted to psychological stress. Even though palmar sweat print and heart rate were indicators of increasing levels of psychological stress, those measures could not differentiate between anxiety levels. The problem arose when one tried to intercorrelate autonomic measures as indices of stress.

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<sup>26</sup>E.D. Ryan, op.cit. (1962).

<sup>27</sup>R. Martens, op.cit. (1969).

<sup>28</sup>R. Martens and D.M. Landers, op.cit. (1970).

But in a study by Lazarus et al., in which heart rate and palmar skin conductance were measured on subjects viewing a benign control film and a stressor film a correlation of .545 was found between these two physiological measurements.

These results were also confirmed in a study by Mordkoff.<sup>30</sup>

Martin states "Research thus far gives little ground for optimism that these variables will correlate very high if at all but, we should not really expect high agreement among indicators, since each type of indicator reflects a specific kind of transaction between the individual and the situation."<sup>31</sup>

### Summary

Three different areas of investigation were reviewed.

In the first part, stress and performance, the anxiety variable was excluded. Different stressors were

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<sup>29</sup>R.S. Lazarus, J.C. Speisman and A.M. Mordkoff, "The Relationship between Autonomic Indicators of Psychological Stress: Heart Rate and Skin Conductance", Psychosomatic Medicine, 25, (1963), 19-30.

<sup>30</sup>A.M. Mordkoff, "The Relationship between Psychological and Physiological Response to Stress", Psychosomatic Medicine, 26, (1964), 135-150.

<sup>31</sup>B. Martin, "The Assessment of Anxiety by Physiological Behavioral Measures", Psychological Bulletin, 58 (1961) 234-255.

used such as electric shocks, failure and audience. The<sup>21</sup> results from those studies were not sufficiently significant to demonstrate either an improvement or decrement in performance as related to the Hull-Spence drive theory.

The major investigations in the area of stress, anxiety and performance were also analysed. Many authors have hypothesised that low anxious subjects would be superior in their performance on a difficult task to high anxious subjects. Farber and Spence<sup>32</sup> arrived at that conclusion in one study but in a follow up experiment<sup>33</sup> no significant differences between high and low anxious subjects were found. A study by Grice<sup>34</sup> showed a better performance by the low anxiety group.

Meyer and Noble<sup>35</sup> and Ryan and Lackie<sup>36</sup>, studying the effects of tension and competition, showed a better performance of the low anxiety groups. But using an electric shock stressor, Carron<sup>37,38</sup> and Carron and Morford<sup>39</sup> did not

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<sup>32</sup>I.E. Farber and K.W. Spence, op.cit. (1953).

<sup>33</sup>I.E. Farber and K.W. Spence, op.cit. (1956).

<sup>34</sup>G.R. Grice, op.cit.

<sup>35</sup>R. Meyer and E. Noble, op.cit.

<sup>36</sup>E.D. Ryan and W.L. Lackie, op.cit.

<sup>37</sup>A.V. Carron, op.cit. (1965).

<sup>38</sup>A.V. Carron, op.cit. (1968).

<sup>39</sup>A.V. Carron and W.R. Morford, op.cit.

find any significant differences between high and low anxiety groups. Contrary to these findings, Martens<sup>40</sup> arrived at a better performance of the high anxiety group in the presence of an audience.

But in two other studies Martens<sup>41</sup> and Martens and Landers<sup>42</sup> found no significant differences in the performance of groups differing in level of anxiety.

Finally, a third section dealt with the effects of different stressors on performance and their physiological measurements. Among those measures, heart rate and galvanic skin resistance have often been used. An increase in pulse rate and a decrease in galvanic skin resistance have been indicators of psychological stress.<sup>43,44,45,46,47</sup>

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<sup>40</sup>R. Martens, op.cit. (1969).

<sup>41</sup>R. Martens, op.cit. (1969).

<sup>42</sup>R. Martens and D.M. Landers, op.cit.

<sup>43</sup>L. Baker and W. Taylor, op.cit.

<sup>44</sup>J.M. Harmon and W.R. Taylor, op.cit.

<sup>45</sup>W.R. Johnson, op.cit.

<sup>46</sup>R. Martens and W.R. Landers, op.cit. (1970).

<sup>47</sup>E.D. Ryan op.cit. (1962).



As was mentioned previously, a great deal of investigation has been reported in relation with stress, anxiety and performance, but most of these studies failed to provide evidence that the stressor was effective in eliciting state anxiety.

This present study has attempted to provide evidence of the intensity of the stressor on the organism by measuring its effect with heart rate and galvanic skin resistance.

## Chapter 3

### METHODOLOGY

#### Introduction

The purpose of this study was to determine the effects of a specific psychological stressor on the performance of low anxious, medium anxious and high anxious subjects. A yellow flood lamp was used as the stressor. To evaluate its physiological effect, heart rate and galvanic skin resistance were the selected measurements.

#### The Subjects

The IPAT Anxiety Scale Questionnaire<sup>1</sup> was administered to two hundred and seventy male subjects. They were all undergraduate students registered at the University of Ottawa and their ages varied between eighteen and twenty-nine years. According to their score on the IPAT Anxiety Scale, one hundred and twenty subjects were selected and assigned to the following groups (Table 1):

#### Control groups

1. Low anxious group. To this group were assigned twenty subjects who scored below 19 on the IPAT Anxiety Scale. The mean score of the group was 13.85.

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<sup>1</sup>R.B. Cattell and I.H. Scheir, Handbook for the IPAT Anxiety Scale Questionnaire, (Illinois: Institute for Personality and Ability Testing, 1963, p.10).

2. Medium anxious group. Twenty subjects formed this group. Their average anxiety score was 25.65.

3. High anxious group. Twenty subjects who scored above 38 were assigned to this group. Their average score was 43.60.

#### Experimental groups:

1. Low anxious group. To this group were assigned twenty subjects who scored below 19. The mean score of the group was 14.85.

2. Medium anxious group. Twenty subjects formed this group with an average of 28.85.

3. High anxious group. Twenty subjects who scored above 38 were assigned to this group. The group average was 41.35.

Within each level of anxiety, the subjects were assigned at random to either a control or an experimental group.

The mean and standard deviation of each group on the anxiety score are outlined in APPENDIX A, Table 17.

#### Motor Task

The motor task for all subjects consisted of balancing on a stabilometer. The subjects were each given twelve consecutive trials of thirty seconds in duration. Each trial was followed by a rest period of thirty seconds (Table 1). The motor performance was measured by registering the time the platform was held in a range of plus four and minus four

Table 1  
The Experimental Design

| Groups       | Subjects | Trials | Stressing trials | Stressing period per trial | Time of each stressing period |
|--------------|----------|--------|------------------|----------------------------|-------------------------------|
| Experimental | 20 L.A.  | 12     | 6                | 2                          | 6 sec.                        |
|              | 20 M.A.  | 12     | 6                | 2                          | 6 sec.                        |
|              | 20 H.A.  | 12     | 6                | 2                          | 6 sec.                        |
| Control      | 20 L.A.  | 12     | 0                | 0                          |                               |
|              | 20 M.A.  | 12     | 0                | 0                          |                               |
|              | 20 H.A.  | 12     | 0                | 0                          |                               |

Legend

|       |                |
|-------|----------------|
| L.A.: | Low Anxiety    |
| M.A.: | Medium Anxiety |
| H.A.: | High Anxiety   |
| Sec.: | Seconds        |

degrees from the horizontal.

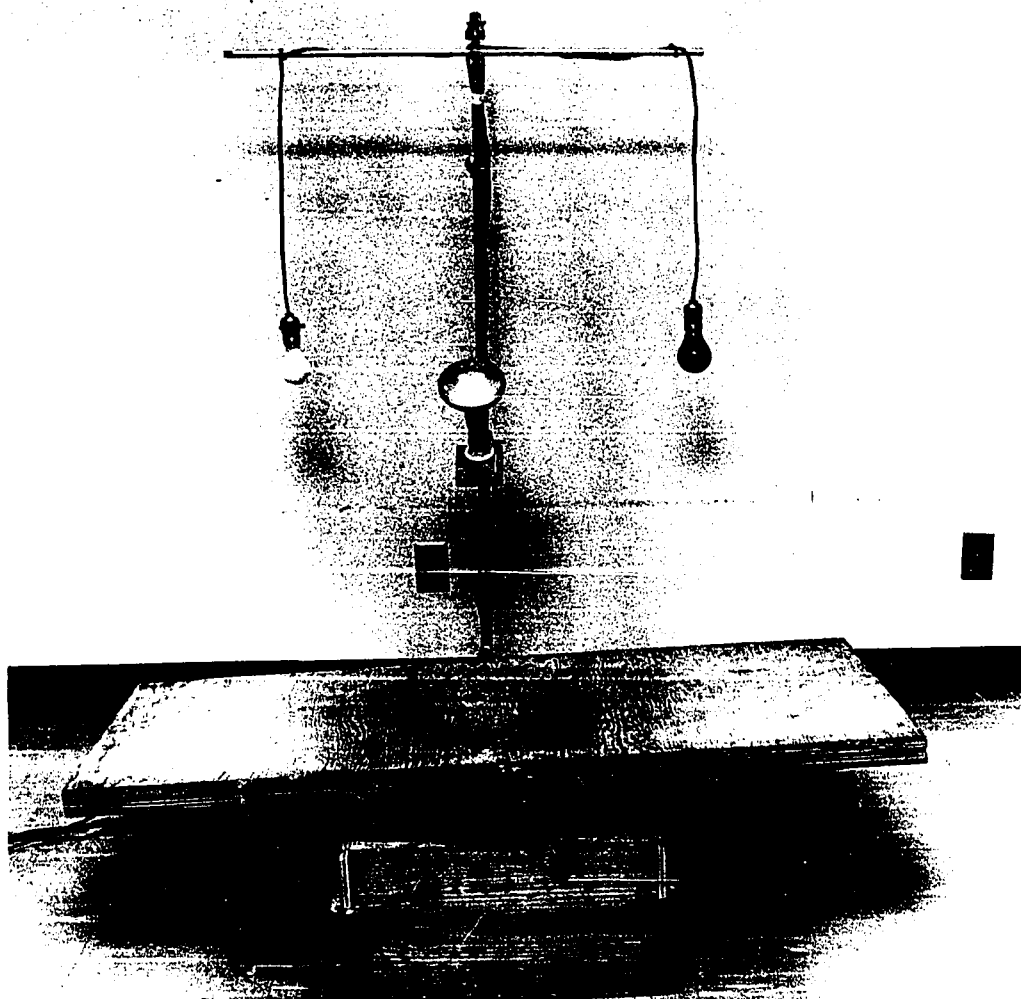
### Apparatus

Stabilometer (Plate 1). This instrument consisted of a horizontal pivot platform, forty-eight inches long, twenty-four inches wide and one and one half inches thick. A steel rod eleven sixteenths of an inch in diameter was attached under the platform so as to form the axis of rotation. The ends of the rod were inserted into two pillow blocks fixed on the top of each upright support. The upright supports were joined to one another at the bottom by two wooden braces. Two boards attached to the upright supports, one on either side, prevented the platform from tilting to an angle of more than twenty degrees from the horizontal. Two coil springs, ten inches long, were attached connecting the braces and the underside of the platform on both sides. The top of the platform was fourteen inches above floor level.

Light stimuli. A forty watt white lamp, a forty watt yellow lamp and a one hundred and fifty watt colourtone yellow flood lamp were suspended three feet above level, facing the subjects on the stabilometer (Plate 1).

The white light was used to command the subjects to step on the stabilometer at the beginning of each trial and off the stabilometer at the end of each trial. No verbal exchanges were made between the subject and the experimenter during the entire testing period.

Plate 1  
Stabilometer and Lights



The red light, connected to an electrical contact under the platform, turned on when the platform was held in the range of plus four and minus four degrees from the horizontal.

The yellow flood lamp was used to induce a psychological stressing condition. Connected to a second electrical contact under the platform, it was turned on during the stressing period (Table 2) when the platform was not held in the range of plus four and minus four degrees from the horizontal.

These three lights were connected to three different silent mercury switches (Plate 2).

Electric interval timers. Two Grab-Lab electric interval timers were used in this study (Plate 2). The one at the right in the picture in which one revolution corresponds to sixty seconds, was used to determine the length of the trials and rest periods. The other timer, on the left in the picture, in which one revolution corresponds to fifteen seconds, was connected parallel with the electrical contact and the red light. This timer was used to register the performance for each trial.

Grass polygraph. A Grass Model 5D polygraph was used to record the galvanic skin resistance and the heart rate. Calibration was done according to the instrument manual (Section 7)<sup>2</sup>. Two relatively non-polarizing electrodes and electrode

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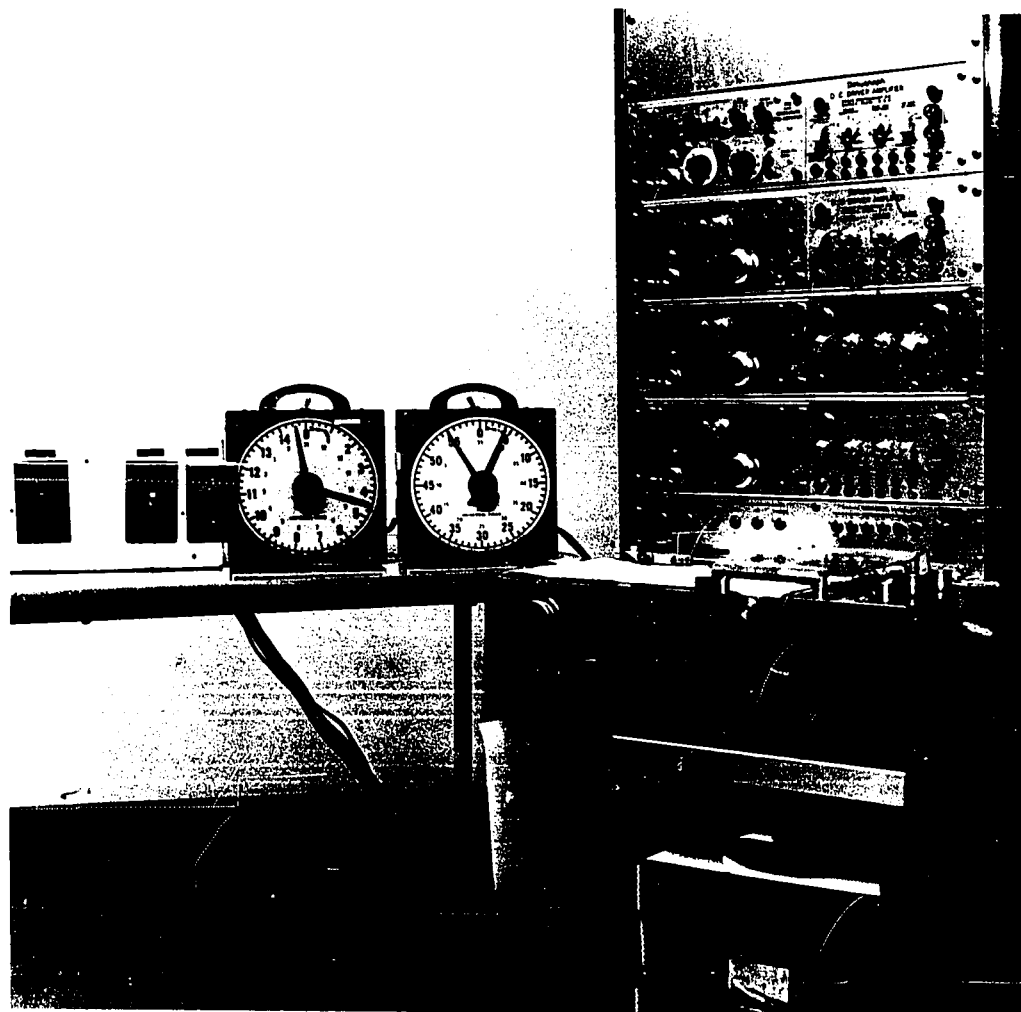
<sup>2</sup>Grass Instrument Company, Model 5 P1, Low-Level D.C. Preamplifier, Quincy, Massachusetts, (1960).

Table 2  
Example of a Reference Card

|                   | 1   | 2     | 3          | 4 | 5   | 6   | 7 | 8   | 9 | 10  | 11 | 12  |
|-------------------|-----|-------|------------|---|-----|-----|---|-----|---|-----|----|-----|
| Trials            |     |       |            |   |     |     |   |     |   |     |    |     |
| Stressing trials  |     | x     |            |   | x   | x   |   | x   |   | x   |    | x   |
| Stressing periods |     | B-E   |            |   | A-B | D-E |   | C-E |   | D-E |    | A-C |
| Reference time    | A = | 0 to  | 5 seconds  |   |     |     |   |     |   |     |    |     |
|                   | B = | 6 to  | 11 seconds |   |     |     |   |     |   |     |    |     |
|                   | C = | 12 to | 17 seconds |   |     |     |   |     |   |     |    |     |
|                   | D = | 18 to | 23 seconds |   |     |     |   |     |   |     |    |     |
|                   | E = | 24 to | 29 seconds |   |     |     |   |     |   |     |    |     |



Plate 2  
Grass Polygraph, Timers and Switch Box



paste were used to record the galvanic skin resistance. Two recording electrodes and one electrode for grounding were used to register the heart rate. The speed of the paper was set at ten millimeters per second.

### Testing procedures

The subject entered the laboratory appropriately dressed. He was asked to sit on a stool facing the stabilometer. The galvanic skin resistance electrodes were installed on the first and third fingers of the left hand, and the heart rate electrodes were attached to the chest. These areas of the body were first wiped with alcohol before the application of the electrodes.

The subject was now given the following information: his task would consist of balancing on the stabilometer for twelve trials, each trial having a duration of thirty seconds with a rest period of thirty seconds between each trial. The act of balancing on the stabilometer would be to hold the platform at the horizontal level by straddling the axis of rotation of the apparatus. The red light would turn on when the platform was held in the correct position. The white light would turn on five seconds before each trial and that would be the subject's command to step on the stabilometer and begin his performance. After the white light was turned off, the fifteen second revolution timer would turn on. At the end of the thirty second trial the white light would turn on again for approximately two seconds to give the command to step down.

The performance would be recorded and the fifteen second revolution timer would be reset at zero for the new trial.

After all these procedures were explained, the subject was then permitted one trial to get acquainted with his task. At this time the testing period began. The subject was now asked to sit on the stool in front of the stabilometer for the purpose of obtaining a basal level in galvanic skin resistance and heart rate. This period of inactivity varied for each subject from ten to twenty minutes. One minute before the first trial the subject was told to stand up and be attentive to the white light since at that point he would not receive any further verbal directives from the experimenter. The subject now began his twelve trials on the stabilometer and the results were recorded. No spectators were allowed in the laboratory at any time. Only the experimenter and one assistant were present. These procedures were followed for all subjects of the control groups and experimental groups.

Psychological stressing condition. The following procedures were followed for the subjects of the experimental groups without their foreknowledge: a yellow flood lamp was used to induce a psychological stressing condition. At random, six trials were selected in which this stressing condition would be present. Each one of the trials was divided equally into five periods of six seconds each, and at random two of

these periods were selected. At the exact time the subject reached these periods during the testing of his performance, the yellow flood lamp was turned on. This lamp, connected to an electrical contact under the platform, was turned on only when the platform was not held in the range of plus four or minus four degrees from the horizontal.

For all subjects of the experimental group a reference card was made on which appeared the stressing trials selected at random and the stressing periods for each of these trials (Table 2).

During the testing, the experimenter was in charge of the physiological measurements. The assistant was in charge of the timers, the switch box and the recording of the performances of each subject for each trial.

### Statistical Procedures

Analyses of variance were made for the following:

1. Total performance score on the twelve trials.
2. Heart rate at rest.
3. Heart rate during exercise.
4. Heart rate differences between rest and exercise.
5. Galvanic skin resistance at rest.
6. Galvanic skin resistance during exercise.
7. Galvanic skin resistance differences between rest and exercise.

When significant differences were found the Duncan's new Multiple Range Test<sup>3</sup> was selected as a post hoc procedure.

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<sup>3</sup>A.L. Edwards, Experimental Design in Psychological Research (New York: Holt, Rinehart and Winston, 1968, p.130).

## Chapter 4

### PRESENTATION AND DISCUSSION OF RESULTS

#### Introduction

The areas of investigation were the following:

1. Comparison of the performance of twelve trials on the stabilometer of low anxious, medium anxious and high anxious subjects.
2. Comparison of the performance of low, medium and high anxious subjects when submitted to a psychological stressing condition.
3. Comparison of the heart rate of low, medium and high anxious subjects at rest and during exercise.
4. Comparison of the heart rate of low, medium and high anxious subjects during exercise when submitted to a psychological stressing condition.
5. Comparison of the galvanic skin resistance of low, medium and high anxious subjects at rest and during exercise.
6. Comparison of the galvanic skin resistance of low, medium and high anxious subjects during exercise when submitted to a psychological stressing condition.

In order to make these comparisons one hundred and twenty subjects were selected. They were divided according to their levels of anxiety and assigned to three control and three experimental groups, each formed of twenty subjects.

Each subject had to perform twelve trials on a stabilometer. The motor task was to hold the platform within a range of plus four and minus four degrees from the horizontal. Heart rate and galvanic skin resistance were recorded for each subject throughout the testing periods.

### Presentation of Results

Total performance on the stabilometer. For each subject and for each trial, the performance score was recorded. These results appear in Appendices B to G, Tables 18 to 23 inclusive. The total individual performance is recorded in Appendix H, Table 24. A summary of these results appear in Table 3. An analysis of variance (Table 4) was computed using the total performance score of each subject. A significant F. at the .01 level of confidence was obtained for the experimental conditions. The sums and means of the non-stress and stress groups were computed and it was found

|      | Control groups<br>Non-stress | Experimental groups<br>Stress |
|------|------------------------------|-------------------------------|
| Sums | 274.1415                     | 327.1685                      |
| Mean | 91.3805                      | 109.0561                      |

that the mean performance of the experimental groups was significantly superior (109.0561) to the mean performance of the control groups (91.3805).

Heart rate at rest. The heart rate at rest was recorded for each subject. A period of thirty seconds was selected at the end of the rest period from which was calculated

Table 3

The Sums, Means and Standard Deviations for the Performance  
of each Group.

|                        | CONTROL GROUPS |                   |                 | EXPERIMENTAL GROUPS |                   |                 |
|------------------------|----------------|-------------------|-----------------|---------------------|-------------------|-----------------|
|                        | Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety | Low<br>Anxiety      | Medium<br>Anxiety | High<br>Anxiety |
| Sums                   | 1959.53        | 1720.19           | 1803.11         | 2094.15             | 2081.85           | 2367.37         |
| Means                  | 97.9765        | 86.0095           | 90.1555         | 104.7075            | 104.0925          | 118.3685        |
| Standard<br>deviations | 37.1665        | 27.5135           | 29.0720         | 41.8866             | 37.9308           | 39.0786         |



Table 4

Analysis of Variance for the Total Performance  
Score on the Twelve Trials

| Source of<br>variation     | Sum of<br>squares | Degrees<br>of freedom | Mean<br>squares | F        |
|----------------------------|-------------------|-----------------------|-----------------|----------|
| Anxiety levels             | 1,772.60449       | 2                     | 886.30225       | 0.65576  |
| Experimental<br>conditions | 9,372.84766       | 1                     | 9,372.84766     | 6.93488* |
| Interaction                | 2,309.86230       | 2                     | 1,154.93115     | 0.85452  |
| Error                      | 154,076.84765     | 114                   | 1,351.55129     |          |
| Total                      | 167,532.12500     | 119                   |                 |          |

\*Significant at the .01 level.

the heart rate. These data appear in Appendix I, Table 25. A summary of these data is outlined in Table 5. The analysis of variance (Table 6) showed a significant F. at the .05 level of confidence for the experimental conditions which demonstrated a significantly higher resting

|      | Control groups<br>Non-stress | Experimental groups<br>Stress |
|------|------------------------------|-------------------------------|
| Sums | 116.70                       | 126.20                        |
| Mean | 38.90                        | 42.07                         |

heart rate for the experimental groups (42.07) as compared to the control groups (38.90).

Heart rate during exercise. The heart rate during exercise was recorded for each subject and for each trial. The total heart rate of each subject appears in Appendix Q, Table 33. The sums, means and standard deviations for the heart rate of each group during exercise are outlined in Table 7. The analysis of variance (Table 8) did not show a significant F.

Differences in heart rate between rest and exercise. The differences in heart rate between each trial and the resting level of each subject for each group appear in Appendices J to O, Tables 26 to 31 inclusive. The summation of these differences appears in Appendix P, Table 32. The summary of these data (Table 9) was followed by the analysis of variance (Table 10) which yielded F. significant at the .05 level of confidence for the anxiety levels.

|      | Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety |
|------|----------------|-------------------|-----------------|
| Sums | 370.10         | 288.55            | 327.65          |
| Mean | 185.05         | 144.28            | 163.83          |

The Duncan's New Multiple Range test showed that the mean of the low anxiety groups (185.05) was significantly higher at the .05 level of confidence than the mean of the medium anxiety groups.

Resting level in galvanic skin resistance. At the end of the resting period of each subject, an interval of thirty seconds was selected to measure the basal level in galvanic skin resistance. This period was divided into ten three second intervals. The galvanic skin resistance was measured for the middle eight intervals, and the average of those eight intervals represented the resting level in galvanic skin resistance of each subject. These results, expressed in ohms, appear in Appendix R, Table 34. The summary of these data is outlined in table 11. The analysis of variance (Table 12) showed a significant F. at the .05 level of confidence for the anxiety levels. With the Duncan's New Multiple Range test it was found that the

|      | Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety |
|------|----------------|-------------------|-----------------|
| Sums | 54,182.06      | 55,046.46         | 62,877.31       |
| Mean | 27,091.03      | 27,523.23         | 31,438.66       |

mean galvanic skin resistance of the high anxiety groups at rest (31,438.66) was significantly higher at the .05 level

Table 5  
The Sums, Means and Standard Deviations of each Group for  
the Heat Rate at Rest.

|                        | CONTROL GROUPS |                   |                 | EXPERIMENTAL GROUPS |                   |                 |
|------------------------|----------------|-------------------|-----------------|---------------------|-------------------|-----------------|
|                        | Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety | Low<br>Anxiety      | Medium<br>Anxiety | High<br>Anxiety |
| Sums                   | 782            | 792               | 760             | 817                 | 830               | 877             |
| Means                  | 39.10          | 39.60             | 38.00           | 40.85               | 41.50             | 43.85           |
| Standard<br>deviations | 6.84           | 6.98              | 4.73            | 8.04                | 9.80              | 8.14            |

Table 6  
Analysis of Variance for the Heart Rate at Rest

| Source of variation     | Sum of squares | Degrees of freedom | Mean squares | F         |
|-------------------------|----------------|--------------------|--------------|-----------|
| Anxiety levels          | 18.31667       | 2                  | 9.15833      | 0.15142   |
| Experimental conditions | 300.83325      | 1                  | 300.83325    | 4.97411** |
| Interaction             | 108.16665      | 2                  | 54.05832     | 0.89382   |
| Error                   | 6,894.68750    | 114                | 60.47971     |           |
| Total                   | 7,321.95313    | 119                |              |           |

\*\*Significant at the .05 level.

Table 7

The Sums, Means and Standard Deviations of each Group for the Heart Rate during Exercise.

|                        | CONTROL GROUPS |                   |                 | EXPERIMENTAL GROUPS |                   |                 |
|------------------------|----------------|-------------------|-----------------|---------------------|-------------------|-----------------|
|                        | Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety | Low<br>Anxiety      | Medium<br>Anxiety | High<br>Anxiety |
| Sums                   | 13,293         | 12,421            | 12,670          | 13,297              | 12,814            | 13,527          |
| Means                  | 664.65         | 621.05            | 633.50          | 664.85              | 640.70            | 676.35          |
| Standard<br>deviations | 102.66         | 74.86             | 71.29           | 128.56              | 107.39            | 94.23           |

Table 8

## Analyses of Variance for the Heart Rate during Exercise

| Source of variation     | Sum of squares | Degrees of freedom | Mean squares | F       |
|-------------------------|----------------|--------------------|--------------|---------|
| Anxiety levels          | 24,270.19922   | 2                  | 12,135.09766 | 1.18922 |
| Experimental conditions | 13,083.40625   | 1                  | 13,383.40625 | 1.28215 |
| Interaction             | 9,139.26563    | 2                  | 4,569.63281  | 0.44781 |
| Error                   | 1,163,281.7500 | 114                | 10,204.22587 |         |
| Total                   | 1,209,774.0000 | 119                |              |         |

Table 9

The Sums, Means and Standard Deviations of each Group for the Differences between Heart Rate at Rest and Heart Rate during Exercise.

|                        | CONTROL GROUPS |                   |                 | EXPERIMENTAL GROUPS |                   |                 |
|------------------------|----------------|-------------------|-----------------|---------------------|-------------------|-----------------|
|                        | Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety | Low<br>Anxiety      | Medium<br>Anxiety | High<br>Anxiety |
| Sums                   | 3,909          | 2,917             | 3,550           | 3,493               | 2,854             | 3,003           |
| Means                  | 195.45         | 145.85            | 177.50          | 174.65              | 142.70            | 150.15          |
| Standard<br>deviations | 68.23          | 61.84             | 66.06           | 77.61               | 47.74             | 49.05           |



Table 10

Analysis of Variance for the Differences  
between Heart Rate at Rest and Heart Rate during Exercise

| Source of variation     | Sum of squares | Degrees of freedom | Mean squares | F         |
|-------------------------|----------------|--------------------|--------------|-----------|
| Anxiety levels          | 33,270.71484   | 2                  | 16,635.35547 | 4.02616** |
| Experimental Conditions | 8,772.29688    | 1                  | 8,772.29688  | 2.12311   |
| Interaction             | 3,133.54980    | 2                  | 1,566.77490  | 0.37919   |
| Error                   | 471,026.00000  | 114                | 4,131.80701  |           |
| Total                   | 516,202.50000  | 119                |              |           |

\*\*Significant at the .05 level

Table 11

The Sums, Means and Standard Deviations of each Group for  
the Galvanic Skin Resistance at Rest.

|                        | CONTROL GROUPS |                   |                 | EXPERIMENTAL GROUPS |                   |                 |
|------------------------|----------------|-------------------|-----------------|---------------------|-------------------|-----------------|
|                        | Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety | Low<br>Anxiety      | Medium<br>Anxiety | High<br>Anxiety |
| Sums                   | 533,563.58     | 692,216.64        | 664,247.24      | 550,077.50          | 608,712.50        | 593,299.00      |
| Means                  | 26,678.18      | 24,610.83         | 33,212.36       | 27,503.88           | 30,435.63         | 29,664.95       |
| Standard<br>deviations | 8,019.79       | 10,090.43         | 13,919.68       | 8,448.86            | 6,623.66          | 9,421.33        |

Table 12

Analysis of Variance for the Resting Level in Galvanic Skin Resistance

| Source of variation     | Sum of squares       | Degrees of freedom | Mean squares      | F         |
|-------------------------|----------------------|--------------------|-------------------|-----------|
| Anxiety levels          | 661,158,912.00000    | 2                  | 330,579,456.00000 | 3.51730** |
| Experimental conditions | 158,558,000.00000    | 1                  | 158,558,000.00000 | 1.68700   |
| Interaction             | 148,423,648.00000    | 2                  | 74,211,824.00000  | 0.78960   |
| Error                   | 10,714,344,448.00000 | 114                | 93,985,477.00000  |           |
| Total                   | 11,682,480,128.00000 | 119                |                   |           |

\*\*Significant at the .05 level

of confidence than the mean of the low anxiety groups at rest (27,091.03).

Galvanic skin resistance during exercise. The galvanic skin resistance during exercise was recorded for each subject and for each trial. The total galvanic skin resistance for each subject in each group is recorded in Appendix Z, Table 42. The sums, means and standard deviations for the galvanic skin resistance are outlined in Table 13. The analysis of variance (Table 14) did not yield a significant F.

Differences in galvanic skin resistance between rest and exercise. The differences in galvanic skin resistance between each trial and the resting level for each subject appear in Appendices S to X, Tables 35 to 40 inclusive. The summation of these differences is in Appendix Y, Table 41.

From these differences, an analysis of variance (Table 16) showed a significant F. at the .05 level of confidence for the interaction between the three anxiety levels and the two experimental conditions. The Duncan's New Multiple Range Test was applied to these data. It was found (Table 15) that the mean of the medium anxiety control group ( -89,465.81) was significantly higher (P.05) than the mean of the low anxiety control group ( -31,375.51) and the mean of the high anxiety experimental group ( -43,689.25). In addition, the mean of the high anxiety control group

( -71,161.54) was significantly higher at the .05 level of confidence than the mean of the low anxiety control group ( -31,375.51).

Table 13

The Sums, Means and Standard Deviations of each Group for the Galvanic Skin Resistance during Exercise.

|                        | CONTROL GROUPS |                   |                 | EXPERIMENTAL GROUPS |                   |                 |
|------------------------|----------------|-------------------|-----------------|---------------------|-------------------|-----------------|
|                        | Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety | Low<br>Anxiety      | Medium<br>Anxiety | High<br>Anxiety |
| Sums                   | 5,775,252.78   | 6,517,283.48      | 6,547,736.07    | 5,472,864.50        | 6,188,467.86      | 6,182,953.00    |
| Means                  | 288,762.64     | 325,864.17        | 327.386.80      | 273,643.23          | 309,423.39        | 309,147.65      |
| Standard<br>deviations | 99,043.13      | 109,139.50        | 131,421.00      | 89,800.63           | 74,474.25         | 81,178.25       |

Table 14

## Analysis of Variance for the Galvanic Skin Resistance during Exercise

| Source of variation     | Sum of squares          | Degrees of freedom | Mean squares         | F       |
|-------------------------|-------------------------|--------------------|----------------------|---------|
| Anxiety levels          | 35,361,415,168.00000    | 2                  | 17,680,707,584.00000 | 1.79210 |
| Experimental conditions | 8,720,789,504.00000     | 1                  | 8,720,789,504.00000  | 0.88390 |
| Interaction             | 105,454,512.00000       | 2                  | 52,727,248.00000     | 0.00530 |
| Error                   | 1,124,668,801,024.00000 | 114                | 9,865,515,798.00000  |         |
| Total                   | 1,168,856,055,808.00000 |                    |                      |         |

Table 15

The Sums, Means and Standard Deviations of each Group for the Differences between Galvanic Skin Resistance at Rest and Galvanic Skin Resistance during Exercise. Significant Differences between Means and expressed in Parentheses.

|                        | CONTROL GROUPS               |                              |                        | EXPERIMENTAL GROUPS   |                          |                        |
|------------------------|------------------------------|------------------------------|------------------------|-----------------------|--------------------------|------------------------|
|                        | Low<br>Anxiety<br>(1)        | Medium<br>Anxiety<br>(2)     | High<br>Anxiety<br>(3) | Low<br>Anxiety<br>(4) | Medium<br>Anxiety<br>(5) | High<br>Anxiety<br>(6) |
| Sums                   | -627,510.18                  | -1,789,316.20                | -1,423,230.81          | -1,128,065.50         | -1,116,082.14            | -873,785.00            |
| Means                  | -31,375.51<br>(.05, 2 and 3) | -89,465.81<br>(.05, 1 and 6) | -71,161.54<br>(.05, 1) | -56,403.27            | -55,804.11               | -43,689.25<br>(.05, 2) |
| Standard<br>deviations | 51,340.94                    | 42,464.09                    | 75,664.63              | 51,440.57             | 41,683.68                | 57,895.29              |



Table 16

Analysis of Variance for the Difference between Galvanic Skin Resistance at Rest and Galvanic Skin Resistance during Exercise.

| Source of variation     | Sum of squares        | Degrees of freedom | Mean squares         | F         |
|-------------------------|-----------------------|--------------------|----------------------|-----------|
| Anxiety levels          | 16,629,510,144.00000  | 2                  | 8,314,753,024.00000  | 2.78710   |
| Experimental conditions | 4,381,696,000.00000   | 1                  | 4,381,696,000.00000  | 1.46870   |
| Interaction             | 20,685,635,583.99999  | 2                  | 10,342,817,792.00000 | 3.46990** |
| Error                   | 340,093,771,776.00000 | 114                | 2,983,278,699.00000  |           |
| Total                   | 381,790,584,832.00000 | 119                |                      |           |

\*\*Significant at the .05 level

## Discussion of Results

As was pointed out in the first chapter, this study attempted to relate the level of performance of low, medium and high anxious subjects to the Hull-Spence drive theory. From this theory it is assumed that the higher the level of drive or trait anxiety of the subjects, the more they would be sensitive to experimental stress.

In connection with the difficulty of the task, studies <sup>1,2,3,4</sup> have shown that low anxious subjects were superior in their performance to high anxious subjects when the task was simple. However, in a difficult task, while "the performance of a high anxiety group would be expected to be inferior to that of a low anxiety group in early stages of learning, it should become superior in later stages".<sup>5</sup>

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<sup>1</sup>I.E. Farber and K.W. Spence, "Complex Learning and Conditionning as a Function of Anxiety", Journal of Experimental Psychology, 45, (1953), 120-125.

<sup>2</sup>G.R. Grice, "Discrimination Reaction Time as a Function of Anxiety and Intelligence", Journal of Abnormal and Social Psychology, 50, (1965), 71-74.

<sup>3</sup>R. Meyer and E. Noble, "Summation of Manifest Anxiety and Muscular Tension", Journal of Experimental Psychology, 55, (1958) 559-602.

<sup>4</sup>E.D. Ryan and W.L. Lackie, "Competitive and Non-Competitive Performance in Relation to Achievement and Manifest Anxiety", Journal of Personality and Social Psychology, 1, (1965) 342-345.

<sup>5</sup>R. Martens, "Anxiety and Motor Behavior", (Unpublished Material, Motor Performance and Play Research Laboratory, University of Illinois, 1970).

Performance on the Stabilometer. In this study, the mean performance of each group (Table 3) revealed that no significant differences were found between the low, medium and high anxiety control groups (Table 4).

Within the limitations of this study, it appears that these results do not support the Hull-Spence drive theory. The same conclusion was reached by Farber and Spence<sup>6</sup>, Carron<sup>7,8</sup>, Carron and Morford<sup>9</sup>, Martens<sup>10</sup>, Martens and Landers<sup>11</sup> and Ryan and Lackie<sup>12</sup>.

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<sup>6</sup>I.E. Farber and K.W. Spence, "Effects of Anxiety, Stress and Task Variables on Reaction Time", Journal of Personality, 25, (1956), 1-18.

<sup>7</sup>A.V. Carron, "Complex Motor Skilled Performance under Conditions of Externally Induced Stress" (unpublished Master of Arts Thesis, University of Alberta, 1965).

<sup>8</sup>A.V. Carron, "Motor Performance under Stress", Research Quarterly, 39, (1968), 463-469.

<sup>9</sup>A.V. Carron and W.R. Morford, "Anxiety, Stress and Motor Learning", Perceptual and Motor Skills, 27, (1968) 507-511.

<sup>10</sup>R. Martens, "Effect on Performance of Learning a Complex Motor Task in the Presence of Spectators", Research Quarterly, 40, (1969), 317-323.

<sup>11</sup>R. Martens and D.M. Landers, "Effect of Anxiety, Competition and Failure on Performance of a Complex Motor Task", Journal of Motor Behavior, 1, (1969), 1-9.

<sup>12</sup>E.D. Ryan and W.L. Lackie, op.cit.

Concerning the experimental groups, no significant differences were found between the low, medium and high anxiety groups. Similar results have been obtained by Carron and Morford<sup>13</sup>, Farber and Spence<sup>14</sup>, Martens<sup>15</sup> and Martens and Landers<sup>16</sup>.

When the comparison was made between the control groups and the experimental groups, the results (page 37) showed that the performance of the experimental groups was significantly higher (P.01, Table 4) than the performance of the control groups. Assuming that the stressor used in this study had a negative effect on the total performance, these results would then be in contradiction to the drive theory.

Since this significant difference in performance between the control and the experimental groups cannot be explained by the Hull-Spence theory, it could then be assumed that the stressor's effect was an increase in the degree of activation of the experimental group. Duffy<sup>17</sup> has suggested that a continuous increase in the degree of

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<sup>13</sup>A.V. Carron and W.R. Morford, op.cit.

<sup>14</sup>I.E. Farber and K.W. Spence, op.cit.

<sup>15</sup>R. Martens, op.cit.

<sup>16</sup>R. Martens and D.M. Landers, op.cit.

<sup>17</sup>E. Duffy, Activation and Behavior, (New York: John Wiley & Sons, Inc., 1962).

activation would increase the level of performance up to a certain point after which a greater increase in activation would result in a decrease in performance. These results when plotted would form an inverted-U shaped curve.

In this study, the level of activation as produced by the stressor could have yielded this significant difference in performance, but this could only be assumed since the physiological measurements utilized in this study do not support this difference in degree of activation between the control and the experimental groups.

Physiological Indicators of Stress. To determine the effectiveness of the stressing condition, heart rate and galvanic skin resistance were the selected physiological measurements used.

Heart rate during exercise (Table 8) and galvanic skin resistance during exercise (Table 14) do not show any significant differences between the experimental and the control groups. In relation to these measurements the psychological stressing condition did not affect either the heart rate or the galvanic skin resistance of the subjects of all groups during exercise.

The results for the differences between heart rate during exercise and heart rate at rest (page 41) showed that the mean of the low anxiety groups (185.05) was significantly higher than the mean of the medium anxiety groups (144.28).

Similarly, the results for the differences in galvanic skin resistance between exercise and rest (Tables 15 and 16) showed that the mean of the medium anxiety control group was significantly higher ( $P.05$ ) than the mean of the high anxiety experimental group.

In conclusion, these results obtained from heart rate and galvanic skin resistance suggested that the stressor used was not sufficient to arouse significant changes in the autonomous nervous system.

### Summary

In order to test the Hull-Spence drive theory, a comparison of the performances of low, medium and high anxiety groups was made. No significant differences were found. When submitted to a psychological stressing condition, no significant differences could again be found between the performance of low, medium and high anxiety experimental groups. However, when the comparisons were made between the stress groups and the non stress groups, it was found that the performance of the experimental groups was significantly superior to the performance of the control groups.

Heart rate and galvanic skin resistance were selected to assess the effects of the stressing condition and it was concluded that the stressor was not sufficient to arouse changes in the autonomic nervous system.

## Chapter 5

### SUMMARY CONCLUSIONS AND RECOMMENDATIONS

#### Summary

The purpose of this investigation was to study the effects of psychological stress on motor performance of low anxious, medium anxious and high anxious subjects. Heart rate and galvanic skin resistance were selected to assess the physiological effects of stress.

One hundred and twenty male university students participated in this study. They were selected according to their level of anxiety as measured by the IPAT Anxiety Scale. The subjects were divided into three control groups composed of twenty low anxious subjects, twenty medium anxious subjects and twenty high anxious subjects. Similarly, twenty low anxious, twenty medium anxious and twenty high anxious subject formed the experimental groups.

Each subject performed twelve trials on a stabilometer. The task was to hold the platform of the stabilometer within a range of plus four and minus four degrees from the horizontal.

A yellow flood lamp was used to induce a psychological stressing condition in the experimental subjects for six of the twelve trials.

The performance of all subjects was recorded for

each trial. The measurements of heart rate and galvanic skin resistance were taken at rest and during each trial.

The results demonstrated that the performance of the experimental groups was significantly higher ( $P.01$ ) than the performance of the control groups.

Heart rate during exercise and galvanic skin resistance during exercise did not show any significant differences between the experimental and the control groups.

The differences in heart rate between exercise and rest of the low anxiety groups were significantly higher ( $P.05$ ) than those of the medium anxiety groups.

Similarly, the differences in galvanic skin resistance between exercise and rest (Table 15) demonstrated that the mean of the medium anxiety control group was significantly higher ( $P.05$ ) than the mean of the low anxiety control group and the mean of the high anxiety experimental group. In addition, the mean of the high anxiety control group was significantly higher ( $P.05$ ) than the mean of the low anxiety control group.

### Conclusions

Within the limitations of this study, the significant difference in the performances between the experimental groups and the control groups did not support the Hull-Spence drive theory.

It also appeared from the measurements of heart



rate and galvanic skin resistance that the stressing condition was not sufficient to arouse significant changes in the autonomic nervous system.

### Recommendations

The effect of psychological stress on performance, using a stressor of greater intensity, could be an interesting area of investigation.

The same experimental design as was used in this study could be altered by increasing the number of trials.

Also, other physiological measurements such as respiratory frequency and amplitude and palmar sweat index could be used to assess the effects of the stressor on the performance of the subjects.

Finally, investigation of the inverted-U hypothesis could be the object of a scientific study in a design where subjects differ in levels of drive and where they are submitted to different levels of stress.

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## APPENDICES

# Appendix A - TABLE 17

The Sums, Means and Standard Deviations of each Group for the Scores Obtained on the IPAT Anxiety Scale.

|                        | CONTROL GROUPS |                   |                 | EXPERIMENTAL GROUPS |                   |                 |
|------------------------|----------------|-------------------|-----------------|---------------------|-------------------|-----------------|
|                        | Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety | Low<br>Anxiety      | Medium<br>Anxiety | High<br>Anxiety |
| Sums                   | 277            | 513               | 872             | 297                 | 577               | 827             |
| Means                  | 13.85          | 25.65             | 43.60           | 14.85               | 28.85             | 41.35           |
| Standard<br>deviations | 4.04           | 5.49              | 5.41            | 3.15                | 5.80              | 5.70            |



# APPENDIX B - TABLE 18

Low Anxiety Control Group. Performance of  
each Subject for each Trial expressed in Seconds.

| Trial | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|       | 5.80  | 6.46  | 8.92  | 8.76  | 7.28  | 6.28  | 10.78 | 8.00  | 9.50  | 4.47  | 10.27 | 8.46  |
|       | 4.90  | 4.45  | 6.38  | 5.82  | 4.45  | 5.12  | 10.55 | 6.18  | 7.38  | 8.10  | 6.18  | 11.35 |
|       | 2.54  | 2.95  | 4.56  | 7.30  | 7.43  | 6.27  | 7.22  | 5.85  | 4.70  | 5.58  | 3.78  | 7.20  |
|       | 2.09  | 2.45  | 2.80  | 2.48  | 3.35  | 2.40  | 7.80  | 9.40  | 5.12  | 3.45  | 5.80  | 2.80  |
|       | 1.40  | 4.70  | 4.72  | 8.18  | 7.70  | 5.40  | 6.72  | 6.35  | 5.75  | 3.35  | 6.22  | 6.30  |
|       | 2.25  | 2.95  | 4.08  | 4.40  | 3.28  | 5.30  | 2.22  | 4.32  | 2.75  | 4.05  | 4.29  | 3.00  |
|       | 1.82  | 2.05  | 1.43  | 2.20  | 2.00  | 2.22  | 1.52  | 2.40  | 4.82  | 2.75  | 2.90  | 1.77  |
|       | 9.22  | 8.79  | 9.80  | 10.85 | 16.67 | 8.40  | 15.70 | 8.34  | 9.77  | 8.51  | 15.68 | 12.31 |
|       | 7.47  | 11.35 | 9.38  | 8.12  | 10.74 | 8.11  | 7.53  | 12.52 | 11.27 | 11.20 | 12.42 | 11.70 |
|       | 9.75  | 10.72 | 9.00  | 6.12  | 12.90 | 10.70 | 10.79 | 11.45 | 12.48 | 7.20  | 12.30 | 14.90 |
|       | 8.22  | 6.13  | 7.88  | 7.70  | 7.71  | 11.17 | 9.35  | 10.76 | 11.54 | 9.40  | 6.75  | 10.32 |
|       | 4.28  | 3.87  | 16.10 | 12.35 | 8.97  | 16.13 | 10.00 | 12.79 | 9.80  | 15.12 | 8.70  | 7.10  |
|       | 9.92  | 11.68 | 8.79  | 10.43 | 10.31 | 10.95 | 10.63 | 5.28  | 8.44  | 10.22 | 13.05 | 13.68 |
|       | 6.22  | 10.47 | 11.60 | 15.59 | 10.05 | 18.78 | 13.92 | 7.12  | 11.00 | 12.17 | 9.45  | 14.47 |
|       | 6.00  | 10.69 | 5.10  | 4.67  | 8.19  | 11.07 | 10.12 | 11.25 | 11.42 | 10.20 | 11.75 | 9.95  |
|       | 7.79  | 4.23  | 2.69  | 2.82  | 2.28  | 5.18  | 6.25  | 4.44  | 4.11  | 2.80  | 7.92  | 6.87  |
|       | 2.00  | 3.10  | 2.22  | 3.95  | 7.10  | 10.86 | 9.18  | 9.12  | 7.73  | 10.29 | 10.68 | 9.32  |
|       | 14.35 | 11.92 | 11.55 | 8.32  | 11.21 | 14.57 | 17.83 | 19.70 | 18.25 | 18.70 | 14.56 | 19.20 |
|       | 4.53  | 3.68  | 9.66  | 11.09 | 10.95 | 11.72 | 9.95  | 7.70  | 7.28  | 10.07 | 10.34 | 13.97 |
|       | 9.10  | 7.58  | 8.54  | 9.73  | 4.96  | 7.43  | 9.08  | 8.30  | 9.33  | 10.71 | 7.78  | 13.31 |

# APPENDIX C - TABLE 19

Medium Anxiety Control Group. Performance  
of each Subject for each Trial expressed in Seconds.

| Trial | 1     | 2     | 3    | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12 |
|-------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|----|
| 8.62  | 4.53  | 10.18 | 6.94 | 8.50  | 12.73 | 14.36 | 11.00 | 8.82  | 10.33 | 11.35 | 15.65 |    |
| 7.94  | 7.55  | 4.46  | 8.95 | 6.98  | 9.73  | 9.35  | 10.57 | 8.54  | 12.21 | 10.54 | 9.31  |    |
| 7.77  | 9.41  | 8.37  | 7.22 | 6.00  | 7.43  | 5.93  | 12.26 | 11.71 | 8.18  | 13.07 | 6.00  |    |
| 2.75  | 2.80  | 4.00  | 4.47 | 4.48  | 3.37  | 3.47  | 3.50  | 5.72  | 3.47  | 3.50  | 3.75  |    |
| 5.40  | 4.43  | 3.28  | 3.92 | 2.53  | 4.60  | 3.97  | 5.69  | 9.10  | 5.05  | 5.34  | 8.93  |    |
| 6.23  | 6.94  | 8.10  | 8.97 | 7.29  | 5.94  | 5.92  | 4.77  | 10.98 | 9.35  | 10.21 | 11.21 |    |
| 4.25  | 4.46  | 4.55  | 4.54 | 4.94  | 5.69  | 5.28  | 4.20  | 4.87  | 6.12  | 4.50  | 8.11  |    |
| 5.18  | 6.00  | 5.59  | 7.57 | 7.53  | 6.96  | 8.04  | 4.66  | 4.60  | 5.10  | 4.35  | 7.52  |    |
| 9.79  | 10.73 | 9.58  | 9.54 | 15.83 | 17.75 | 11.42 | 12.57 | 13.10 | 14.20 | 11.69 | 10.96 |    |
| 5.24  | 3.54  | 5.53  | 5.93 | 5.25  | 5.46  | 2.35  | 7.87  | 4.41  | 4.74  | 8.09  | 9.05  |    |
| 7.27  | 5.80  | 7.00  | 7.42 | 8.67  | 9.00  | 8.18  | 9.05  | 13.64 | 13.04 | 10.46 | 7.80  |    |
| 8.67  | 10.20 | 5.53  | 9.91 | 5.79  | 6.48  | 5.17  | 5.62  | 8.48  | 7.62  | 7.11  | 7.85  |    |
| 6.43  | 8.56  | 8.44  | 6.15 | 6.34  | 9.25  | 6.78  | 14.53 | 8.12  | 12.17 | 14.92 | 15.00 |    |
| 2.46  | 4.00  | 2.20  | 4.75 | 3.85  | 2.68  | 5.13  | 3.25  | 1.68  | 2.33  | 5.40  | 2.70  |    |
| 2.03  | 3.48  | 3.32  | 4.33 | 4.95  | 4.85  | 7.55  | 7.47  | 7.15  | 6.75  | 6.35  | 8.18  |    |
| 5.08  | 4.12  | 6.50  | 6.54 | 7.82  | 9.25  | 8.47  | 6.00  | 12.04 | 12.29 | 12.73 | 12.37 |    |
| 6.93  | 3.21  | 4.45  | 2.98 | 5.66  | 2.35  | 5.77  | 2.92  | 5.42  | 5.40  | 5.09  | 7.37  |    |
| 3.75  | 4.05  | 3.17  | 7.05 | 5.52  | 7.12  | 8.72  | 7.52  | 7.47  | 7.18  | 7.94  | 8.69  |    |
| 4.13  | 3.72  | 3.08  | 7.10 | 5.92  | 5.34  | 7.42  | 3.98  | 6.37  | 8.95  | 7.80  | 4.04  |    |
| 4.05  | 7.42  | 10.31 | 9.68 | 8.53  | 8.11  | 11.48 | 7.97  | 13.93 | 9.23  | 9.24  | 9.93  |    |

# APPENDIX D - TABLE 20

High Anxiety Control Group. Performance of  
each Subject for each Trial expressed in Seconds.

| Trial | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 2.15  | 2.15  | 9.20  | 6.45  | 8.10  | 10.55 | 5.45  | 7.80  | 5.65  | 9.10  | 11.98 | 9.20  | 6.15  |
| 1.20  | 1.20  | 7.45  | 6.35  | 8.20  | 14.00 | 15.58 | 13.32 | 15.72 | 17.15 | 8.28  | 15.58 | 14.00 |
| 4.20  | 4.20  | 2.83  | 4.18  | 7.85  | 7.72  | 4.75  | 8.10  | 6.61  | 5.63  | 9.25  | 8.00  | 9.32  |
| 6.00  | 6.00  | 7.00  | 5.70  | 5.83  | 5.35  | 6.22  | 6.75  | 7.50  | 8.60  | 12.30 | 5.26  | 7.75  |
| 4.54  | 4.54  | 7.81  | 7.50  | 9.18  | 7.00  | 8.21  | 4.98  | 4.40  | 10.94 | 9.31  | 11.00 | 9.20  |
| 2.08  | 2.08  | 1.90  | 2.46  | 2.58  | 6.20  | 5.87  | 4.50  | 5.92  | 3.24  | 4.89  | 4.50  | 7.25  |
| 12.28 | 12.28 | 8.39  | 11.65 | 9.39  | 10.21 | 8.40  | 5.22  | 9.78  | 9.55  | 13.60 | 8.37  | 12.20 |
| 1.83  | 1.83  | 3.42  | 2.45  | 3.35  | 2.19  | 4.25  | 2.67  | 3.73  | 5.75  | 4.15  | 1.92  | 4.67  |
| 6.74  | 6.74  | 7.62  | 8.82  | 12.31 | 8.14  | 12.00 | 12.12 | 12.44 | 17.28 | 16.20 | 6.28  | 14.25 |
| 2.37  | 2.37  | 2.69  | 2.96  | 2.00  | 2.37  | 2.61  | 4.78  | 5.82  | 2.62  | 3.92  | 1.70  | 6.87  |
| 6.10  | 6.10  | 6.79  | 6.52  | 7.77  | 9.47  | 8.94  | 7.59  | 11.47 | 10.37 | 9.70  | 9.90  | 8.37  |
| 6.15  | 6.15  | 6.50  | 6.49  | 6.70  | 9.83  | 9.79  | 7.51  | 9.10  | 12.47 | 7.25  | 7.53  | 8.75  |
| 5.15  | 5.15  | 6.42  | 7.53  | 8.32  | 8.83  | 11.02 | 7.22  | 12.50 | 13.54 | 6.21  | 10.00 | 8.15  |
| 5.00  | 5.00  | 5.85  | 7.79  | 4.33  | 6.18  | 5.71  | 7.46  | 7.14  | 6.88  | 8.21  | 5.53  | 6.97  |
| 5.85  | 5.85  | 7.60  | 8.59  | 10.29 | 8.18  | 15.79 | 7.60  | 8.54  | 7.43  | 14.82 | 14.79 | 12.91 |
| 1.95  | 1.95  | 3.31  | 4.34  | 3.75  | 5.50  | 4.90  | 5.21  | 4.31  | 8.25  | 5.00  | 8.12  | 10.00 |
| 11.84 | 11.84 | 10.67 | 8.42  | 12.16 | 12.97 | 10.45 | 10.86 | 5.85  | 13.00 | 10.53 | 9.58  | 5.47  |
| 4.31  | 4.31  | 6.78  | 8.26  | 6.47  | 6.17  | 7.35  | 10.52 | 7.43  | 9.15  | 6.50  | 8.47  | 9.34  |
| 2.85  | 2.85  | 4.00  | 6.12  | 5.90  | 3.85  | 3.29  | 4.00  | 2.00  | 4.67  | 5.06  | 4.37  | 4.35  |
| 7.06  | 7.06  | 7.67  | 8.77  | 4.08  | 9.14  | 10.41 | 8.42  | 4.74  | 8.11  | 7.60  | 5.75  | 8.22  |

APPENDIX E - TABLE 21

Low Anxiety Experimental Group. Performance  
of each Subject for each Trial expressed in Seconds.

| Trial | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|       | 0.96  | 2.92  | 1.50  | 2.49  | 3.21  | 2.18  | 3.19  | 3.45  | 3.44  | 3.23  | 3.58  | 2.22  |
|       | 10.13 | 9.10  | 6.06  | 10.30 | 12.30 | 17.08 | 13.32 | 11.10 | 10.93 | 10.48 | 14.11 | 14.55 |
|       | 1.27  | 5.90  | 4.77  | 11.40 | 14.52 | 6.84  | 12.18 | 11.93 | 7.48  | 4.75  | 7.49  | 3.32  |
|       | 11.45 | 13.75 | 16.71 | 16.00 | 11.10 | 17.00 | 18.31 | 17.81 | 12.72 | 19.31 | 12.25 | 19.31 |
|       | 2.21  | 4.00  | 5.71  | 5.25  | 2.61  | 5.22  | 4.52  | 7.29  | 3.53  | 7.54  | 5.83  | 4.31  |
|       | 6.75  | 8.45  | 9.00  | 11.66 | 8.81  | 8.04  | 12.30 | 13.46 | 10.25 | 11.81 | 13.18 | 13.62 |
|       | 10.47 | 12.43 | 8.54  | 11.57 | 11.65 | 10.12 | 11.80 | 9.47  | 9.17  | 6.82  | 9.22  | 11.78 |
|       | 7.22  | 10.98 | 6.24  | 10.69 | 10.72 | 11.66 | 13.28 | 13.33 | 13.23 | 13.79 | 19.47 | 14.25 |
|       | 6.70  | 7.11  | 9.65  | 7.71  | 12.38 | 4.87  | 5.40  | 3.79  | 5.10  | 8.43  | 9.12  | 6.19  |
|       | 4.78  | 3.70  | 4.06  | 3.71  | 9.19  | 2.47  | 14.32 | 6.97  | 11.98 | 8.95  | 4.59  | 7.00  |
|       | 2.11  | 2.82  | 6.75  | 4.00  | 5.57  | 5.98  | 3.94  | 4.46  | 4.06  | 7.80  | 6.75  | 6.18  |
|       | 11.12 | 9.11  | 15.75 | 12.75 | 18.28 | 15.21 | 14.80 | 16.82 | 14.94 | 15.54 | 13.85 | 18.10 |
|       | 1.96  | 8.16  | 7.19  | 6.50  | 4.35  | 5.47  | 5.10  | 3.18  | 12.32 | 9.34  | 7.75  | 11.45 |
|       | 2.81  | 7.50  | 6.51  | 5.86  | 3.75  | 5.00  | 8.76  | 11.05 | 13.11 | 8.81  | 10.69 | 8.97  |
|       | 4.89  | 6.87  | 5.58  | 7.49  | 16.12 | 11.28 | 13.75 | 8.52  | 12.13 | 9.28  | 18.09 | 12.71 |
|       | 10.93 | 10.47 | 11.52 | 7.79  | 10.68 | 13.20 | 12.57 | 7.77  | 9.82  | 17.80 | 12.19 | 13.48 |
|       | 6.68  | 11.14 | 9.71  | 9.45  | 7.11  | 7.25  | 6.30  | 11.05 | 7.83  | 9.85  | 4.33  | 12.55 |
|       | 6.82  | 10.55 | 17.16 | 15.18 | 13.96 | 9.36  | 5.90  | 14.60 | 12.41 | 16.34 | 11.97 | 9.26  |
|       | 2.17  | 4.75  | 4.68  | 7.47  | 6.80  | 5.66  | 3.30  | 3.75  | 4.69  | 6.24  | 6.77  | 5.93  |
|       | 2.55  | 3.19  | 7.72  | 1.34  | 1.97  | 2.77  | 3.17  | 3.31  | 7.43  | 4.08  | 1.78  | 4.72  |

APPENDIX F - TABLE 22

Medium Anxiety Experimental Group. Performance  
of each Subject for each Trial expressed in Seconds.

| Trial | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|-------|---|---|---|---|---|---|---|---|---|----|----|----|
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |
|       |   |   |   |   |   |   |   |   |   |    |    |    |

APPENDIX G - TABLE 23

High Anxiety Experimental Group. Performance  
of each Subject for each Trial expressed in Seconds.

| Trial | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|
| 15.47 | 10.82 | 16.90 | 6.10  | 15.17 | 18.00 | 16.27 | 14.59 | 20.04 | 17.45 | 16.57 | 16.10 |    |
| 7.12  | 7.25  | 7.75  | 15.00 | 12.15 | 12.71 | 16.00 | 18.35 | 14.00 | 13.20 | 16.51 | 16.25 |    |
| 3.92  | 10.96 | 7.56  | 8.00  | 7.10  | 7.92  | 9.45  | 8.78  | 12.99 | 6.30  | 8.68  | 8.97  |    |
| 3.47  | 5.21  | 2.23  | 3.45  | 3.45  | 4.79  | 1.94  | 4.76  | 4.68  | 5.17  | 6.77  | 5.59  |    |
| 7.58  | 9.16  | 9.70  | 13.77 | 14.93 | 18.84 | 20.62 | 8.13  | 11.97 | 19.44 | 8.48  | 6.63  |    |
| 10.34 | 9.11  | 10.74 | 10.12 | 18.42 | 16.51 | 10.70 | 16.53 | 14.29 | 17.79 | 16.08 | 15.95 |    |
| 0.50  | 2.07  | 1.35  | 2.10  | 4.97  | 3.10  | 1.11  | 2.02  | 2.75  | 3.91  | 3.82  | 1.81  |    |
| 8.29  | 8.82  | 6.16  | 4.16  | 8.53  | 12.75 | 5.05  | 13.09 | 8.95  | 8.03  | 10.30 | 8.53  |    |
| 4.97  | 7.66  | 12.54 | 10.84 | 10.33 | 14.62 | 9.41  | 6.96  | 10.62 | 7.23  | 9.30  | 8.92  |    |
| 5.78  | 6.16  | 7.05  | 11.29 | 12.47 | 7.79  | 8.15  | 12.65 | 12.48 | 10.30 | 9.27  | 11.95 |    |
| 11.18 | 11.32 | 6.29  | 8.96  | 10.62 | 7.54  | 10.73 | 13.55 | 5.57  | 8.93  | 12.78 | 10.95 |    |
| 7.93  | 9.09  | 7.68  | 8.57  | 10.16 | 12.50 | 14.96 | 6.73  | 6.62  | 12.15 | 14.64 | 6.18  |    |
| 8.43  | 11.28 | 12.04 | 13.21 | 11.04 | 11.79 | 11.18 | 11.50 | 14.55 | 15.34 | 11.75 | 14.42 |    |
| 2.68  | 4.25  | 4.78  | 4.69  | 5.53  | 4.48  | 3.71  | 8.22  | 7.94  | 4.23  | 4.95  | 6.47  |    |
| 10.08 | 8.80  | 12.71 | 16.81 | 11.02 | 9.21  | 16.04 | 16.00 | 14.53 | 13.28 | 19.77 | 16.19 |    |
| 1.10  | 4.59  | 5.71  | 9.31  | 3.27  | 9.31  | 5.96  | 7.02  | 10.77 | 10.02 | 7.75  | 10.00 |    |
| 7.54  | 8.24  | 11.77 | 14.23 | 15.09 | 11.15 | 13.53 | 14.71 | 12.50 | 12.75 | 16.19 | 15.37 |    |
| 3.12  | 10.28 | 9.17  | 12.78 | 14.97 | 5.96  | 9.17  | 8.53  | 11.12 | 14.18 | 10.32 | 8.78  |    |
| 5.38  | 4.33  | 5.81  | 12.21 | 10.79 | 9.62  | 7.83  | 9.47  | 11.15 | 14.40 | 11.11 | 14.02 |    |
| 4.11  | 4.07  | 11.71 | 11.14 | 9.31  | 4.68  | 8.56  | 10.26 | 7.58  | 13.91 | 12.30 | 10.18 |    |

## APPENDIX H - TABLE 24

The Performance of each Subject for Twelve Trials expressed in Seconds.

| CONTROL GROUPS |                   |                 |  | EXPERIMENTAL GROUPS |                   |                 |  |
|----------------|-------------------|-----------------|--|---------------------|-------------------|-----------------|--|
| Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety |  | Low<br>Anxiety      | Medium<br>Anxiety | High<br>Anxiety |  |
| 94.98          | 123.01            | 92.78           |  | 32.37               | 186.10            | 183.48          |  |
| 80.86          | 105.13            | 136.83          |  | 139.46              | 81.12             | 156.29          |  |
| 63.38          | 103.35            | 78.44           |  | 81.85               | 88.93             | 100.63          |  |
| 49.94          | 45.28             | 84.26           |  | 185.72              | 86.13             | 51.51           |  |
| 66.79          | 66.24             | 94.07           |  | 58.02               | 98.15             | 149.25          |  |
| 42.89          | 95.91             | 51.39           |  | 127.33              | 136.04            | 166.58          |  |
| 27.88          | 61.51             | 119.04          |  | 123.04              | 69.47             | 29.51           |  |
| 134.04         | 73.10             | 138.20          |  | 144.86              | 72.76             | 102.66          |  |
| 121.81         | 147.16            | 40.38           |  | 86.45               | 45.65             | 113.40          |  |
| 128.31         | 67.46             | 40.71           |  | 81.72               | 114.95            | 115.34          |  |
| 106.93         | 107.33            | 102.99          |  | 60.42               | 59.91             | 118.42          |  |
| 125.21         | 88.53             | 102.07          |  | 176.27              | 81.25             | 127.21          |  |
| 123.38         | 116.69            | 104.89          |  | 82.77               | 190.46            | 146.53          |  |
| 140.84         | 40.41             | 77.05           |  | 92.82               | 95.74             | 61.93           |  |
| 110.41         | 66.41             | 122.39          |  | 126.71              | 84.03             | 164.44          |  |
| 57.38          | 103.21            | 64.64           |  | 138.22              | 103.02            | 84.81           |  |
| 85.55          | 57.55             | 121.80          |  | 103.36              | 113.62            | 153.07          |  |
| 180.16         | 78.18             | 90.75           |  | 143.52              | 87.00             | 118.38          |  |
| 110.94         | 67.85             | 50.46           |  | 65.21               | 155.23            | 116.12          |  |
| 105.85         | 109.88            | 89.97           |  | 44.03               | 132.29            | 107.81          |  |

## APPENDIX I - TABLE 25

Heart Rate at Rest of each Subject taken over a Period of Thirty Seconds.

| CONTROL GROUPS |                   |                 | EXPERIMENTAL GROUPS |                   |                 |
|----------------|-------------------|-----------------|---------------------|-------------------|-----------------|
| Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety | Low<br>Anxiety      | Medium<br>Anxiety | High<br>Anxiety |
| 32             | 40                | 50              | 41                  | 32                | 35              |
| 36             | 36                | 29              | 36                  | 51                | 52              |
| 37             | 49                | 32              | 27                  | 38                | 44              |
| 42             | 38                | 40              | 48                  | 40                | 37              |
| 27             | 31                | 38              | 27                  | 52                | 52              |
| 35             | 30                | 36              | 42                  | 38                | 38              |
| 40             | 46                | 39              | 33                  | 28                | 34              |
| 36             | 56                | 34              | 41                  | 47                | 39              |
| 37             | 36                | 41              | 31                  | 43                | 43              |
| 40             | 38                | 34              | 48                  | 31                | 33              |
| 38             | 36                | 39              | 42                  | 48                | 41              |
| 34             | 35                | 40              | 52                  | 30                | 47              |
| 38             | 38                | 44              | 31                  | 33                | 56              |
| 45             | 45                | 38              | 34                  | 48                | 47              |
| 46             | 34                | 37              | 53                  | 35                | 35              |
| 40             | 36                | 33              | 49                  | 44                | 35              |
| 39             | 55                | 36              | 44                  | 61                | 52              |
| 39             | 39                | 37              | 46                  | 30                | 63              |
| 63             | 34                | 46              | 51                  | 62                | 49              |
| 38             | 40                | 37              | 41                  | 39                | 45              |



APPENDIX J - TABLE 26

Low Anxiety Control Group. Differences in Heart Rate of  
each Subject for each Trial between Resting Level and Exercise.

| Trial | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 |
|-------|----|----|----|----|----|----|----|----|----|----|----|----|
| 21    | 18 | 20 | 19 | 21 | 22 | 21 | 22 | 21 | 22 | 21 | 23 | 22 |
| 19    | 18 | 17 | 19 | 20 | 18 | 21 | 18 | 21 | 19 | 15 | 19 | 20 |
| 27    | 26 | 27 | 23 | 23 | 25 | 23 | 23 | 23 | 23 | 24 | 25 | 25 |
| 13    | 12 | 14 | 15 | 14 | 13 | 14 | 13 | 14 | 13 | 12 | 12 | 11 |
| 34    | 29 | 24 | 20 | 28 | 24 | 23 | 24 | 23 | 25 | 25 | 23 | 23 |
| 20    | 17 | 16 | 12 | 12 | 13 | 12 | 13 | 12 | 14 | 13 | 11 | 13 |
| 22    | 23 | 24 | 20 | 21 | 21 | 17 | 21 | 17 | 19 | 20 | 20 | 20 |
| 21    | 11 | 10 | 7  | 5  | 7  | 5  | 7  | 5  | 5  | 6  | 4  | 5  |
| 20    | 17 | 13 | 18 | 14 | 15 | 16 | 15 | 16 | 19 | 17 | 18 | 19 |
| 17    | 18 | 20 | 19 | 19 | 20 | 19 | 20 | 19 | 17 | 22 | 20 | 19 |
| 14    | 10 | 8  | 7  | 7  | 10 | 7  | 10 | 7  | 7  | 6  | 7  | 7  |
| 18    | 17 | 13 | 11 | 10 | 9  | 10 | 9  | 10 | 11 | 11 | 11 | 12 |
| 27    | 24 | 26 | 26 | 26 | 26 | 27 | 26 | 27 | 27 | 20 | 20 | 18 |
| 26    | 23 | 24 | 23 | 22 | 25 | 24 | 25 | 24 | 25 | 27 | 24 | 23 |
| 12    | 5  | 9  | 9  | 11 | 9  | 7  | 9  | 9  | 11 | 9  | 10 | 16 |
| 17    | 9  | 15 | 12 | 10 | 8  | 10 | 8  | 9  | 10 | 9  | 9  | 7  |
| 23    | 20 | 17 | 15 | 14 | 14 | 15 | 14 | 15 | 12 | 15 | 15 | 13 |
| 11    | 11 | 8  | 7  | 8  | 8  | 10 | 8  | 10 | 9  | 8  | 8  | 9  |
| 21    | 21 | 21 | 19 | 20 | 19 | 17 | 19 | 17 | 17 | 16 | 15 | 14 |
| 17    | 14 | 13 | 12 | 15 | 12 | 13 | 11 | 12 | 16 | 11 | 14 | 14 |

# APPENDIX K - TABLE 27

Medium Anxiety Control Group. Differences in Heart Rate of each Subject for each Trial between Resting Level and Exercise.

| Trials | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 |
|--------|----|----|----|----|----|----|----|----|----|----|----|----|
| 13     | 16 | 14 | 15 | 15 | 15 | 14 | 15 | 14 | 15 | 12 | 15 | 14 |
| 18     | 15 | 13 | 15 | 15 | 15 | 17 | 18 | 16 | 17 | 19 | 16 | 13 |
| 11     | 9  | 7  | 8  | 8  | 5  | 5  | 2  | 4  | 4  | 5  | 5  | 5  |
| 19     | 14 | 17 | 14 | 14 | 14 | 14 | 15 | 17 | 16 | 17 | 19 | 16 |
| 14     | 14 | 12 | 13 | 13 | 14 | 13 | 9  | 9  | 9  | 12 | 11 | 10 |
| 31     | 25 | 21 | 16 | 16 | 21 | 19 | 17 | 18 | 17 | 19 | 18 | 16 |
| 26     | 20 | 14 | 16 | 16 | 17 | 16 | 14 | 14 | 14 | 15 | 13 | 16 |
| 13     | 8  | 9  | 6  | 6  | 8  | 9  | 9  | 5  | 7  | 6  | 7  | 5  |
| 9      | 7  | 7  | 7  | 10 | 7  | 6  | 5  | 10 | 11 | 8  | 10 | 7  |
| 9      | 5  | 6  | 4  | 4  | 3  | 5  | 5  | 4  | 5  | 5  | 8  | 5  |
| 24     | 17 | 18 | 20 | 20 | 9  | 11 | 12 | 10 | 7  | 5  | 7  | 5  |
| 5      | 0  | 1  | 4  | 4  | 3  | 3  | 4  | 5  | 3  | 4  | 3  | 4  |
| 15     | 14 | 16 | 16 | 16 | 18 | 16 | 14 | 14 | 14 | 16 | 13 | 17 |
| 7      | 4  | 3  | 5  | 5  | 7  | 7  | 9  | 7  | 8  | 8  | 8  | 10 |
| 19     | 18 | 19 | 18 | 18 | 22 | 20 | 19 | 20 | 21 | 21 | 18 | 19 |
| 27     | 20 | 19 | 16 | 16 | 16 | 16 | 14 | 17 | 16 | 17 | 15 | 14 |
| 9      | 8  | 8  | 6  | 6  | 7  | 5  | 6  | 5  | 3  | 3  | 3  | 4  |
| 13     | 13 | 13 | 13 | 13 | 14 | 13 | 15 | 14 | 14 | 14 | 13 | 14 |
| 23     | 23 | 20 | 20 | 20 | 20 | 21 | 20 | 18 | 18 | 18 | 15 | 14 |
| 17     | 13 | 8  | 8  | 7  | 9  | 11 | 7  | 9  | 8  | 7  | 10 | 8  |

# APPENDIX L - TABLE 28

High Anxiety Control Group. Differences in Heart Rate of each Subject for each Trial between Resting Level and Exercise.

| Trial | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 |
|-------|----|----|----|----|----|----|----|----|----|----|----|----|
| 14    | 4  | 7  | 4  | 5  | 5  | 6  | 6  | 5  | 4  | 4  | 3  | 4  |
| 27    | 20 | 21 | 20 | 19 | 21 | 23 | 21 | 20 | 20 | 20 | 23 | 27 |
| 22    | 14 | 15 | 14 | 11 | 11 | 12 | 11 | 12 | 12 | 13 | 13 | 14 |
| 18    | 12 | 14 | 12 | 14 | 14 | 15 | 13 | 14 | 17 | 18 | 16 | 18 |
| 20    | 16 | 22 | 16 | 15 | 15 | 14 | 20 | 20 | 16 | 15 | 11 | 14 |
| 12    | 11 | 8  | 11 | 12 | 10 | 12 | 10 | 11 | 11 | 9  | 10 | 11 |
| 17    | 10 | 10 | 10 | 10 | 8  | 9  | 8  | 8  | 6  | 7  | 8  | 7  |
| 27    | 22 | 22 | 22 | 25 | 25 | 24 | 25 | 25 | 22 | 22 | 22 | 22 |
| 17    | 13 | 13 | 17 | 16 | 13 | 19 | 19 | 19 | 14 | 14 | 15 | 16 |
| 25    | 24 | 29 | 24 | 25 | 24 | 24 | 25 | 26 | 25 | 23 | 23 | 25 |
| 18    | 16 | 17 | 16 | 15 | 15 | 18 | 16 | 17 | 15 | 16 | 15 | 16 |
| 17    | 14 | 15 | 14 | 16 | 17 | 15 | 16 | 15 | 14 | 13 | 13 | 13 |
| 17    | 10 | 10 | 10 | 12 | 14 | 13 | 14 | 12 | 15 | 13 | 12 | 11 |
| 20    | 19 | 21 | 19 | 20 | 22 | 18 | 18 | 16 | 17 | 16 | 16 | 17 |
| 10    | 12 | 11 | 12 | 10 | 10 | 11 | 8  | 9  | 9  | 8  | 8  | 10 |
| 19    | 16 | 21 | 16 | 12 | 14 | 11 | 12 | 12 | 12 | 14 | 14 | 13 |
| 12    | 6  | 5  | 6  | 7  | 9  | 10 | 9  | 10 | 8  | 10 | 10 | 8  |
| 23    | 22 | 22 | 22 | 20 | 17 | 18 | 18 | 17 | 20 | 18 | 20 | 20 |
| 17    | 18 | 16 | 18 | 17 | 18 | 19 | 22 | 24 | 24 | 25 | 22 | 22 |
| 4     | 3  | 4  | 3  | 5  | 5  | 5  | 5  | 3  | 5  | 5  | 7  | 7  |

# APPENDIX M - TABLE 29

Low Anxiety Experimental Group. Differences in Heart Rate of each Subject for each Trial between Resting Level and Exercise.

| Trial | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 |
|-------|----|----|----|----|----|----|----|----|----|----|----|----|
| 16    | 13 | 13 | 13 | 14 | 13 | 12 | 16 | 14 | 12 | 15 | 11 | 13 |
| 16    | 10 | 10 | 10 | 10 | 10 | 9  | 11 | 9  | 10 | 12 | 10 | 9  |
| 15    | 18 | 23 | 23 | 20 | 20 | 21 | 18 | 16 | 16 | 15 | 16 | 18 |
| 19    | 5  | 4  | 4  | 7  | 4  | 4  | 3  | 4  | 1  | 6  | 4  | 1  |
| 13    | 10 | 11 | 11 | 10 | 10 | 9  | 8  | 10 | 10 | 8  | 9  | 10 |
| 17    | 15 | 13 | 13 | 13 | 13 | 13 | 9  | 10 | 11 | 10 | 9  | 10 |
| 25    | 14 | 14 | 14 | 13 | 11 | 12 | 14 | 13 | 11 | 11 | 10 | 11 |
| 19    | 17 | 18 | 18 | 19 | 18 | 19 | 16 | 17 | 13 | 14 | 15 | 14 |
| 25    | 21 | 20 | 20 | 19 | 18 | 19 | 22 | 21 | 20 | 18 | 19 | 15 |
| 24    | 24 | 25 | 25 | 22 | 21 | 19 | 18 | 19 | 18 | 20 | 16 | 14 |
| 25    | 31 | 30 | 30 | 30 | 30 | 27 | 27 | 27 | 27 | 26 | 30 | 31 |
| 8     | 7  | 7  | 7  | 3  | 5  | 6  | 7  | 7  | 8  | 7  | 10 | 8  |
| 18    | 6  | 7  | 7  | 6  | 9  | 8  | 11 | 12 | 8  | 8  | 8  | 7  |
| 11    | 10 | 8  | 8  | 12 | 15 | 12 | 9  | 10 | 11 | 12 | 10 | 10 |
| 16    | 14 | 17 | 17 | 15 | 14 | 14 | 15 | 14 | 15 | 12 | 11 | 11 |
| 14    | 6  | 10 | 10 | 9  | 10 | 8  | 6  | 7  | 10 | 8  | 6  | 9  |
| 19    | 18 | 16 | 16 | 16 | 16 | 11 | 16 | 15 | 15 | 15 | 15 | 15 |
| 10    | 12 | 11 | 11 | 11 | 11 | 12 | 15 | 12 | 13 | 14 | 11 | 12 |
| 29    | 34 | 33 | 33 | 32 | 32 | 32 | 32 | 31 | 31 | 31 | 30 | 31 |
| 21    | 20 | 18 | 18 | 16 | 16 | 15 | 17 | 13 | 13 | 14 | 13 | 13 |

# APPENDIX N - TABLE 30

Medium Anxiety Experimental Group. Differences in Heart Rate of each Subject for each Trial between Resting Level and Exercise.

| Trials | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 |
|--------|----|----|----|----|----|----|----|----|----|----|----|----|
| 30     | 28 | 22 | 22 | 22 | 15 | 12 | 10 | 11 | 17 | 13 | 10 | 10 |
| 7      | 7  | 8  | 7  | 7  | 6  | 6  | 7  | 7  | 6  | 8  | 5  | 2  |
| 17     | 17 | 18 | 17 | 17 | 17 | 17 | 17 | 16 | 15 | 14 | 15 | 14 |
| 14     | 9  | 8  | 8  | 8  | 9  | 8  | 7  | 7  | 6  | 8  | 8  | 7  |
| 12     | 10 | 11 | 11 | 11 | 14 | 13 | 13 | 13 | 13 | 13 | 11 | 10 |
| 28     | 19 | 19 | 19 | 20 | 17 | 14 | 16 | 14 | 15 | 15 | 17 | 12 |
| 20     | 19 | 21 | 20 | 20 | 17 | 19 | 19 | 17 | 18 | 19 | 18 | 20 |
| 4      | 6  | 4  | 4  | 4  | 4  | 7  | 4  | 6  | 6  | 4  | 7  | 5  |
| 10     | 9  | 7  | 8  | 8  | 9  | 9  | 11 | 12 | 11 | 11 | 11 | 9  |
| 23     | 17 | 10 | 12 | 12 | 12 | 13 | 13 | 11 | 13 | 12 | 12 | 13 |
| 17     | 15 | 15 | 12 | 12 | 16 | 16 | 16 | 18 | 16 | 14 | 16 | 17 |
| 12     | 6  | 5  | 5  | 5  | 6  | 10 | 8  | 9  | 8  | 11 | 9  | 8  |
| 19     | 13 | 13 | 18 | 18 | 17 | 16 | 17 | 17 | 18 | 18 | 16 | 18 |
| 21     | 17 | 17 | 13 | 13 | 12 | 12 | 13 | 11 | 12 | 12 | 14 | 12 |
| 12     | 12 | 10 | 9  | 9  | 8  | 7  | 7  | 8  | 8  | 9  | 9  | 8  |
| 24     | 16 | 11 | 11 | 11 | 9  | 7  | 7  | 9  | 8  | 7  | 9  | 10 |
| 16     | 15 | 11 | 10 | 10 | 11 | 14 | 13 | 11 | 11 | 9  | 9  | 8  |
| 17     | 12 | 11 | 9  | 9  | 10 | 9  | 10 | 7  | 9  | 8  | 7  | 8  |
| 9      | 10 | 4  | 8  | 8  | 6  | 7  | 5  | 7  | 7  | 6  | 5  | 3  |
| 16     | 12 | 13 | 14 | 14 | 13 | 14 | 12 | 11 | 11 | 12 | 12 | 11 |

# APPENDIX 0 - TABLE 31

High Anxiety Experimental Group. Differences in Heart Rate of each Subject for each Trial between Resting Level and Exercise.

| Trial | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 |
|-------|----|----|----|----|----|----|----|----|----|----|----|----|
| 21    | 13 | 11 | 14 | 11 | 14 | 16 | 13 | 9  | 6  | 7  | 7  | 7  |
| 16    | 12 | 9  | 14 | 14 | 15 | 16 | 15 | 15 | 18 | 20 | 20 | 21 |
| 16    | 13 | 14 | 16 | 13 | 14 | 13 | 11 | 13 | 12 | 13 | 13 | 14 |
| 14    | 11 | 10 | 9  | 8  | 7  | 9  | 10 | 9  | 7  | 6  | 6  | 6  |
| 16    | 15 | 10 | 9  | 8  | 6  | 6  | 9  | 8  | 5  | 8  | 8  | 9  |
| 13    | 8  | 8  | 5  | 9  | 9  | 6  | 9  | 7  | 12 | 7  | 7  | 7  |
| 15    | 15 | 14 | 14 | 15 | 15 | 15 | 14 | 16 | 17 | 17 | 17 | 18 |
| 17    | 16 | 15 | 15 | 14 | 14 | 14 | 15 | 15 | 14 | 13 | 13 | 13 |
| 14    | 16 | 15 | 14 | 14 | 15 | 14 | 18 | 17 | 16 | 16 | 16 | 16 |
| 18    | 20 | 22 | 18 | 18 | 17 | 20 | 17 | 15 | 16 | 15 | 15 | 16 |
| 17    | 12 | 15 | 12 | 12 | 15 | 15 | 13 | 13 | 14 | 14 | 14 | 15 |
| 16    | 8  | 8  | 9  | 9  | 8  | 6  | 5  | 4  | 5  | 4  | 4  | 6  |
| 13    | 14 | 16 | 15 | 15 | 14 | 19 | 19 | 18 | 19 | 20 | 20 | 21 |
| 7     | 12 | 8  | 7  | 7  | 8  | 7  | 8  | 8  | 9  | 10 | 10 | 9  |
| 18    | 7  | 6  | 8  | 8  | 8  | 11 | 10 | 11 | 7  | 10 | 10 | 13 |
| 26    | 26 | 26 | 22 | 22 | 21 | 20 | 20 | 21 | 20 | 17 | 17 | 17 |
| 13    | 13 | 12 | 10 | 10 | 12 | 12 | 12 | 11 | 12 | 12 | 12 | 13 |
| 7     | 6  | 6  | 5  | 5  | 6  | 7  | 7  | 8  | 9  | 9  | 9  | 9  |
| 13    | 10 | 11 | 7  | 7  | 6  | 6  | 4  | 8  | 6  | 4  | 4  | 4  |
| 25    | 22 | 20 | 13 | 13 | 19 | 18 | 14 | 14 | 11 | 12 | 12 | 13 |

# APPENDIX P - TABLE 32

Summation of the Differences in Heart Rate of  
each Subject between Rest and Exercise.

| CONTROL GROUPS |                   |                 |                | EXPERIMENTAL GROUPS |                 |                |                   |
|----------------|-------------------|-----------------|----------------|---------------------|-----------------|----------------|-------------------|
| Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety | Low<br>Anxiety | Medium<br>Anxiety   | High<br>Anxiety | Low<br>Anxiety | Medium<br>Anxiety |
| 249            | 172               | 67              | 162            | 200                 | 142             |                |                   |
| 222            | 192               | 262             | 126            | 76                  | 185             |                |                   |
| 297            | 70                | 160             | 216            | 194                 | 162             |                |                   |
| 157            | 192               | 183             | 62             | 99                  | 105             |                |                   |
| 300            | 140               | 198             | 118            | 144                 | 109             |                |                   |
| 167            | 238               | 127             | 143            | 206                 | 100             |                |                   |
| 247            | 195               | 108             | 159            | 227                 | 185             |                |                   |
| 94             | 92                | 283             | 199            | 61                  | 175             |                |                   |
| 198            | 97                | 192             | 237            | 117                 | 186             |                |                   |
| 231            | 64                | 298             | 240            | 161                 | 212             |                |                   |
| 97             | 145               | 194             | 341            | 188                 | 168             |                |                   |
| 144            | 39                | 178             | 83             | 97                  | 82              |                |                   |
| 296            | 183               | 153             | 108            | 200                 | 204             |                |                   |
| 288            | 83                | 220             | 130            | 166                 | 103             |                |                   |
| 117            | 234               | 116             | 168            | 107                 | 118             |                |                   |
| 127            | 207               | 170             | 103            | 128                 | 257             |                |                   |
| 191            | 67                | 104             | 187            | 138                 | 143             |                |                   |
| 105            | 163               | 235             | 144            | 117                 | 85              |                |                   |
| 220            | 230               | 244             | 378            | 77                  | 84              |                |                   |
| 162            | 114               | 58              | 189            | 151                 | 198             |                |                   |

## APPENDIX Q - TABLE 33

The Total Heart Rate of each Subject during Exercise.

| Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety | Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety |
|----------------|-------------------|-----------------|----------------|-------------------|-----------------|
| 633            | 652               | 667             | 654            | 584               | 562             |
| 654            | 624               | 610             | 558            | 688               | 809             |
| 741            | 658               | 544             | 540            | 650               | 690             |
| 661            | 648               | 663             | 638            | 579               | 549             |
| 624            | 512               | 654             | 442            | 768               | 733             |
| 587            | 598               | 559             | 647            | 662               | 556             |
| 727            | 747               | 576             | 555            | 563               | 593             |
| 526            | 764               | 691             | 691            | 625               | 643             |
| 642            | 529               | 684             | 609            | 633               | 702             |
| 711            | 520               | 706             | 816            | 533               | 608             |
| 553            | 577               | 662             | 845            | 764               | 660             |
| 552            | 459               | 658             | 707            | 457               | 646             |
| 752            | 639               | 681             | 480            | 596               | 876             |
| 828            | 623               | 676             | 538            | 742               | 667             |
| 669            | 642               | 560             | 804            | 527               | 538             |
| 607            | 639               | 566             | 691            | 656               | 677             |
| 659            | 727               | 536             | 715            | 870               | 767             |
| 573            | 631               | 679             | 696            | 477               | 841             |
| 976            | 638               | 796             | 990            | 821               | 872             |
| 618            | 594               | 502             | 681            | 619               | 738             |



# APPENDIX R - TABLE 34

Resting Level of each Subject in  
Galvanic Skin Resistance expressed in Ohms.

| CONTROL GROUPS |                   |                 | EXPERIMENTAL GROUPS |                   |                 |
|----------------|-------------------|-----------------|---------------------|-------------------|-----------------|
| Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety | Low<br>Anxiety      | Medium<br>Anxiety | High<br>Anxiety |
| 9,943.75       | 38,375.00         | 30,850.00       | 36,158.00           | 23,112.50         | 20,400.00       |
| 29,237.50      | 27,537.50         | 18,838.00       | 44,925.00           | 32,675.00         | 30,700.00       |
| 21,737.50      | 47,383.33         | 21,762.00       | 39,375.00           | 21,225.00         | 22,075.00       |
| 16,250.00      | 25,250.00         | 24,150.00       | 21,400.00           | 33,950.00         | 26,537.00       |
| 29,473.00      | 29,683.33         | 27,266.00       | 30,262.00           | 42,900.00         | 25,100.00       |
| 15,900.00      | 25,983.33         | 25,675.00       | 28,582.00           | 40,712.50         | 24,700.00       |
| 12,700.00      | 41,100.00         | 31,350.00       | 29,285.00           | 34,675.00         | 44,925.00       |
| 26,325.00      | 21,383.33         | 22,350.00       | 31,512.00           | 31,587.50         | 19,462.00       |
| 34,500.00      | 24,983.33         | 25,875.00       | 14,833.00           | 27,750.00         | 28,100.00       |
| 34,463.00      | 43,683.33         | 22,200.00       | 28,083.00           | 39,925.00         | 43,550.00       |
| 33,500.00      | 52,666.66         | 55,033.33       | 22,175.00           | 26,462.50         | 29,350.00       |
| 28,250.00      | 31,050.00         | 35,968.75       | 20,287.50           | 36,712.50         | 34,350.00       |
| 21,558.33      | 31,750.00         | 33,175.00       | 24,425.00           | 23,425.00         | 26,612.50       |
| 23,763.00      | 53,612.50         | 29,587.50       | 34,775.00           | 27,787.50         | 27,487.50       |
| 28,712.50      | 26,437.50         | 49,341.66       | 27,550.00           | 21,875.00         | 26,587.50       |
| 32,400.00      | 40,250.00         | 39,512.50       | 14,062.50           | 32,162.50         | 18,300.00       |
| 30,200.00      | 47,637.50         | 41,562.50       | 15,750.00           | 35,800.00         | 18,800.00       |
| 33,300.00      | 25,650.00         | 37,250.00       | 20,637.50           | 24,875.00         | 30,712.50       |
| 39,012.50      | 27,025.00         | 17,575.00       | 37,562.50           | 23,937.50         | 49,300.00       |
| 32,337.50      | 30,775.00         | 74,925.00       | 28,437.50           | 27,162.50         | 46,250.00       |

# APPENDIX S - TABLE 35

Low Anxiety Control Group. Differences in Galvanic Skin Resistance of each Subject for each Trial between Resting Level and Exercise.

(Trials one to six)

| Trials | 1          | 2         | 3         | 4         | 5         | 6         |
|--------|------------|-----------|-----------|-----------|-----------|-----------|
|        | -712.50    | 600.00    | 1,075.00  | 1,300.00  | 1,581.25  | 1,568.75  |
|        | -8,270.83  | -5,087.50 | -2,937.50 | -3,962.50 | -4,200.00 | -3,850.00 |
|        | -6,425.00  | -3,387.50 | -4,025.00 | -4,225.00 | -5,162.50 | -5,287.50 |
|        | -5,712.00  | -5,212.00 | -4,100.00 | -3,850.00 | -3,363.00 | -2,200.00 |
|        | -5,973.00  | -6,573.00 | -6,811.00 | -6,761.00 | -7,735.00 | -8,448.00 |
|        | -2,800.00  | 300.00    | -613.00   | -350.00   | -1,250.00 | -1,212.00 |
|        | -5,475.00  | -4,088.00 | -3,162.00 | -2,475.00 | -2,500.00 | -2,500.00 |
|        | -7,991.00  | -5,000.00 | -2,450.00 | -2,300.00 | -1,025.00 | -00.00    |
|        | -6,925.00  | -4,675.00 | -2,113.00 | -413.00   | -788.00   | -838.00   |
|        | -8,975.00  | -7,075.00 | -4,913.00 | -6,263.00 | -4,751.00 | -4,226.00 |
|        | -3,463.00  | -813.00   | -413.00   | -600.00   | -3,000.00 | -2,962.00 |
|        | -8,862.00  | -7,012.00 | -7,725.00 | -5,975.00 | -6,562.00 | -6,262.00 |
|        | -1,033.33  | -733.33   | -649.00   | -516.66   | 75.00     | 50.00     |
|        | 4,537.00   | 5,974.00  | 8,362.00  | 9,237.00  | 11,437.00 | 11,862.00 |
|        | -4,262.50  | -3,706.25 | -3,143.75 | -4,731.25 | -1,025.00 | -1,006.25 |
|        | -10,066.67 | -6,066.66 | -6,083.33 | -4,183.33 | -4,416.66 | -3,866.66 |
|        | -5,487.50  | -2,387.50 | -4,512.50 | -5,087.50 | -6,100.00 | -6,162.50 |
|        | -3,925.00  | -1,237.50 | 562.50    | 2,262.50  | 5,000.00  | 5,887.50  |
|        | -5,112.50  | -3,112.50 | -2,712.50 | -2,425.00 | -2,600.00 | -2,862.50 |
|        | -5,712.50  | -4,700.00 | -3,837.50 | -1,700.00 | -00.00    | 1,512.50  |

Table 35 (continued)

Low Anxiety Control Group. Differences in Galvanic Skin Resistance of each Subject for each Trial between Resting Level and Exercise.

(Trials seven to twelve)

| Trials | 7         | 8         | 9          | 10         | 11         | 12         |
|--------|-----------|-----------|------------|------------|------------|------------|
|        | 1,650.00  | 1,668.75  | 1,812.50   | 1,943.75   | 1,887.50   | 1,762.50   |
|        | -5,187.50 | -6,575.00 | -7,762.50  | -5,937.50  | -7,612.50  | -6,387.50  |
|        | -7,537.50 | -7,337.50 | -9,125.00  | -10,112.50 | -9,775.00  | -10,375.00 |
|        | -2,313.00 | -2,750.00 | -2,113.00  | -3,100.00  | -3,500.00  | -3,513.00  |
|        | -9,235.00 | -9,698.00 | -10,535.00 | -10,748.00 | -10,873.00 | -11,798.00 |
|        | -1,337.00 | -1,950.00 | -2,200.00  | -2,525.00  | -2,487.00  | -2,400.00  |
|        | -3,075.00 | -2,937.00 | -3,937.00  | -3,837.00  | -4,262.00  | -5,400.00  |
|        | 750.00    | -388.00   | 362.00     | -13.00     | -338.00    | -1,362.00  |
|        | -700.00   | -1,687.00 | -1,600.00  | -1,812.00  | -2,312.00  | -3,112.00  |
|        | -1,976.00 | -2,101.00 | -1,901.00  | -3,088.00  | -4,100.00  | -5,888.00  |
|        | -4,412.00 | -5,012.00 | -5,512.00  | -6,900.00  | -7,475.00  | -7,712.00  |
|        | -6,887.00 | -6,837.00 | -7,350.00  | -8,775.00  | -5,100.00  | -6,125.00  |
|        | 50.00     | 691.67    | 650.00     | 791.67     | 597.67     | 666.67     |
|        | 12,375.00 | 12,450.00 | 12,287.00  | 12,750.00  | 12,212.00  | 12,750.00  |
|        | -981.25   | -1,468.75 | -1,587.50  | -2,368.75  | -3,143.75  | -3,368.75  |
|        | -4,716.66 | -3,866.66 | -4,200.00  | -4,533.33  | -5,050.00  | -4,800.00  |
|        | -5,912.50 | -5,262.50 | -5,862.50  | -5,650.00  | -5,525.00  | -6,112.50  |
|        | 4,875.00  | 2,950.00  | 2,650.00   | 4,887.50   | 6,025.00   | 5,987.50   |
|        | -4,075.00 | -4,337.50 | -5,750.00  | -7,000.00  | -8,537.50  | -10,387.50 |
|        | 3,637.50  | 3,925.00  | 1,512.50   | 3,375.00   | 2,712.50   | 2,162.50   |

# APPENDIX T - TABLE 36

Medium Anxiety Control Group. Differences in Galvanic Skin Resistance of each Subject for each Trial between Resting Level and Exercise.

(Trials one to six)

| Trials | 1          | 2          | 3          | 4          | 5          | 6          |
|--------|------------|------------|------------|------------|------------|------------|
|        | -14,550.00 | -13,487.50 | -12,375.00 | -12,650.00 | -11,212.50 | -9,650.00  |
|        | -13,050.00 | -10,512.50 | -9,287.50  | -11,412.50 | -9,962.50  | -9,612.50  |
|        | -10,666.66 | -7,883.33  | -6,999.99  | -6,499.99  | -6,766.66  | -7,916.66  |
|        | -7,100.00  | -7,033.33  | -6,000.00  | -5,366.66  | -6,066.66  | -6,933.33  |
|        | -6,966.66  | -5,999.99  | -6,349.99  | -6,233.33  | -5,966.66  | -6,149.99  |
|        | -3,899.99  | -2,899.99  | -3,695.83  | -3,745.83  | -4,395.83  | -4,283.33  |
|        | -13,133.33 | -11,637.50 | -8,100.00  | -7,400.00  | -9,037.50  | -9,175.00  |
|        | -4,649.99  | -3,516.66  | -2,349.99  | -3,016.66  | -4,266.66  | -3,916.66  |
|        | -6,950.00  | -6,433.33  | -5,383.33  | -5,900.00  | -6,100.00  | -7,033.33  |
|        | -9,633.33  | -11,366.66 | -10,383.33 | -9,350.00  | -8,266.66  | -8,266.66  |
|        | -16,966.66 | -13,316.66 | -12,566.66 | -12,629.16 | -9,441.66  | -7,729.16  |
|        | -1,475.00  | -1,075.00  | -337.50    | -912.50    | -2,800.00  | -3,762.50  |
|        | -2,550.00  | -1,800.00  | -1,162.50  | -700.00    | -837.50    | 200.00     |
|        | -13,000.00 | -10,650.00 | -12,512.50 | -11,050.00 | -10,750.00 | -8,800.00  |
|        | -4,900.00  | -6,625.00  | -5,762.50  | -4,862.50  | -5,650.00  | -4,287.50  |
|        | -13,712.50 | -6,787.50  | -6,012.50  | -7,462.50  | -6,800.00  | -8,437.50  |
|        | -5,025.00  | -7,237.50  | -6,237.50  | -5,587.50  | -6,675.00  | -7,987.50  |
|        | -3,350.00  | -1,412.50  | -700.00    | 1,625.00   | 2,300.00   | 3,325.00   |
|        | -11,937.50 | -8,762.50  | -8,975.00  | -9,600.00  | -10,950.00 | -10,475.00 |
|        | -12,962.50 | -12,175.00 | -10,825.00 | -10,662.50 | -11,350.00 | -12,437.50 |

Table 36 (continued)

Medium Anxiety Control Group. Differences in Galvanic Skin Resistance of each Subject for each Trial between Resting Level and Exercise.

(Trials seven to twelve)

| Trials | 7          | 8          | 9          | 10         | 11         | 12         |
|--------|------------|------------|------------|------------|------------|------------|
|        | -9,412.50  | -6,612.50  | -8,363.50  | -8,275.00  | -8,700.00  | -8,987.50  |
|        | -10,300.00 | -10,725.00 | -10,762.50 | -11,187.50 | -11,375.00 | -12,000.00 |
|        | -8,045.83  | -9,158.33  | -10,320.83 | -10,533.33 | -10,683.33 | -11,233.33 |
|        | -7,850.00  | -8,600.00  | -9,337.50  | -9,475.00  | -10,175.00 | -10,937.50 |
|        | -5,316.66  | -5,399.99  | -7,166.66  | -6,866.66  | -7,599.99  | -6,333.33  |
|        | -4,770.83  | -5,583.33  | -6,070.83  | -5,908.33  | -6,458.33  | -6,395.83  |
|        | -8,987.50  | -10,762.50 | -10,250.00 | -11,600.00 | -12,337.50 | -12,225.00 |
|        | -4,583.33  | -4,966.66  | -5,699.99  | -5,883.33  | -5,733.33  | -5,683.33  |
|        | -5,833.33  | -6,366.66  | -6,066.66  | -6,750.00  | -6,566.66  | -6,833.33  |
|        | -7,050.00  | -5,916.66  | -5,950.00  | -5,766.66  | -5,283.33  | -5,850.00  |
|        | -7,254.16  | -6,679.16  | -7,841.66  | -6,279.16  | -7,591.66  | -8,279.16  |
|        | -4,487.50  | -5,570.00  | -6,225.00  | -4,712.50  | -5,050.00  | -6,400.00  |
|        | 625.00     | 462.50     | 375.00     | 675.00     | 612.50     | 612.50     |
|        | -7,475.00  | -6,787.50  | -6,425.00  | -7,187.50  | -7,562.50  | -6,825.00  |
|        | -5,675.00  | -6,237.50  | -6,725.00  | -7,037.50  | -6,562.50  | -6,837.50  |
|        | -9,925.00  | -10,775.00 | -10,425.00 | -10,000.00 | -10,725.00 | -11,487.50 |
|        | -9,687.50  | -13,600.00 | -14,412.50 | -16,100.00 | -18,875.00 | -17,437.50 |
|        | 1,800.00   | 2,150.00   | 2,187.50   | 1,487.50   | 75.00      | -925.00    |
|        | -11,250.00 | -11,737.50 | -12,287.50 | -12,912.50 | -13,225.00 | -13,862.50 |
|        | -11,375.00 | -11,450.00 | -11,625.00 | -10,512.50 | -12,087.50 | -10,925.00 |

## APPENDIX U - TABLE 37

High Anxiety Control Group. Differences in Galvanic Skin Resistance of each Subject for each Trial between Resting Level and Exercise.

(Trials one to six)

| Trials | 1          | 2          | 3          | 4          | 5          | 6          |
|--------|------------|------------|------------|------------|------------|------------|
|        | -3,950.00  | -4,825.00  | -5,475.00  | -6,175.00  | -6,863.00  | -7,163.00  |
|        | -6,761.00  | -4,438.00  | -5,113.00  | -4,651.00  | -5,226.00  | -5,013.00  |
|        | -4,562.00  | -4,350.00  | -4,512.00  | -5,312.00  | -6,188.00  | -7,687.00  |
|        | -7,438.00  | -4,513.00  | -3,725.00  | -2,350.00  | -4,088.00  | -4,138.00  |
|        | -13,516.00 | -11,941.00 | -10,054.00 | -9,854.00  | -13,019.00 | -13,666.00 |
|        | -3,513.00  | -3,063.00  | -2,588.00  | -1,988.00  | -1,959.00  | -1,625.00  |
|        | -7,000.00  | -4,375.00  | -4,788.00  | -6,725.00  | -7,075.00  | -7,588.00  |
|        | -3,775.00  | -888.00    | 862.00     | 2,600.00   | 1,664.00   | 2,262.00   |
|        | -6,675.00  | -6,138.00  | -3,813.00  | -2,825.00  | -2,813.00  | -2,850.00  |
|        | -650.00    | 1,512.00   | 4,012.00   | 4,775.00   | 4,225.00   | 5,900.00   |
|        | -18,866.66 | -15,650.00 | -12,666.66 | -11,866.66 | -12,183.33 | -15,883.33 |
|        | -3,368.75  | -3,968.75  | -3,825.00  | -4,010.42  | -3,427.08  | -2,952.08  |
|        | -9,975.00  | -5,125.00  | -4,237.50  | -3,125.00  | -2,000.00  | -775.00    |
|        | -6,412.50  | -4,800.00  | -3,075.00  | -2,287.50  | -2,250.00  | -875.00    |
|        | -2,491.66  | -2,425.00  | -2,400.00  | -2,233.33  | -2,375.00  | -1,458.33  |
|        | -14,500.00 | -11,737.50 | -9,537.50  | -7,975.00  | -7,762.50  | -6,037.50  |
|        | -1,662.50  | -412.50    | 1,350.00   | 1,450.00   | 2,100.00   | 1,187.50   |
|        | -8,600.00  | -9,237.50  | -11,075.00 | -12,912.50 | -14,137.50 | -15,437.50 |
|        | -2,012.50  | -2,100.00  | -1,787.50  | -2,212.50  | -2,922.50  | -3,612.50  |
|        | -12,162.50 | -17,325.00 | -16,900.00 | -16,475.00 | -19,125.00 | -20,862.50 |

Table 37 (continued)

High Anxiety Control Group. Differences in Galvanic Skin Resistance of each Subject for each Trial between Resting Level and Exercise.

(Trials seven to twelve)

| Trials | 7          | 8          | 9          | 10         | 11         | 12         |
|--------|------------|------------|------------|------------|------------|------------|
|        | -6,888.00  | -7,183.00  | -6,750.00  | -6,525.00  | -6,488.00  | -6,638.00  |
|        | -5,201.00  | -5,800.00  | -6,863.00  | -6,751.00  | -6,300.00  | -7,826.00  |
|        | -8,149.00  | -8,235.00  | -8,725.00  | -8,914.00  | -9,425.00  | -9,650.00  |
|        | -3,188.00  | -2,350.00  | -3,988.00  | -4,200.00  | -5,150.00  | -4,775.00  |
|        | -13,816.00 | -15,254.00 | -13,891.00 | -10,604.00 | -10,516.00 | -11,141.00 |
|        | -1,425.00  | -1,575.00  | -2,188.00  | -2,088.00  | -2,659.00  | -3,375.00  |
|        | -9,475.00  | -8,875.00  | -8,650.00  | -10,113.00 | -9,875.00  | -9,825.00  |
|        | 1,937.00   | 2,512.00   | 2,925.00   | 3,350.00   | 2,962.00   | 616.00     |
|        | -3,338.00  | -3,225.00  | -2,063.00  | -625.00    | 3,537.00   | 258.00     |
|        | 5,100.00   | 5,350.00   | 5,375.00   | 5,762.00   | 5,725.00   | 5,862.00   |
|        | -15,899.99 | -17,683.33 | -11,766.66 | -13,950.00 | -12,783.33 | -14,566.66 |
|        | -3,202.08  | -3,285.41  | -3,210.41  | -3,935.41  | -4,618.75  | -5,118.75  |
|        | -525.00    | -1,200.00  | -1,950.00  | -1,587.50  | -3,325.00  | -3,837.50  |
|        | 100.00     | 512.50     | 1,212.50   | 950.00     | 1,725.00   | 837.50     |
|        | -1,941.66  | 216.66     | 616.66     | -1,469.66  | -483.33    | -291.66    |
|        | -6,900.00  | -8,637.50  | -7,712.50  | -8,275.00  | -7,837.50  | -9,000.00  |
|        | 837.50     | -2,412.50  | -3,887.50  | -4,700.00  | -4,550.00  | -7,050.00  |
|        | -16,087.50 | -16,662.50 | -16,962.50 | -17,537.50 | -18,462.50 | -18,687.50 |
|        | -5,400.00  | -4,487.50  | -5,775.00  | -6,325.00  | -6,222.50  | -7,900.00  |
|        | -22,950.00 | -25,325.00 | -27,350.00 | -30,312.50 | -31,187.50 | -34,050.00 |

# APPENDIX V - TABLE 38

Low Anxiety Experimental Group. Differences in Galvanic Skin Resistance of each Subject for each Trial between Resting Level and Exercise.

(Trials one to six)

| Trials | 1          | 2          | 3          | 4          | 5          | 6          |
|--------|------------|------------|------------|------------|------------|------------|
|        | -11,158.00 | -7,883.00  | -6,883.00  | -6,296.00  | -5,608.00  | -6,446.00  |
|        | -15,408.00 | -12,212.00 | -11,037.00 | -9,963.00  | -11,037.00 | -11,087.00 |
|        | -16,650.00 | -10,142.00 | -8,575.00  | -9,100.00  | -5,558.00  | -11,350.00 |
|        | -2,075.00  | -2,375.00  | -2,825.00  | -1,800.00  | -2,100.00  | -1,775.00  |
|        | -1,396.00  | -2,337.00  | -2,000.00  | -737.00    | -12.00     | 1,925.00   |
|        | -8,132.00  | -6,432.00  | -5,795.00  | -6,145.00  | -6,132.00  | -5,357.00  |
|        | -5,305.00  | -3,105.00  | -1,110.00  | 65.00      | 1,190.00   | 2,465.00   |
|        | -2,462.00  | -50.00     | 1,825.00   | 1,401.00   | 2,413.00   | 2,188.00   |
|        | -2,108.00  | -1,458.00  | -1,708.00  | -1,908.00  | -2,808.00  | -3,395.00  |
|        | -5,708.00  | -6,433.00  | -6,833.00  | -7,696.00  | -8,783.00  | -9,483.00  |
|        | -3,287.50  | -5,737.50  | -3,712.50  | -2,400.00  | -3,225.00  | -3,325.00  |
|        | -2,400.00  | -962.50    | -600.00    | -1,137.50  | -1,062.50  | -887.50    |
|        | -8,350.00  | -6,637.50  | -5,637.50  | -4,787.50  | -4,775.00  | -5,237.50  |
|        | -11,500.00 | -9,212.50  | -8,150.00  | -10,400.00 | -10,437.50 | -9,662.50  |
|        | -8,112.50  | -6,600.00  | -6,737.50  | -6,962.50  | -6,612.50  | -6,700.00  |
|        | -2,350.00  | -762.50    | -587.50    | 500.00     | -300.00    | 137.50     |
|        | -6,812.50  | -6,062.50  | -4,575.00  | -3,738.00  | -2,975.00  | -2,862.50  |
|        | -4,925.00  | -4,675.00  | -3,075.00  | -3,162.50  | -4,900.00  | -3,075.00  |
|        | -10,825.00 | -7,050.00  | -2,662.50  | -100.00    | 887.50     | -1,212.50  |
|        | -2,737.50  | -2,900.00  | -3,675.00  | -3,562.50  | -4,100.00  | -4,087.50  |



Table 38 (continued)

Low Anxiety Experimental Group. Differences in Galvanic Skin Resistance of each Subject for each Trial between Resting Level and Exercise.

(Trials seven to twelve)

| Trials | 7          | 8          | 9          | 10         | 11         | 12         |
|--------|------------|------------|------------|------------|------------|------------|
|        | -8,508.00  | -7,121.00  | -6,658.00  | -9,846.00  | -8,558.00  | -10,445.00 |
|        | -11,375.00 | -11,725.00 | -12,425.00 | -13,337.00 | -14,537.00 | -16,182.00 |
|        | -11,700.00 | -11,162.00 | -12,887.00 | -13,237.00 | -14,862.00 | -15,337.00 |
|        | -1,525.00  | -1,675.00  | -1,487.00  | -850.00    | -475.00    | 112.00     |
|        | 875.00     | 1,277.00   | 1,388.00   | 363.00     | -924.00    | -1,149.00  |
|        | -5,457.00  | -5,807.00  | -6,482.00  | -6,819.00  | -7,432.00  | -7,494.00  |
|        | 4,152.00   | 6,340.00   | 8,215.00   | 8,429.00   | 8,540.00   | 7,003.00   |
|        | 1,700.00   | 1,988.00   | 2,250.00   | 2,338.00   | 2,150.00   | 1,963.00   |
|        | -4,120.00  | -5,146.00  | -5,383.00  | -5,458.00  | -5,008.00  | -4,821.00  |
|        | -10,095.00 | -10,383.00 | -10,795.00 | -11,258.00 | -11,646.00 | -12,083.00 |
|        | -4,187.50  | -4,937.50  | -6,212.50  | -6,600.00  | -6,800.00  | -7,450.00  |
|        | -787.50    | -625.00    | -1,300.00  | -1,675.00  | -1,712.50  | -1,575.00  |
|        | -5,500.00  | -6,387.50  | -7,037.50  | -6,825.00  | -6,825.00  | -7,012.50  |
|        | -10,250.00 | -10,000.00 | -10,287.50 | -11,550.00 | -11,600.00 | -12,262.50 |
|        | -6,587.50  | -6,912.50  | -6,925.00  | -8,062.50  | -7,000.00  | -7,012.50  |
|        | -425.00    | -1,800.00  | -800.00    | -1,650.00  | -2,350.00  | -1,762.50  |
|        | -3,787.50  | -3,925.00  | -3,837.50  | -3,675.00  | -4,200.00  | -3,975.00  |
|        | -4,975.00  | -5,362.50  | -5,462.50  | -4,950.00  | -5,362.50  | -5,412.50  |
|        | -100.00    | -112.50    | 275.00     | -125.00    | -100.00    | -162.50    |
|        | -4,562.50  | -4,800.00  | -4,612.50  | -4,375.00  | -4,150.00  | -3,462.50  |

# APPENDIX W - TABLE 39

Medium Anxiety Experimental Group. Differences in Galvanic Skin Resistance of each Subject for each Trial between Resting Level and Exercise.

(Trials one to six)

| Trials | 1          | 2          | 3          | 4          | 5          | 6          |
|--------|------------|------------|------------|------------|------------|------------|
|        | -6,775.00  | -6,300.00  | -5,312.50  | -4,425.00  | -5,387.50  | -4,800.00  |
|        | -4,562.50  | -2,800.00  | -687.50    | 1,487.50   | 2,637.50   | 5,687.50   |
|        | -5,287.50  | -2,825.00  | -2,275.00  | -1,400.00  | -1,262.50  | -1,025.00  |
|        | -3,775.00  | -3,462.50  | -2,500.00  | -1,775.00  | -2,350.00  | -1,562.50  |
|        | -5,012.50  | -9,462.50  | -10,275.00 | -11,075.00 | -11,925.00 | -13,700.00 |
|        | -8,662.50  | -5,325.00  | -5,325.00  | -5,287.50  | -5,325.00  | -4,212.50  |
|        | -2,675.00  | -1,975.00  | -1,700.00  | -1,975.00  | -2,737.50  | -2,962.50  |
|        | -7,925.00  | -2,887.50  | -2,500.00  | -2,325.00  | -2,337.50  | -2,950.00  |
|        | -8,675.00  | -6,975.00  | -5,450.00  | -7,200.00  | -6,325.00  | -6,250.00  |
|        | -12,937.50 | -10,637.50 | -10,475.00 | -9,075.00  | -9,987.50  | -7,750.00  |
|        | -6,587.50  | -4,662.50  | -3,575.00  | -2,662.50  | -2,375.00  | -1,662.50  |
|        | -12,025.00 | -11,037.50 | -8,400.00  | -6,375.00  | -7,712.50  | -6,937.50  |
|        | -4,125.00  | -1,862.50  | -700.00    | -1,037.50  | -1,237.50  | -1,787.50  |
|        | -5,900.00  | -3,025.00  | -1,812.50  | -1,600.00  | -1,850.00  | -3,325.00  |
|        | -9,850.00  | -8,087.50  | -8,087.50  | -7,862.50  | -8,087.50  | -8,362.50  |
|        | -10,800.00 | -8,112.50  | -5,637.50  | -5,400.00  | -4,450.00  | -3,725.00  |
|        | -6,475.00  | -6,525.00  | -11,625.00 | -10,750.00 | -10,087.50 | -9,625.00  |
|        | -9,087.50  | -7,787.50  | -7,075.00  | -6,000.00  | -4,950.00  | -4,287.50  |
|        | -4,537.50  | -2,012.50  | -975.00    | -2,212.50  | -2,287.50  | -3,287.50  |
|        | -4,850.00  | -412.50    | 587.50     | 337.50     | 37.50      | -62.50     |

Table 39 (continued)

Medium Anxiety Experimental Group. Differences in Galvanic Skin Resistance of each Subject for each Trial between Resting Level and Exercise.

(Trials seven to twelve)

| Trials | 7          | 8          | 9          | 10         | 11         | 12         |
|--------|------------|------------|------------|------------|------------|------------|
|        | -4,300.00  | -3,700.00  | -4,325.00  | -4,175.00  | -4,100.00  | -3,400.00  |
|        | 3,525.00   | 4,000.00   | 7,375.00   | 3,337.50   | 2,987.50   | 2,612.50   |
|        | -562.50    | -150.00    | 231.25     | -156.25    | -281.25    | -631.25    |
|        | -1,037.50  | -407.14    | -187.50    | 475.00     | 387.50     | -12.50     |
|        | -14,975.00 | -16,975.00 | -17,700.00 | -18,537.50 | -19,687.50 | -19,600.00 |
|        | -3,962.50  | -5,237.50  | -5,262.50  | -5,412.50  | -5,925.00  | -7,025.00  |
|        | -3,175.00  | -4,575.00  | -5,875.00  | -6,837.50  | -7,937.50  | -9,987.50  |
|        | -1,462.50  | -662.50    | -225.00    | 1,737.50   | 1,800.00   | 1,537.50   |
|        | -8,150.00  | -7,075.00  | -7,087.50  | -8,287.50  | -8,562.50  | -7,487.50  |
|        | -7,075.00  | -6,550.00  | -5,162.50  | -1,937.50  | -1,487.50  | -700.00    |
|        | -1,675.00  | -2,687.50  | -3,600.00  | -3,350.00  | -3,225.00  | -4,237.50  |
|        | -6,162.50  | -6,575.00  | -7,450.00  | -9,437.50  | -7,550.00  | -7,200.00  |
|        | -2,487.50  | -3,287.50  | -3,400.00  | -3,662.50  | -4,212.50  | -5,187.50  |
|        | -3,362.50  | -3,787.50  | -4,312.50  | -5,125.00  | -5,287.50  | -5,525.00  |
|        | -8,187.50  | -9,600.00  | -8,700.00  | -8,737.50  | -9,362.50  | -9,300.00  |
|        | -2,500.00  | -1,812.50  | -1,800.00  | -400.00    | -587.50    | -287.50    |
|        | -4,562.50  | -4,637.50  | -3,437.50  | -5,687.50  | -1,600.00  | -1,675.00  |
|        | -5,000.00  | -4,562.50  | -4,787.50  | -4,837.50  | -3,937.50  | -5,750.00  |
|        | -3,912.50  | -4,212.50  | -4,662.50  | -6,037.50  | -6,062.50  | -6,737.50  |
|        | -512.50    | -1,275.00  | -1,875.00  | -2,950.00  | -3,737.50  | -3,850.00  |

# APPENDIX X - TABLE 40

High Anxiety Experimental Group. Differences in Galvanic Skin Resistance of each Subject for each Trial between Resting Level and Exercise.

(Trials one to six)

| Trials | 1          | 2          | 3          | 4          | 5          | 6          |
|--------|------------|------------|------------|------------|------------|------------|
|        | 1,350.00   | 1,170.00   | 2,590.00   | 2,600.00   | 3,910.00   | 3,950.00   |
|        | -3,037.00  | -738.00    | 188.00     | 525.00     | 475.00     | 1,175.00   |
|        | -3,538.00  | -1,288.00  | 487.00     | 1,312.00   | 1,187.00   | 1,225.00   |
|        | -4,920.00  | -1,503.00  | -1,648.00  | -2,257.00  | -1,977.00  | -1,017.00  |
|        | -425.00    | -250.00    | 200.00     | 450.00     | 650.00     | 475.00     |
|        | 2,188.00   | 1,875.00   | 2,700.00   | 2,475.00   | 2,412.00   | 2,138.00   |
|        | -17,475.00 | -18,250.00 | -16,563.00 | -11,700.00 | -11,637.00 | -9,825.00  |
|        | -4,387.00  | -3,312.00  | -2,237.00  | -1,750.00  | -1,937.00  | -2,450.00  |
|        | -4,700.00  | -4,062.00  | -3,275.00  | -2,563.00  | -3,125.00  | -1,875.00  |
|        | -8,987.00  | -7,875.00  | -8,912.00  | -9,475.00  | -11,990.00 | -11,275.00 |
|        | -7,338.00  | -7,500.00  | -7,638.00  | -7,538.00  | -7,225.00  | -7,113.00  |
|        | -9,750.00  | -8,537.50  | -3,337.50  | -1,012.50  | 100.00     | 1,987.50   |
|        | -5,075.50  | -4,162.50  | -3,550.00  | -3,337.50  | -4,275.00  | -4,387.50  |
|        | -3,775.00  | -4,575.00  | -5,725.00  | -7,225.00  | -8,000.00  | -8,612.50  |
|        | -2,562.50  | -1,012.50  | 362.50     | 2,337.50   | 2,525.00   | 2,850.00   |
|        | -2,737.50  | -2,175.00  | -1,675.00  | -1,687.50  | -1,487.50  | -1,400.00  |
|        | -1,300.00  | -1,287.50  | -1,387.50  | -1,337.50  | -1,425.00  | -1,562.50  |
|        | -9,212.50  | -7,287.50  | -5,987.50  | -6,775.00  | -7,025.00  | -8,087.50  |
|        | -7,825.00  | -512.50    | 775.00     | 3,450.00   | 1,012.50   | -50.00     |
|        | -13,750.00 | -13,637.50 | -12,662.50 | -11,262.50 | -12,612.50 | -12,800.00 |

Table 40 (continued)

High Anxiety Experimental Group. Differences in Galvanic Skin Resistance of each Subject for each Trial between Resting Level and Exercise.

(Trials seven to twelve)

| Trials | 7          | 8          | 9          | 10         | 11         | 12         |
|--------|------------|------------|------------|------------|------------|------------|
|        | 4,800.00   | 6,500.00   | 6,670.00   | 8,450.00   | 9,070.00   | 9,660.00   |
|        | -950.00    | -650.00    | -737.00    | -2,166.00  | -2,625.00  | -1,350.00  |
|        | 613.00     | 1,412.00   | 962.00     | 625.00     | 13.00      | -1,712.00  |
|        | -2,407.00  | 1,193.00   | 403.00     | -767.00    | -1,617.00  | 383.00     |
|        | 637.00     | 462.00     | 375.00     | 687.00     | 525.00     | 412.00     |
|        | 2,000.00   | 1,900.00   | 1,525.00   | 757.00     | 813.00     | 775.00     |
|        | -8,413.00  | -8,287.00  | -8,387.00  | -8,012.00  | -          | -          |
|        | -2,125.00  | -3,425.00  | -3,012.00  | -3,049.00  | -3,412.00  | -4,724.00  |
|        | -2,600.00  | -3,175.00  | -3,150.00  | -3,575.00  | -3,762.00  | -4,925.00  |
|        | -11,000.00 | -9,525.00  | -11,388.00 | -9,925.00  | -8,363.00  | -8,575.00  |
|        | -7,725.00  | -7,800.00  | -8,213.00  | -7,987.00  | -9,462.00  | -2,037.00  |
|        | 325.50     | 1,062.50   | 600.00     | 875.00     | 575.00     | 112.50     |
|        | -4,850.00  | -5,687.50  | -6,100.00  | -6,025.00  | -6,125.00  | -6,287.50  |
|        | -9,787.50  | -10,275.00 | -10,275.00 | -10,900.00 | -11,525.00 | -11,187.00 |
|        | 2,275.00   | 3,975.00   | 3,362.50   | 2,325.00   | -312.50    | 1,262.50   |
|        | -1,462.50  | -1,425.00  | -1,437.50  | -1,000.00  | -225.00    | 25.00      |
|        | -1,725.00  | -1,925.00  | -2,162.50  | -2,362.50  | -2,587.50  | -2,825.00  |
|        | -9,062.50  | -9,300.00  | -10,100.00 | -11,287.50 | -10,825.00 | -11,562.50 |
|        | -3,475.00  | -6,787.50  | -8,650.00  | -12,137.50 | -13,100.00 | -13,875.00 |
|        | -12,987.50 | -14,437.50 | -16,487.50 | -16,637.50 | -17,125.00 | -16,512.50 |

## APPENDIX Y - TABLE 41

Summation of the Differences in Galvanic  
Skin Resistance of each Subject between Rest and Exercise.

| CONTROL GROUPS |                   |                 | EXPERIMENTAL GROUPS |                   |                 |
|----------------|-------------------|-----------------|---------------------|-------------------|-----------------|
| Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety | Low<br>Anxiety      | Medium<br>Anxiety | High<br>Anxiety |
| 16,137.50      | -124,275.00       | -74,923.00      | -94,910.00          | -57,000.00        | -60,720.00      |
| -67,220.83     | -130,187.50       | -69,943.00      | -150,225.00         | 25,600.00         | 9,890.00        |
| -82,775.00     | -106,708.27       | -85,709.00      | -140,560.00         | -15,625.00        | 1,298.00        |
| -41,726.00     | -94,874.98        | -49,903.00      | -18,850.00          | -16,207.14        | -16,134.00      |
| -105,188.00    | -76,349.91        | -147,272.00     | -2,727.00           | -168,925.00       | 4,198.00        |
| -19,424.00     | -58,108.28        | -28,046.00      | -74,484.00          | -66,962.50        | 21,558.00       |
| -43,648.00     | -124,465.83       | -94,364.00      | 36,879.00           | -52,412.50        | -115,549.00     |
| -19,755.00     | -54,266.59        | 17,027.00       | 17,704.00           | -18,200.00        | -35,820.00      |
| -26,975.00     | -76,216.63        | -30,570.00      | -43,321.00          | -87,525.00        | -40,787.00      |
| -55,527.00     | -93,083.29        | 52,948.00       | -111,196.00         | -83,775.00        | -117,290.00     |
| -48,274.00     | -116,574.92       | -173,766.61     | -57,875.00          | -40,300.00        | -87,576.00      |
| -83,472.00     | -42,987.50        | -44,922.89      | -14,725.00          | -96,862.50        | -17,000.00      |
| 640.36         | -3,587.50         | -37,662.50      | -75,012.50          | -32,987.50        | -59,863.00      |
| 126,233.00     | -109,025.00       | -14,362.50      | -125,312.50         | -44,912.50        | -101,862.00     |
| -30,793.00     | -71,162.50        | -16,736.31      | -84,225.00          | -104,225.00       | 17,387.50       |
| -61,849.96     | -112,550.00       | -105,962.50     | -12,150.00          | -45,512.50        | -16,687.50      |
| -64,062.50     | -128,550.00       | -17,750.00      | -50,425.50          | -76,687.50        | -21,887.50      |
| 35,925.00      | 8,562.50          | -175,800.00     | -55,337.50          | -68,062.50        | -106,512.50     |
| -58,912.50     | -136,025.00       | -51,487.50      | -21,287.50          | -46,937.50        | -61,175.00      |
| 2,887.50       | -138,387.50       | -274,025.00     | -47,025.00          | -18,562.50        | -170,912.50     |

# APPENDIX Z - TABLE 42

The Total Galvanic Skin Resistance  
of Each Subject during Exercise expressed in Ohms.

| CONTROL GROUPS |                   |                 | EXPERIMENTAL GROUPS |                   |                 |
|----------------|-------------------|-----------------|---------------------|-------------------|-----------------|
| Low<br>Anxiety | Medium<br>Anxiety | High<br>Anxiety | Low<br>Anxiety      | Medium<br>Anxiety | High<br>Anxiety |
| 135,462.50     | 336,225.00        | 295,277.00      | 338,986.00          | 220,350.00        | 305,520.00      |
| 283,629.17     | 200,262.50        | 156,113.00      | 388,875.00          | 417,700.00        | 358,510.00      |
| 178,075.00     | 461,891.69        | 175,435.00      | 331,940.00          | 239,075.00        | 266,198.00      |
| 153,274.00     | 208,125.02        | 239,897.00      | 237,950.00          | 391,192.86        | 302,310.00      |
| 248,488.00     | 279,850.05        | 179,920.00      | 360,417.00          | 345,875.00        | 305,398.00      |
| 171,376.00     | 253,691.68        | 280,054.00      | 265,500.00          | 421,587.50        | 317,958.00      |
| 108,752.00     | 368,554.17        | 281,836.00      | 388,299.00          | 363,687.50        | 333,701.00      |
| 296,145.00     | 202,333.37        | 285,227.00      | 395,838.00          | 360,850.00        | 197,724.00      |
| 387,025.00     | 223,583.33        | 279,930.00      | 134,675.00          | 245,475.00        | 296,413.00      |
| 358,299.00     | 431,116.67        | 319,348.00      | 225,800.00          | 395,325.00        | 405,310.00      |
| 353,726.00     | 515,425.00        | 486,633.35      | 208,225.00          | 277,250.00        | 264,624.00      |
| 255,528.00     | 329,612.50        | 386,702.11      | 228,725.00          | 343,687.50        | 395,199.50      |
| 259,340.32     | 377,412.50        | 360,437.50      | 218,087.50          | 248,112.50        | 259,487.00      |
| 411,389.00     | 534,325.00        | 340,687.50      | 291,987.50          | 288,537.50        | 227,988.00      |
| 313,756.25     | 246,087.50        | 575,363.61      | 246,375.00          | 158,275.00        | 336,437.50      |
| 326,950.04     | 370,450.00        | 368,187.50      | 156,600.00          | 340,437.50        | 202,912.50      |
| 298,337.50     | 442,787.50        | 481,000.00      | 138,574.50          | 352,912.50        | 203,712.50      |
| 435,525.00     | 316,362.50        | 271,200.00      | 192,312.50          | 230,437.50        | 262,037.50      |
| 409,237.50     | 188,275.00        | 159,412.50      | 429,462.50          | 240,312.50        | 530,425.00      |
| 390,937.50     | 230,912.50        | 625,075.00      | 294,225.00          | 307,387.50        | 384,087.50      |