THE EFFECT OF MOTIVATION AND ANXIETY ON WEIGHT DISCRIMINATION

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THE EFFECT OF MOTIVATION AND ANXIETY
ON WEIGHT DISCRIMINATION

THESIS

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By

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Introduction

There have been copious amounts of research done in the last twenty years investigating the effect of anxiety on performance. In some instances anxiety facilitates performance while in others it obstructs performance. The problem has been to generate a set of laws that will account for these effects. One such set of laws often used as an explanation of the phenomenon of anxiety is Hullian drive theory (Hull, 1943). The position taken by Hull can be summarized as follows:

All habits activated in a given situation combine multiplicatively with the total effective drive state (D) operating at the moment to form excitatory potential $E[HxD]$. Total effective drive in the Hullian system is determined by the summation of extant need states, primary and secondary, irrespective of their source and their relevance to the type of reinforcement employed. Since response strength is determined in part by $E$, the implication of varying drive level in any situation in which a single habit is evoked is clear: the higher the drive, the greater the value of $E$ and hence of response strength (Taylor, 1956, p. 304).

However, in more complex situations involving many competing response tendencies, the performance of high and low anxiety groups depends upon the relative strengths and dispositions of all of the responses, not just that of the correct response. In such complex tasks the concepts of
Oscillatory inhibition ($O$) and threshold ($L$) are needed. The concept $O$ is to allow for the variability of behavior occurring within an organism and between an organism and his environment. Oscillatory inhibition varies from moment to moment as does the behavior of the organism (Taylor, 1956).

$O$ also plays an inhibitory role, its value being subtracted from excitatory potential $E$ thus yielding momentary excitatory potential $E$. In order for $E$ to activate a response, it must attain minimum or threshold value that is presumably the same for all similar habit tendencies evoked in a given situation. Thus,

$$R = f(E) \times (E - O - L)$$

(Taylor, 1956, p. 304).

In a complex task, involving many competing response tendencies, the response that will appear will have the greatest habit strength and hence, momentary excitatory potential. In this situation, an interaction between drive level and the number and strengths of the various correct and incorrect response tendencies accounts for the production of the response (Taylor, 1956).

When the correct response is weaker (i.e., has less habit strength) than one or more of the competing response tendencies, high drive groups should be inferior in performance to low drive groups. That is because of the multiplicative relationship between habit strength and drive, the stronger incorrect tendencies gain relatively more $E$ than the correct tendencies for the high drive subjects, $S$s, thus leading to a greater probability of occurrence of one of the stronger incorrect responses in the high drive group (Taylor, 1956, p. 305).
It is also possible for a high drive level situation to strengthen new relatively weak competing responses until they have relatively more excitatory potential than did the original strong responses (Taylor, 1956).

Hull has pointed out that anxiety can serve as a drive, but that hunger or thirst could just as well be used as drive producing mechanisms. The Taylor Manifest Anxiety Scale (Taylor, 1953), hereafter referred to as the TMAS, was created to measure anxiety level in an experiment involving eyelid conditioning (Taylor, 1951). In this experiment, two groups of 30 Ss were chosen on the basis of extreme scores, upper twelfth and lower ninth percentiles, on the TMAS. Ss having high anxiety were superior in amount of eyelid conditioning and the speed of acquisition of the conditioned response to Ss having low anxiety. Many studies have supported these results (Spence, Farber, & Taylor, 1954; Spence & Taylor, E., 1954; Taylor, 1956; Worell, L. & Worell, J., 1963). One investigation, however, has failed to replicate these findings (Turner, 1962).

Much research has also been done in the area of reaction time and anxiety. Several studies (Wenar, 1954; Desiderado, Butler, & Meyer, 1966; Bluhm, 1965) have reported that high-anxiety Ss had significantly faster reaction times than did
low-anxiety Ss, but several experiments (Nash, Phelan, Demas, & Bittner, 1966; Worell et al., 1963) have not found a correlation between anxiety and response time. The often conflicting results of such studies led to the formulation by Taylor of two alternative hypotheses, termed the "chronic" and the "reactive" (1956), which specify the conditions under which behavioral differences between anxiety groups may be expected.

Two alternative hypotheses have been entertained concerning the conditions under which emotionality is evoked. One is that test scores reflect differences in a chronic emotional state so that individuals scoring high on the scale (TMAS) tend to bring a higher level of emotionality or anxiety "in the door" with them than do Ss scoring at lower levels (Taylor, 1951). A second alternative conception is that TMAS scores reflect different potentialities for anxiety arousal, high scoring Ss being those who tend to react more emotionally and adapt less readily to novel or threatening situation than do low scorers (Spence et al., 1954). According to the first hypothesis, differences among anxious and non-anxious (providing other conditions imposed by the theory are met) should be found whether or not there is any "threat" in the form of noxious stimulation, fear of failure or the like, in the situation. Thus, for example, the performance of anxious Ss should be superior to the non-anxious in both classical defense conditioning, in which a noxious stimulus is employed, and in reward conditioning into which no objective threat has been introduced. In the case of the second conception, differences would be expected in the performance of anxiety groups only in those situations in which some threat is present (Taylor, 1956, p. 306).

Thus if the reactive hypothesis is correct, differences between high-anxiety groups and low-anxiety groups will not be
observed unless noxious stimulation or naturally stressful situations, such as doctoral examinations, are present during assessment or precede assessment of performance.

Conditioned discriminations and generalization studies using high-anxiety Ss have had ambiguous results. Taylor states:

... anxious Ss should exhibit a greater excitatory strength both to the positive (reinforced) conditioned stimulus CS and to the negative (non-reinforced) conditioned stimulus CS and further, that the difference in excitatory strength of the two stimuli should be greater for the anxious group (Taylor, 1956, p. 307).

Spence and his colleagues partially confirmed this statement in two separate studies (Spence et al., 1954; Spence & Farber, 1953); however, there are several contradictory studies (Turner, 1962; Worell et al., 1963; Desiderado et al., 1966; Hilgard, Jones, & Kaplan, 1951). As an example of the latter, Hilgard and his colleagues demonstrated that high-anxiety Ss did not evidence superior conditioned discrimination when compared to low-anxiety Ss. In fact their performance was inferior. He theorizes that

Discrimination depends on two related but not identical functions; one accurately perceiving the events in the environment and two acting appropriately to the problem inherent in these perceptions (Hilgard et al., 1951, p. 98).
Another performance area that has generated copious amounts of drive level research is serial learning. This area is particularly amenable to the testing of the Hullian proposal: with simple tasks involving only one response tendency or one dominant response tendency, high anxiety should facilitate performance; with complex tasks involving competing response tendencies, high anxiety should decrease performance. Nonsense syllables in a serial list can be easily manipulated so as to increase or decrease response tendencies, i.e., increase or decrease associational content. There are several serial lists composed of nonsense syllables ranked according to their associational value. Montague (1953), in a study using three lists of serial nonsense syllables varying in associational content, reported a significant interaction between anxiety and associational content. He found that a high-anxiety group of Ss did significantly better in remembering a list of nonsense syllables with low associational value than did a low-anxiety group. He also reported that the low-anxiety group did significantly better than did the high-anxiety group when the associational content of the syllables was high. Several studies have reported similar effects (Taylor & Chapman, 1955; Beam, 1955).
A performance measure sometimes used by researchers investigating drive theory is maze learning. Farber and Spence (1953) have completed a study using this performance measure and Ss selected by extreme scores on the TMAS. They reported that

... anxious Ss were significantly inferior in maze performance both for trials and errors and that anxious Ss tended to make relatively more errors at the more difficult choice points (Farber et al., 1953, p. 125).

Axelrod, Cowen, and Heilizer (1956) did a replication of the Farber and Spence study but failed to find a significant difference in maze performance among high-anxious and low-anxious groups. Matarrazo, Ulett, and Saslow (1955) have also reported a study using maze performance with the criterion being the total amount of time and the number of trials needed to reach mastery. In the Matarrazo study those Ss with medium scores of anxiety evidenced superior maze performance. He theorizes that

further research on anxiety and learning will reveal some tasks for which there will be found no relation to anxiety levels and still others showing various other types of relationships (Matarrazo et al., 1955, p. 94).

Sundry experimenters have been interested in the effect of anxiety on sensory perception. Some of the sensory perception areas investigated have been perceptual rigidity, perceptual closure, flicker fusion, auditory discrimination,
and perceptual motor steadiness. Wiggins, Brokaw, Heckel, and Salzberg (1962), using perceptual motor steadiness as their performance measure, found a positive correlation between perceptual motor steadiness and anxiety in a patient population and a negative correlation in a college population. However, Vaught and Newman (1966) in a similar study have reported contradictory results; i.e., high-anxiety Ss were much poorer in a motor steadiness test than were low-anxiety Ss. Vaught suggests that Wiggins may have confounded his experiment by using a motivational condition. The reactive hypothesis predicts differences in performance among high-anxiety Ss under differentially motivating conditions.

There appears to be considerable doubt as to whether or not a correlation exists between anxiety and intelligence. There are numerous studies to support both positions. Since Wiggins' two groups, college and patient, may have differed significantly in intelligence, it is possible that intelligence may also have confounded his study.

Numerous visual discrimination tasks have been used to determine if stress effects visual thresholds. Moffitt and Stagner (1956) found no significant interaction between anxiety or threat and increases in perceptual sharpening or accuracy of articulation of incomplete figures. However,
they found that anxiety due to threat modified the perceptual process enhancing constancy in the case of tachistoscopic closure, rigidity and stability. Smock (1948) found anxiety to be generally associated with perceptual rigidity and increased speed of closure. Longenecker (1962) has reported a study using differentially motivating instructions and stress and nonstress conditions. Performance was indicated in this study by five perceptual recognition tests: Holtzman Figure-Recognition Test, achromatic Form; Holtzman Figure-Recognition Test, chromatic Form; Witkins Embedded Figures Test; Witkins Hidden Digits Test and the Mooney Closure Test. Subjects were rated for anxiety by the Sarason Test Anxiety Questionnaire, hereafter referred to as the TAQ. High-anxious and high-motivated Ss were inferior in performance to low-anxious and low-motivated Ss. In the nonstress condition high-anxious and high-motivated Ss performed better than did the low-anxious and low-motivated Ss.

When groups of high-anxious Ss' and low-anxious Ss' performance on flicker fusion tasks are compared, the high-anxious groups evidenced lower flicker fusion threshold and increased latencies (Buhler, 1954; Jones, 1958; Krugman, 1947; Wagoner, 1960). Hullian drive theory predicts facilitated performance where consistent steady or flicker responses are elicited.
Since 1950 there has been some interest in the effect of anxiety on audition. Rankin (1962) reported a significant relationship between TMAS scores and measures of loudness, time and timbre; i.e., high-anxiety Ss' performance was superior. These results are understandable if auditory tasks are viewed as simple one response type situations in which high-anxiety Ss would be expected to perform better than low-anxiety Ss. Similar results were reported by Jones (1958) in an auditory flicker fusion task in which the criterion was the perceived separation of two audible clicks. Reed and Francis (1962) have also reported similar conclusions.

According to Taylor (1956) what is of importance is the difficulty of the task, not the particular kind of task used. Thus, if the task is simple, discrimination thresholds will be lowered, and if the task is difficult the thresholds will be raised.

Much of the research done in the area of anxiety and performance is an attempt to confirm one of two theoretical positions, either the "Iowa" position advocated by Taylor and Spence or the "Mandler and Sarason" position (Child, 1954).
Mandler and Sarason state that anxiety can serve as a drive-stimulus which may elicit competing responses, facilitating responses, or both. Competing responses are referred to as "task-irrelevant" responses and facilitating responses are thought of as "task-relevant" responses. Anxiety is capable of being reduced by either of these two types of responses. It will be reduced if the individual makes task-relevant responses and learns the task. However, it will also be reduced by defense mechanisms (task-irrelevant responses) which will interfere with learning. The essential difference between the two positions might be summarized as follows: (a) In attempting to account for the influence of anxiety upon performance the "Iowa" group stresses the augmentation of the reaction potential produced by the drive properties of anxiety. (b) Mandler and Sarason prefer to account for the influence of anxiety upon performance by drawing attention to the mediating responses which are elicited by anxiety as a drive-stimulus. Both groups recognize each other's position but each insists that the other's position is subsidiary (Nicholson, 1958, p. 304).

Thus, in a complex performance situation the "Iowa" group would explain the performance of high-anxiety Ss in terms of drive increasing the strong incorrect response tendencies relatively more than correct weak ones; whereas Mandler and Sarason explain the same performance in terms of difficult tasks eliciting more task-irrelevant responses or interfering responses in high-anxiety Ss. The latter group, Mandler and Sarason, believes that a difficult task causes a high-anxiety S to project himself as a failure because he is learning slowly. This feeling of failure will increase his level of anxiety; therefore, the decrement in
performance of high anxiety Ss will be greater with difficult tasks (Nicholson, 1958). Mandler and Sarason (1952) also postulate that two fundamental drives are activated simultaneously in any problem-solving situation: first, there is an anxiety drive that can elicit all responses regardless of their importance to the completion task, and second, there is a task drive which elicits only those responses necessary to the successful completion of the task. To Mandler and Sarason, performance in stressful situations is due to three factors: motivation, difficulty of task, and anxiety. They have developed a questionnaire (Mandler et al., 1952) designed to measure test anxiety. Interfering responses, i.e.,

... feeling of inadequacy, helplessness, heightened somatic reaction, anticipation of punishment or loss of status and esteem, and implicit attempts at leaving the testing situation ... (Mandler et al., 1952, p. 164).

are considered by the TAQ as indications of debilitating anxiety which leads to poor performance in a testing situation.

There are no reported studies demonstrating the effects of anxiety on weight discrimination. Matarrazo (Matarrazo et al., 1955) points out that new tasks involving anxiety will be found for which there are no reported results and
that there is no simple way of indicating the results beforehand. It appears likely, however, that research in weight discrimination under stress conditions will parallel research using other perceptual threshold measures.

This study was an attempt to determine if Ss differing in anxiety, motivation, and stress evidence differential weight discrimination performance. One phenomenon that should be encountered in any weight discrimination task is "anchoring"; that is, perceived heaviness is affected by context. The following quotation can be more easily understood if these abbreviations are "kept in mind": 1. (B) boundary, 2. (AM) apparent magnitude, 3. (Bl) boundary set by Ss after judging a light series of weights, and 4. (Bh) boundary set by Ss after judging a heavy series of weights.

If only two response categories are available (heavy and light), the reference system can be characterized by one boundary (B) between the two categories. A given weight will thus be judged heavy if the apparent magnitude (AM)>(B) and light if (AM)<(B). The boundary (Bl) set by Ss judging a light series of weights may differ from that set by Ss judging a heavier series (Bh) so that (Bl)#(Bh) (Williams, Ross, & Di Lollo, 1966, p. 137).

Thus the judged difference in a weight discrimination will be affected by a preceding series of discriminations. If the preceding series is light, the comparison will be judged differently from a preceding heavy series.
Several hypotheses were tested:

1. Anxiety will affect the discrimination of lifted weights only during stress conditions or when highly motivating instructions are given.

2. Under stress or motivating conditions, high-anxiety Ss will make relatively more weight discrimination errors than low-anxiety Ss.

3. Women will evidence more anxiety than men.

4. As age increases, anxiety will decrease.

5. Anxiety will be inversely related to college classification. Seniors should evidence the least anxiety.

6. Definitions used as a intervening activity will eliminate contextual anchoring by a preceding series of weight discriminations.

Method

Subjects

One hundred and seventy-eight students taking undergraduate courses at North Texas State University were used as Ss. Due to the nature of the study not all of the Ss were used to test each hypothesis; thus the reported numbers of Ss for any one class of S variables will not tally with the total number of Ss used in the experiment. There were
91 females and 80 males. In the college classification, there were 91 freshmen, 32 sophomores, 31 juniors, and 16 seniors. The ages of the Ss ranged from 17 to 37.

Instruments

The following instruments were used in the experiment:

1. The TMAS with the lie scale, F scale and K scale of the Minnesota Multiphasic Personality Inventory (the F scale is used to determine if the S understood the directions, and the K scale is used to determine if the S malingered).

2. A questionnaire consisting of name, age, sex, college classification, and instructor's name.

3. Eleven words, cavern, designate, domestic, consume, terminate, obstruct, remorse, sanctuary, matchless, reluctant, and calamity, from the Wechsler Adult Intelligence Scale.

4. A trial sheet for recording weight discriminations and definitions.

5. Comparison pill boxes partially filled with lead shot, sealed together with water glass and weighing 100, 112, 124, 136, 148, 160, 172, 184, 196, 208, and 220 grains.

6. A standard pill box painted red and weighing 160 grains.
Procedure

The Ss were tested in class by their instructor with the TMAS and the TAQ. They were instructed that their scores were for an experiment and would be kept completely confidential and that they were to answer all questions. If the Ss asked questions about the purposes of the experiment, they were told that their questions would be answered at a later date. When the S finished, if he had left out a question or questions, he was instructed to answer more fully. If he refused, his data were discarded.

A few days later each group of Ss were given eleven sets of weight discriminations. A weight discrimination consisted of comparing the red pill box, weighing 160 grains with one of the other eleven weighted pill boxes and then writing a definition of one of the words from the Wechsler Adult Intelligence Scale. The order of presentation of weights was 196, 112, 124, 184, 220, 148, 208, 100, 160, 172, and 136. In two classes the weight discriminations were given on the same day as they were tested for anxiety. This was done because the instructor of the classes involved felt that she could not afford to give more class time for the experiment. In all cases the Ss did not know that they would be participating in the experiment until they were
given the weight discrimination task just before they took a major quiz. The professor during the preceding week instructed the Ss that this would be the hardest test they would take in the course. One of these two groups also received motivating instructions before they were given the weight discriminations. Two groups of Ss were tested during a normal classroom period. One of these groups was given motivating instructions; the other was not. Many Ss who were not tested under stress conditions, i.e., before a quiz, did not appear for class. This necessitated their being given the weight discrimination individually or in small groups. Some Ss from the first group, stress, but not all, were given the weight discrimination task when they took their makeup exam. For groups receiving motivating instructions, the instructions were as follows:

This is an experiment to test a new intellectual performance measure. IQ type scores will be constructed from your scores on this task. These IQ scores will be correlated with your college entrance examination scores to see how well your intelligence can be predicted from your performance. If you want to know your composit IQ, place a star in the upper left hand corner of the trial sheet. Now put your name, age, sex, social security number, college classification, and instructor's name at the top of the trial sheet. When I say "go," not yet, pick up the red box with your dominant hand and hold it until I say "stop." When I say "stop" put it down on the desk in front of you. When I say "go" the second time pick up, not yet, the box lettered A in front of you and hold it
until I say "stop" and then put it down on the desk. Then indicate whether the lettered box was heavier, lighter, or equal to the red box by circling H, L, or E on the trial sheet. If the lettered box was heavier than the red one, circle H. If it was lighter than the red box, circle L. If it was equal to the red box, circle E.

After you finish each weight discrimination, I will give you a word to define from the Wechsler Adult Intelligence Scale. Write the definition on the trial sheet directly under the weight discrimination answer that you have just circled. You will only be allowed one minute to write the definition so make your answers very short. When the minute is up, I will say, "stop." Then when I say "go," you will again pick up the red box and hold it until I say "stop." Then when I say "go" you will pick up the box lettered B and hold it until I say "stop" and then as before you will circle H, E, or L on the trial sheet. Remember, we want to know if the lettered box is heavier, lighter or equal to the red box. You will then be given another word to define. We will continue in this manner until all of the boxes have been used.

Always use your dominant hand. Are there any questions? Do your very best.

When the Ss entered the room, the materials were on their desks. They were not allowed to handle the materials. The interval between go and stop when the Ss were lifting weights was five seconds.

The instructions for nonmotivated groups were the same as for motivated groups except for the false information given the motivated group concerning the purpose of the experiment. Thus the nonmotivated group was not falsely told that the purpose of the experiment was to test a new intellectual measure.
The scores on the TMAS and TAQ were converted to \( z \) scores and were added together to form composite anxiety scores. On the basis of this composite anxiety score, the groups were further divided into low and high-anxiety scorers. Seven Ss' data were discarded from the experiment because of lie scores of 9 or above or \( F \) scores of 18 and above. A \( 2 \times 2 \times 2 \) analysis of variance was computed to determine the effects of high and low anxiety, high and low motivation, and high and low stress on weight discrimination performance.

In order to test the last hypothesis, that definitions used as a intervening activity would control anchoring, another group of Ss were given essentially the same instructions as the no-stress no-motivation group. The only difference was that this group paused 60 seconds between weight discriminations without writing a definition. A \( t \) test was computed to test which group, the group that paused 60 seconds between weight discriminations or the group that wrote a definition between discriminations, evidenced superior weight discrimination performance.
Results

The anxiety scores were converted to standard T scores with a mean of 50 and a standard deviation of 10. Thus, negative anxiety scores were transformed to positive scores. This was done so that a 2 x 2 x 2 analysis of variance could be more easily computed on the effects of high and low anxiety, motivation and no-motivation, and stress and no-stress on weight discrimination performance (see Table 1).

Table 1

Summary of the Analysis of Variance of the Effects of High and Low Anxiety, Motivation, and Stress on Weight Discrimination

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (Stress)</td>
<td>7.1608</td>
<td>1</td>
<td>7.1608</td>
<td>.4127</td>
<td>ns</td>
</tr>
<tr>
<td>B (Motivation)</td>
<td>.0118</td>
<td>1</td>
<td>.0118</td>
<td>.0006</td>
<td>ns</td>
</tr>
<tr>
<td>C (Anxiety)</td>
<td>.7917</td>
<td>1</td>
<td>.7917</td>
<td>.0456</td>
<td>ns</td>
</tr>
<tr>
<td>AB</td>
<td>7.5887</td>
<td>1</td>
<td>7.5887</td>
<td>.4373</td>
<td>ns</td>
</tr>
<tr>
<td>AC</td>
<td>4.0995</td>
<td>1</td>
<td>4.0995</td>
<td>.2363</td>
<td>ns</td>
</tr>
<tr>
<td>BC</td>
<td>10.1854</td>
<td>1</td>
<td>10.1854</td>
<td>.5870</td>
<td>ns</td>
</tr>
<tr>
<td>ABC</td>
<td>1.4850</td>
<td>1</td>
<td>1.4850</td>
<td>.0855</td>
<td>ns</td>
</tr>
<tr>
<td>WC</td>
<td>1336.0000</td>
<td>77</td>
<td>17.3508</td>
<td>. .</td>
<td>.</td>
</tr>
</tbody>
</table>
High and low anxiety was determined by selecting Ss whose anxiety scores were in the upper and lower 25 percent of the distribution. The analysis of variance failed to indicate any significant effect on performance by stress anxiety, or motivation at the .05 level of probability.

A one-way analysis of variance was run between college classification on anxiety (Table 2). Although the difference was not significant at the .05 level of probability, there was a trend for anxiety to decrease as college class increased.

Table 2

Summary of the Analysis of Variance of Anxiety and College Classification Differences

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>458.605</td>
<td>3</td>
<td>152.168</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Within</td>
<td>16015.981</td>
<td>166</td>
<td>96.482</td>
<td>1.5844</td>
<td>ns</td>
</tr>
<tr>
<td>Total</td>
<td>16474.586</td>
<td>169</td>
<td>97.483</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

A two-way analysis of variance was computed between high and low anxiety and college classification. There was no significant difference at the .05 level of probability
between college classification and upper and lower anxiety scores (see Table 3).

Table 3

Summary of the Analysis of Variance of High Anxiety, Low Anxiety, and College Classification Differences

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>1293.434</td>
<td>3</td>
<td>431.145</td>
<td>. .</td>
<td>. .</td>
</tr>
<tr>
<td>Within</td>
<td>14034.048</td>
<td>80</td>
<td>175.426</td>
<td>2.4577</td>
<td>. .</td>
</tr>
<tr>
<td>Total</td>
<td>15327.482</td>
<td>83</td>
<td>184.668</td>
<td>. .</td>
<td>. .</td>
</tr>
</tbody>
</table>

A Pearson product moment correlation was computed for age and anxiety. The \( r \) of -.29 was significant at the .05 level of probability. As age increased, anxiety decreased (Table 4).

Table 4

Summary of the Pearsonian Correlation Computed for Anxiety and Age

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>SD</th>
<th>( r )</th>
<th>P</th>
</tr>
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<tbody>
<tr>
<td>Anxiety</td>
<td>50</td>
<td>10</td>
<td>. .</td>
<td>. .</td>
</tr>
<tr>
<td>Age</td>
<td>20.1070</td>
<td>2.7676</td>
<td>-.2864</td>
<td>.05</td>
</tr>
</tbody>
</table>
A point bi-serial correlation was computed to determine if anxiety and sex were related. The correlation value (Rpb), .13, was nonsignificant at the .05 level of probability. Thus, anxiety was not correlated with sex (see Table 5).

Table 5
Summary of the Point Bi-Serial Correlation Between Anxiety and Sex

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>Rpb</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>-.2818</td>
<td>. .</td>
<td>.</td>
</tr>
<tr>
<td>Sex</td>
<td>.1618</td>
<td>.1293</td>
<td>.</td>
</tr>
</tbody>
</table>

t Tests were computed to determine if the performance of Ss who had definitions as a intervening activity differed significantly from the performance of Ss who paused 60 seconds between discriminations. The first t test was computed on the number of errors made by the two groups on a weight discrimination that was preceded by two heavier discriminations. (See Table 6.)
Table 6

\[ t \] Test Between Mean Weight Discrimination Performance of Ss Receiving an Intervening Activity and Ss not Receiving an Intervening Activity

(Heavy Preceding Series)

<table>
<thead>
<tr>
<th>Groups</th>
<th>M</th>
<th>S</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Definitions</td>
<td>.1714</td>
<td>.9394</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Definitions</td>
<td>.3428</td>
<td>.9852</td>
<td>.7452</td>
<td>ns</td>
</tr>
</tbody>
</table>

The \( t \) value, .74, was insignificant at the .05 level of confidence. Performance of Ss having definitions as an intervening activity was not superior to performance of Ss without an intervening activity. The second \( t \) test was computed using the same groups, but this time the weight discrimination was heavier than the two preceding light discriminations. (See Table 7.)

As shown in Table 7, the \( t \) value, .92, was insignificant at the .05 level of probability. Thus, the \( t \) tests indicated that definitions used as an intervening activity did not increase weight discrimination ability.
Table 7

_t Test Between Mean Weight Discrimination Performance of Ss Receiving an Intervening Activity and Ss not Receiving an Intervening Activity (Light Preceding Series)

<table>
<thead>
<tr>
<th>Groups</th>
<th>M</th>
<th>S</th>
<th>_t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Definitions</td>
<td>.6857</td>
<td>.7279</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Definitions</td>
<td>.8285</td>
<td>.5600</td>
<td>.9257</td>
<td>ns</td>
</tr>
</tbody>
</table>

Discussion

The first and second hypotheses, that anxiety would affect performance in a weight discrimination task, were rejected. Anxiety failed to affect performance even when Ss were motivated and enduring strong stress. Most studies have indicated that high-anxiety Ss' performance is significantly poorer than low-anxiety Ss' performance on difficult tasks (Mandler et al., 1952; Taylor & Spence, 1952). Several studies that have failed to replicate this phenomenon have been explained in terms of failing to include boundary conditions indicated by the "reactive hypothesis" (Taylor, 1956). However, in this experiment, conditions were used
so as to conform to both the "reactive hypothesis" and to
the "chronic hypothesis." If the "chronic hypothesis" laws
were operating in this situation, Ss with high test anxiety
scores would have evidenced poorer weight discrimination
performance. However, if the "reactive hypothesis" laws
were operating, then high-anxiety Ss would evidence inferior
weight discrimination performance only when they were highly
motivated or enduring strong stress. It is possible that
certain factors may have confounded this study. Most
studies cited as confirming Hull's drive theory have utilized
Ss scoring in the upper ninth and lower twelfth percentiles
of the distribution of anxiety scores. Due to the limited
time and number of Ss available, such a large distribution
was impossible to attain. If these percentile points had
been used in this study, the number of Ss in some treatment
categories would have been very low. It is possible that a
researcher with a larger sample, utilizing these percentages
to determine high and low anxiety scorers, a difference in
performance between high and low-anxiety Ss would have been
noted. Eleven weight discrimination trials may not have
been sufficient to accurately determine the discrimination
thresholds of the Ss. A good approach might be to utilize
21 or more weight discriminations ranging from 100 to
226 grains. This would have increased the difficulty of the task and allowed a more accurate determination of threshold. The 60 second delay between weight discriminations was too long. Even when a definition was given as an intervening activity, most Ss finished writing the definition in 15 to 30 seconds. An experimenter would be more parsimonious of class and experimental time if the use of an intervening activity is dropped in favor of a short time interval between weight discriminations. Matarrazo (Matarrazo et al., 1955) has pointed out that there will be tasks for which the effect of anxiety will be nonexistent. This appears to be the case in weight discriminations; however, further experimentation, eliminating the confounding variables in this experiment, is needed to categorically state that anxiety does not effect weight discrimination performance.

Women did not significantly evidence more anxiety than men, thus the third hypothesis was rejected. Many studies (Bradbury, 1967; Dutt, 1965; Loughlin, O'Connor, Powell, & Parsley, 1965; Goodstein & Goldberger, 1955; Smith, Powell, & Ross, 1955) have found a significant difference between the sexes in anxiety scores. In these studies women tended to make the higher scores. Jahnke, Cribbeke, & Nirussette (1964) point out that the different sex role expectations of
men and women influences their choice of answers to a questionnaire. He and many other experimenters have failed to find a significant difference between the sexes (Jahnke et al., 1964; Bendig, 1954; Sarason, 1961). Most of the differences between sexes have been found when the TMAS was used to indicate anxiety. The TAQ may eliminate bias arising from different sex role expectations; thus, the use of a combined score utilizing both the TAQ and the TMAS may have reduced the difference between anxiety scores made by men and women.

The fourth hypothesis that anxiety would decrease as age increased was confirmed. This finding is not consensual with research in the area. Bendig (1954; 1960) has reported in two studies that anxiety was not correlated with different age groups. However, in his last study he found some age differences on certain anxiety scales within the IPAT: namely, that as age increased, anxiety decreased. This trend is more fully realized in this study. Older Ss evidenced less anxiety than younger Ss. The age range of Ss in this study was 17 to 37. There were few Ss over 25 years old. If possible, other studies concerning age and anxiety should utilize a more complete and uniform range of ages.
Although there was a trend for anxiety to decrease as college classification increased, it was not significant at the .05 level of probability. Thus, the fifth hypothesis was rejected.

Hypothesis Six was rejected. Definitions used as an intervening activity did not significantly reduce the number of errors made after a series of preceding heavy or light weight discriminations. There was a reduction in the number of errors, but the reduction was not significant at the .05 level of probability. It is possible that the 60 second delay between weight discriminations also controlled anchoring. If anchoring had taken place, the performance of the 60 second delay group would have been inferior to the definitions group. However, there was no difference in performance between these groups. Either anchoring did not take place or the 60 second delay controlled anchoring as well as definitions. In a new experiment, the preceding series of weight discriminations used to create anchoring should be increased to four or more in order to be sure that anchoring will take place. The experimental design should include three groups: (a) a group that would proceed from weight discrimination to weight discrimination without delay; (b) a group that would receive a 30 second delay between
weight discriminations (60 seconds was too long); (c) a
group that would receive 30 seconds for a written definition
between each weight discrimination. Further, this use of an
intervening activity, definitions to control anchoring,
should be tested in a separate experiment.
References


