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A Factor Analytic Study of Anxiety Inducing Situations

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A FACTOR ANALYTIC STUDY OF ANXIETY INDUCING SITUATIONS

by

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ABSTRACT

The primary purpose of this investigation was to explore the factorial structure underlying anxiety inducing situations for college students. The resulting factors were then correlated with four state and trait anxiety measures. This was done in order to partially validate several of the experimenter's hypotheses concerning the compatibility of Spielberger's (1966) trait-state anxiety theory with Endler, Hunt, and Rosenstein's (1962) theory on the three sources of variance involved with trait anxiety.

A total of 89 college students rated a list of 35 empirically derived situations for the amount of anxiety induced in each situation and various subsets of subjects also completed the four state and trait anxiety measures.

A principal component factor analysis with unities in the main diagonal was performed on the correlation matrix resulting from the list of 35 anxiety inducing situations. A five factor equimax rotation and a five factor orthoblique (Harris & Kaiser, 1964) rotation were performed.

The first rotated factor was identified as an interpersonal anxiety situation factor. The second factor was defined by situations that pose a threat to self-esteem through the possibility of task failure. The third factor was somewhat ambiguous but appeared to be principally a factor defined by situations of physical danger. The fourth factor was interpreted to represent situations of anticipation or expectation where personal effort might be involved. The fifth factor was somewhat ambiguous in meaning but had strong loadings by situations where interactions with authority figures were involved.

The STAI trait scale (Spielberger, Gorsuch, & Lushene, 1968) correlated significantly (.001 level) with the total scores for anxiety situations but the Taylor MAS (1951) scores did not (.24 level). Both trait anxiety scales correlated significantly with the second anxiety situation factor, as predicted. The STAI trait scale correlated significantly with the third situation factor, the physical danger factor, contrary to predictions. In general, the STAI trait scale correlated significantly with every situation factor except the fifth factor whereas the MAS correlated significantly only with the second and fifth factors. Finally, the STAI state scale (Spielberger, Gorsuch, & Lushene, 1968) correlated significantly (.03 level) with the second factor, which was interpreted to represent a threat to goal achievement, when factor subscales from the oblique rotation were used. The Zuckerman Adjective Checklist (1960) scores did also (.05 level). When the equimax rotation was used the correlation between the STAI state scale and the second factor just barely failed to reach significance (.06 level) whereas the correlation between the Zuckerman Adjective Checklist scores and the second factor was definitely non-significant (.12 level).

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VITA

Anthony Paul Gillette was born in Chicago on June 24, 1943. He completed his high school education in 1961 at Immaculate Conception High School in Elmhurst, Illinois. He received his Bachelor of Arts degree cum laude in Philosophy from Notre Dame in 1966. In February, 1970, Loyola University conferred on him a Master of Arts degree in clinical psychology. The Ph.D. in clinical psychology was conferred on him by Loyola University in February, 1972.

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CHAPTER I

INTRODUCTION

One of the most highly researched concepts in psychological literature is "anxiety". Any hopes for clarity and agreement between anxiety researchers based on the sheer volume of anxiety research are ill-founded, as Spielberger (1966) has pointed out. There exists no general agreement between researchers on the nature of anxiety or even on what variables are to be considered in analyzing anxiety.

Out of this morass of sometimes conflicting data two relatively recent research trends bear further consideration. Both show promise of giving us a conceptual overview of the concept of anxiety which researchers can agree upon. One in particular also brings empirical clarity to the parameters involved in anxiety research. The first research trend being referred to is Spielberger's (1966) trait-state anxiety concept. The second trend being referred to is the work done by Endler, Hunt, and Rosenstein (1962) on the sources of variance involved with trait anxiety.

Spielberger's (1966) trait-state theory of anxiety grew out of the factor analytic work of Cattell and Scheier (1958; 1961). Trait anxiety is a stable individual difference in a unitary, somewhat permanent personality characteristic. State anxiety, on the other hand, is defined as a transitory state or condition of the organism that fluctuates over time.

More directly relevant to the present research is the work of Endler, Hunt, and Rosenstein (1962), and Endler and Hunt (1966). In this work they hypothesized that there are three sources of variance for any trait (response

class): situations, responses, and individual differences. To assess the amount of variance attributable to each source they invented the S-R Inventory of Anxiety (1962). This inventory employs 11 situations and 14 responses which were made up by the authors. A three-way analysis of variance was used to assess the variance contributions of the subjects, situations, and responses, and their interactions. Furthermore, a factor analysis was done on both the situations and responses.

Endler et al. (1962) said this of the rationale behind the selection of the particular situations they employed:

> The choice of situations for this sample, for which there is no strong defense at this point, is based on an intuitive attempt to select a variety of situations that would be familiar through either direct or vicarious experience to most college freshmen and sophomores, a variety which would include both social and nonsocial situations, and which would vary from the typically innocuous to the quite threatening.

Further refinements of the S-R Inventory employed a wider list of situations and responses (Endler and Hunt, 1969). But here again the list of situations was drawn up by the authors and their colleagues. The subjective criteria employed here raises at least the possibility of covert theorizing. More important is the possibility of not adequately covering the field involved, namely, situations that induced anxiety in college students.

Thurstone (1947) has pointed out a procedural distinction which can be applied to the type of research that Endler et al. have done:

> When a particular domain is to be investigated by means of individual differences, one can proceed in one of two ways. One can invent a hypothesis regarding the processes that underlie the individual differences, and one can then set up a factorial experiment...to test the hypothesis. If no promising hypothesis is available, one can represent the domain as adequately as possible in terms of a set of measurements or numerical indices and proceed with factorial experiment. The analysis might reveal an underlying order which would be of great assistance in formulating the scientific concepts covering the particular domain. In the first case we start with a hypothesis that

> determines the nature of the measurements that enter into the factorial analysis. In the second case we start with no hypothesis, but we proceed, instead, with a set of measurements or indices that cover the domain, hoping to discover in the factorial analysis the nature of the underlying order.

The present research is an attempt to expand on and perhaps partially validate the work of Endler et al. using in this case a more inductive approach. In line with Thurstone's statement above the experimenter has started with a set of empirically derived (rather than subjectively or hypothetically derived) indices which hopefully cover the domain of anxiety inducing situations for college students. A factor analysis was then performed for the purpose of determining the nature of the underlying order involved.

Endler et al. (1962) felt that further research was needed to broaden the situation and response factorial structure. They also felt that such research should begin with an extended sampling of situations before perceeding to response classes. The experimenter is in agreement with this approach. Once the factorial structure of situations that induce anxiety is fixed this structure can then be used in broadening the response factorial structure. The present research is an attempt then to explore the factorial order of anxiety inducing situations alone. Data had been collected on responses to these situations but there has been no attempt to systematically or statistically analyze this data. The data will hopefully be used in future research on the factorial structure of anxiety responses.

Finally, an attempt has been made to interpret Spielberger et al.'s (1966, 1968, 1970) trait-state theory of anxiety in terms of the Endler et al. (1962) research. Trait anxiety, according to Spielberger, is thought to reflect traces of past learning that in some way determine individual differences in anxiety-proneness. Trait anxiety is thus a

disposition to see certain types of situations as dangerous and to respond to them with anxiety states. State anxiety is conceived of as complex emotional reaction which fluctuates over time and varies in intensity. State anxiety involves both subjective unpleasant feelings of tension and apprehension and autonomic nervous system arousal. Spielberger is careful to differentiate anxiety states from the stimuli that evoke them and from the cognitive and behavioral defensive maneuvers used to avoid them. As mentioned previously, Spielberger's work grew out of the factor analytic research of Cattell and Scheier (1958, 1961).

Endler and Hunt (1969) felt that Cattell, in measuring trait anxiety by a score-persons matrix and state anxiety by a score-occasions matrix, failed to tie anxiety indicators to specific situations thereby ignoring an important source of variance. Endler and Hunt differentiate 3 bases for trait anxiety. Spielberger's concept of trait anxiety would seem to fit best Endler and Hunt's third base: a tendency to show expecially strong response-indicators to a relatively few situations.

Spielberger has said that trait anxiety reflects past learning that in some way determines individual differences in anxiety proneness to specific situations. Thus trait anxiety may be regarded as reflecting individual differences in the frequency and the intensity that anxiety states have been manifested in the past, and in the probability that such states will be experienced in the future. From this it would seem that the major source of variance that Spielberger is tapping into with his concept of trait anxiety is individual differences in the subject or anxiety proneness. The variance due to responses is not accounted for at all by Spielberger's concept of trait anxiety.

The variance due to situations is indirectly accounted for with trait

anxiety by the idea of past learning in specific situations leading to anxiety proneness in the present in those same situations. Theoretically, a trait anxiety measure should reflect anxiety proneness in any class of situations which has been associated with anxiety in the past. The measure should not reflect anxiety proneness in only one class of situations. In practice this is not so, as Spielberger et al. (1966, 1968, 1970) have pointed out. Persons high in trait anxiety tend to manifest more intense state anxiety reactions than low trait anxiety persons in situations which hold a threat of failure or threaten a person's self-esteem and self-adequacy. Persons high in trait anxiety do not however manifest more intense state anxiety reactions than low trait anxiety persons in situations which pose a threat of physical danger. This differential response to varying classes of anxiety inducing situations has been demonstrated with two different trait anxiety measures, both the Taylor MAS (Hodges & Spielberger, 1966; Spielberger, 1966) and Spielberger's State-Trait Anxiety Inventory (Hodges & Felling, 1970). Only the variance from the first situational factor that Endler et al. (1962) found is thus accounted for by Spielberger's concept of trait anxiety. The reason for this is apparently due to the nature of the trait anxiety measures employed by Spielberger and his associates, the Taylor MAS and Spielberger, Gorsuch, & Lushene's (1969) State-Trait Anxiety Inventory. Spielberger himself (Spielberger, 1966; Spielberger, Lushene, & McAdoo, 1970) gives no real theoretical reason why this difference should exist. Indeed, in terms of his theory the difference should not exist. That is, a trait anxiety measure should demonstrate anxiety proneness for any and all classes of anxiety inducing situations that the individual has been exposed to in the past.

Spielberger's state anxiety theory also taps into the variance contributed by individual differences in subjects. But unlike Cattell,

Spielberger ties state anxiety to specific situations thus accounting for the variance contributed by the situation (even though theoretically he distinguishes individual differences from situations). Once again, as with his concept of trait anxiety, the variance contributed by responses is not accounted for with Spielberger's concept of state anxiety.

In doing empirical research on his trait-state anxiety theory Spielberger first used the Taylor Manifest Anxiety Scale (1953) as a measure of trait anxiety (Hodges and Spielberger, 1966; Haywood and Spielberger, 1966). Likewise he used the Zuckerman Adjective Checklist (1960) as a measure of state anxiety (Hodges and Spielberger, 1966) early in his research. Spielberger's early use of the Taylor MAS as a trait anxiety indicator adds credance to the theory that the major source of variance contributing to his trait anxiety is individual differences in the subjects and not situations or responses. Endler et al. (1962) theorized that the reason why there were so many contradictory and negative results in anxiety research using the Taylor MAS was because the MAS measured mainly individual differences, leaving out the other two important sources of variance.

Spielberger and his associates later developed separate state and trait anxiety measures of their own, the State-Trait Anxiety Inventory or STAI, (Spielberger, Gorsuch, and Lushene, 1968). The items used in the STAI were originally derived from three widely used anxiety scales: The IPAT Anxiety Scale (Scheier and Cattell, 1958), the Taylor Manifest Anxiety Scale (Taylor, 1953), and the Welsh (1956) Anxiety Scale. The items were rewritten so that each retained its essential content but could be used with different instructions to measure both state and trait anxiety. These items were then subjected to extensive reliability and validity research and were modified, retained, or discarded accordingly. The latest form of the STAI (1969)

contains two separate self-report scales for measuring state and trait anxiety. Each scale consists of 20 statements apiece which ask the subject how they feel at a particular moment in time (state) or how they feel generally (trait). Each subject rates himself on each item on a four point scale ranging from: "Not at all" to "Very much so".

As mentioned previously, the trait scale of the STAI measures the variance contributed by individual differences and to some extent the variance contributed by one of the possible situation factors, namely, situations that pose a threat to self-esteem. The variance contributed by other classes of situations is not accounted for by the STAI trait anxiety scale. Since they are measuring different sources of variance for the most part, scores on the STAI trait anxiety scale should not correlate highly with total scores for situations. If a situational factor is found in the factor analysis which is similar to the first situational factor that Endler et al. (1962) found, namely, situations that pose a threat to goal achievement and therefore self-esteem, then scores on this factor should correlate highly with STAI trait scores. STAI trait scores should not correlate highly with factors that pose no threat to self-esteem, such as factors which pose a threat of physical danger. These last two predictions are in line with Spielberger et al.'s theorizing (1966, 1968, 1970) and with experimental evidence to date (Hodges and Felling, 1970).

The correlation between the situational factors found in the present experiment and the STAI state anxiety scale would depend on the specific factors found and the particular stress situation in which the STAI state anxiety measure was given. In the present experiment the STAI state anxiety measure was administered immediately preceeding an academic test. If a factor is found that is similar to the first situational factor that Endler

et al. (1962) found, namely, situations that are a threat to goal achievement, then scores on this factor should correlate highly with the STAI state anxiety scores.

Using the same rationale as for the STAI trait scale, total scores for situations in the present experiment should not correlate highly with total MAS scores for the same subjects. Like the STAI trait scale, scores on the MAS should correlate highly with a situation factor that represents a threat of failure to self-esteem, if such a factor or factors is found in the factor analysis (Hodges and Spielberger, 1966). The same theorizing behind the STAI state anxiety measure can be applied to the Zuckerman Adjective Checklist. In the present design the Zuckerman Adjective Checklist was administered immediately preceeding an academic test. If a factor is found that is similar to the first situational factor that Endler et al. (1962) found, then subjects scoring high on this factor should also score high on the Zuckerman Checklist. Therefore, if a threat to goal achievement factor is found, scores on it should correlate highly with the scores from the same persons on the Zuckerman Adjective Checklist.

Purpose of this Investigation

The primary purpose of this investigation is to determine the factorial structure underlying anxiety inducing situations for college students. An empirically derived set of situations has been employed toward this end. The resulting factorial structure is to be compared to the factorial structure found by Endler et al. (1962) who used a theoretically derived set of anxiety-inducing situations.

The second purpose of this investigation is to compare the data from the anxiety situation factorial study to trait-state measures of anxiety

(Spielberger et al. 1966, 1968, 1970). Spielberger's trait-state theory of anxiety has been analyzed by the experimenter in terms of Endler et al.'s (1962) theory of three sources of variance contributing to anxiety traits: situations, responses, and individual differences. According to this analysis, overall scores for anxiety situations should not correlate highly with anxiety trait measures, such as STAI trait anxiety scale (Spielberger et al., 1968) and the Taylor MAS (1951), since the two are tapping different sources of variance for the most part. However, scores on the two trait anxiety measures should correlate highly with scores on a situational factor which reflects a threat to self-esteem, if such a factor is found. Scores on a situational factor reflecting a threat to goal achievement should correlate highly with scores on state anxiety measures given in an achievement threatening situation.

Hypotheses

1. There will not be a significant correlation between total anxiety inducing situation scores and scores on the STAI trait anxiety scale, Form X (1968).
2. There will not be a significant correlation between total anxiety inducing situation scores and scores on the Taylor Manifest Anxiety Scale (1951).
3. If a situational factor reflecting threat to self-esteem through failure is found, there will be a significant correlation between the scores of items loading highly on this factor and scores on the STAI trait anxiety scale, Form X.
4. If a situational factor reflecting threat to self-esteem through failure is found, there will be a significant correlation between the scores of items loading highly on this factor and scores on the Taylor Manifest Anxiety Scale.
5. If a situational factor reflecting threat of physical danger is found, there will not be a significant correlation between the scores of items loading highly on this factor and scores on the STAI trait anxiety scale,

Form X.

6. If a situational factor reflecting threat to goal achievement is found, there will be a significant correlation between the scores of items loading highly on this factor and scores on the STAI state anxiety scale, Form X (1968) given in an achievement threatening situation.

7. If a situational factor reflecting threat to goal achievement is found, there will be a significant correlation between the scores of items loading highly on this factor and scores on the Zuckerman Adjective Checklist (1960) given in an achievement threatening situation.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

Endler, Hunt, and Rosenstein (1962) conceived of common traits as describing people in terms of adjectives naming characteristics which are presumed to be applicable to all persons. For any given trait or response class there are three main sources of variance: situations, responses, and individual differences, plus their interactions. In order to study the trait of anxiety the authors developed the S-R Inventory. This inventory employed 11 situations and 14 responses selected by the authors on an intuitive basis. The situations were chosen in order to represent variables that would be familiar to college students, would include both social and nonsocial situations, and that would include innocuous and threatening situations. In the S-R Inventory each situation was listed with all 14 responses and a 1-5 scale for the intensity of each response.

Subjects for the Endler et al. study were introductory psychology students at the University of Illinois and at Pennsylvania State University. In addition to the S-R Inventory the subjects were also given the Minnesota Multiphasic Personality Inventory (MMPI) K and L scales, the Palmar-Sweat Index (PSI), the Institute for Personality and Ability Testing (IPAT) Anxiety scale, the Taylor Manifest Anxiety Scale (MAS), and the Sarason Test Anxiety Questionnaire (TAQ). The authors employed a three-way analysis of variance to assess the variance contributions of the situations, responses, and subjects. Pearson product moment correlations were calculated to assess the degree of covariation among the scores of the different instruments and among the scores from the various situational and response scales of the S-R

Inventory. A factor analysis using the principal component method was performed on both the situations and the responses employed. An exact method of determining communalities, developed by Guttman (1958), was employed in the factor analysis. The quartimax rotational procedure developed by Saunders (1960) was used to rotate the matrix to simple structure. The authors assumed randomness for the sampling of sources of variance although all of the factors were not random. Therefore their results were descriptive rather than statistically generalizable.

The results of the analysis of variance showed that with the Illinois sample the ratio of variance from responses to subjects was better than 7 to 1. The ratio of variance from responses to situations was 2 to 1. The ratio of variance from situations to subjects was almost 4 to 1. In the Penn State sample the ratio of variance from responses to subjects was 40 to 1, from responses to situations was better than 3 to 1, and from situations to subjects was better than 12 to 1. Contributions from all interactions decreased from 3.5% in the Illinois sample to 2.36% in the Penn State Sample.

The intercorrelations between the measures of anxiety were low in both samples. The S-R Inventory correlated .46 with the MAS in the Illinois sample and .34 in the Penn State sample. The S-R Inventory correlated .66 with the TAQ in the Illinois sample and .44 in the Penn State sample. In general the authors reported that the S-R Inventory correlated higher with the other instruments than the other instruments did between themselves. A factor analysis of the correlations between the seven instruments used with the Illinois sample disclosed three factors: self-reported anxiety, physiological anxiety, and anxiety defense. A factor analysis of the correlations between the four instruments used in the Penn State sample disclosed two factors: self-reported anxiety and acquiescence.

A factor analysis was performed on the situations used in the S-R Inventory. Determination of the number of significant common factors was based on the number of latent roots greater than one in the observed correlation matrix. Three factors were found in both samples: the first was concerned with threats to interpersonal status and the achievement of goals; the second with inanimate dangers; and the third factor had an ambiguous meaning. Together the three factors accounted for 84% of the common situational variance in the Illinois sample and 78% in the Penn State sample. In both samples the first factor accounted for more than half of the common variance.

A factor analysis of the responses on the S-R Inventory yielded three factors for the two samples: the first was distress, disruption of action, and avoidance; the second was exhilaration, enjoyment, and approach; and the third was residual autonomic responses. Together the three factors accounted for 70% of the total responses variance in the Illinois sample and 65% in the Penn State sample. The first factor again accounted for over half of the common variance in both samples.

The authors felt that the sampling of both situations and responses should be broadened. They also felt that situations should have an extended sampling first in order to get a better picture of the factor structure of situations. The present research is an attempt by the experimenter to do just that, to get a better picture of the factor structure of situations using empirically derived situations. Once the factor structure of situations is fixed, the structure can then be used to broaden the response sampling, if one wishes to use the methodology employed by Endler and his associates.

Endler and Hunt (1966) performed a statistical analysis that showed that the mean squares from their 1962 study were not pure. For instance, the mean square for situations contained the variance from situations but also variance

from the situation interactions and error variance. They reanalyzed their earlier data by comparing estimated components of variance rather than mean squares. The estimated components come from specification equations which are expected mean squares and are equated to sums of relevant components of variance, all properly weighted. The authors added a new sample of students from a Canadian university. The resulting ratios of variance contributions from the three samples were of the following order: responses to situations were 4 or 5 to 1; responses to subjects ranged from 2 to 1 up to 5 to 1; situations to subjects were roughly 1 to 1. Nearly a third of the total variance came from simple interactions. Responses X situations contributed roughly 8% of the variance; responses X subjects contributed roughly 11% of the variance; and situations X subjects contributed roughly 10% of the variance. Of the three main factors, responses still contributed the majority of the variance. The importance of the variance contribution by situations was downgraded by this experiment until it ranked roughly with the variance contributed by individual differences in the subjects. Of much greater importance is the variance contributed by simple interactions, which turns out to be considerable.

Endler and Hunt (1969) next attempted to extend the range of situation and response sampling. Six different forms of the S-R Inventory, differing in samples of situations and modes of responses, were administered to 22 samples of males and 21 samples of females who varied in age (junior high to adult) and in social class. Situations for the six forms of the S-R Inventory were randomly selected from a master list of 200 situations drawn up by the authors and their colleagues. This list included representation of the three situation factors found in the 1962 study. The range of danger for the situations was deliberately extended downward to determine the limits of the

proportion of variance from situations as a main source. Responses were selected from a master list of 16 responses. The authors admitted that they could not think of any other responses to include. These responses included both positive and negative reactions.

The results showed that in general the proportions for the various sources of variance held up the same as in the 1962 sample. The situational variance was twice as high for women (7.78%) as for men (3.9%). With increasing age the variance contributed by responses went up while the variance contributed by the subjects X response interaction went down. The higher the subjects social class position the higher the variance contribution from subjects and situations and the lower the variance contribution from responses. The reverse was true for those subjects from the lower classes. Extending the range of threat for situations resulted in the variance rising from a maximum of 5.1% for males in the 1962 study to a median of 10.71% in the present study. The variance for females went from a maximum of 9.7% in the 1962 study to a median of 13.1% in the present study. The maximum proportion of situational variance for males never exceeded 13.7% and 19.9% for females. The variance contributed by the two way interactions remained higher than the variance contributed by subjects and situations combined.

Endler and Hunt made some theoretical statements based on their research. In reviewing Cattell's work on anxiety traits and states they made the point that he measures trait anxiety by a score-persons matrix and state anxiety by a score-occasions matrix. Where Cattell fails, in Endler and Hunt's opinion, is that he did not tie anxiety indicators to specific situations. Thus Cattell ignored an important source of variance. Endler and Hunt also believed on the basis of their research that trait anxiety might have three different bases. Trait anxiety can stem from a chronic manifestation of the

indicators of anxiety across situations, evoked by conflicts or situations which people carry around in their minds. It may also stem from a tendency to manifest the indicators of anxiety in a large proportion of situations. Finally trait anxiety may stem from a tendency to show especially strong response indicators to a relatively few situations.

Endler and Hunt (1968) made an attempt to determine the percentage of the variance contributed by the three-way interaction with the S-R Inventory of Anxiety. In previous experiments the variance from the three-way interaction was not distinguished from the error variance. The authors hypothesized that about 10% of the total variance was accounted for by the three-way interaction. To determine the exact amount of variance contributed by the three-way interaction it was necessary to give the S-R Inventory more than once to the same subjects. The authors were concerned that the repeated testing might lead the subjects to reflect their boredom and negative feelings in the test results. The authors gave various forms of their S-R Inventory on two occasions to nine samples of subjects. The results of the analyses of variance showed that the contributions of the three-way interactions to the total variance ranged from 0-11%. The error variance ranged from 10-47%. The authors interpreted the large error variance as reflecting the subject's boredom and negativism. They concluded that their study showed that the three-way interaction could have psychological meaning, namely: "In a specific situation, a particular person has a particular mode of response".

Endler and Bain (1966) used male and female college subjects in an attempt to add to the construct validity of the S-R Inventory. They used just two situations: one loading heavily on the threat to interpersonal status factor, and the other loading heavily on the inanimate danger factor. They found a significant negative relationship between social class and

interpersonal anxiety for males. None of the other hypothesized relationships reached significance for either males or females. The negative results in this study do not reflect back on the validity of the S-R Inventory but rather reflect on the theorizing of the authors in relating factors from the S-R Inventory to other variables.

Several parallel studies indirectly substantiate the research on trait anxiety by Endler and his associates. Basowitz et al. (1955) conducted interviews, ran psychological tests, and performed various physiological measures on men training to be paratroopers. Basowitz and his associates were able to identify two distinct types of anxiety: shame anxiety and harm anxiety. Shame anxiety was particularly high before training started. It was characterized by a concern on the part of the trainees that they would fail out of school and not measure up to internalized ideals or external expectations. During actual training harm anxiety or the concern about physical damage to self increased but shame anxiety consistently exceeded it for most trainees. Shame and harm anxiety were correlated. The authors felt that the distinction between the two was primarily a conceptual one. For the experincer himself they felt there might only be the unitary state of emotional distress. The authors also found that individuals who scored high on one physiological measure that was a strong predictor of anxiety states had higher correlations between shame and harm anxiety than individuals low on this measure. The authors concluded from this than more anxious individuals generalized their distress to all aspects of the situations. It also appeared that harm anxiety was more disruptive of behavior than shame anxiety. Individuals who failed out of paratrooper school had higher harm anxiety scores than those that succeeded. At low levels of intensity shame anxiety was a facilitator of behavior while harm anxiety was a disruptor. The

two types of anxiety that Basowitz and his associates distinguish, shame and harm anxiety, correspond closely to the first two situation factors that Endler et al. (1962) found: threats to interpersonal status and goal achievement, and an inanimate danger threat.

Hamilton (1959) derived a rating scale for the symptoms of anxiety neurosis. He drew up a list of symptoms which he considered to cover the field of anxiety neurosis. In all there were 13 groupings of symptoms: behavior in interviews, apprehension, tension (including irritability), fears (phobias), insomnia, cognitive changes (difficulties in concentration and forgetfulness), depression, somatic symptoms of a general type, cardiovascular symptoms, respiratory symptoms, gastro-intestinal symptoms, genito-urinary symptoms, and general autonomic symptoms (chiefly headaches and sweating). A total of 35 outpatients diagnosed as having anxiety neurosis were rated on Hamilton's scale by three psychiatrists working in pairs. Correlation between raters was high. Product-moment correlations were performed between the variables and the resultant matrix factor analyzed by the method of simple summation. The result was a general factor of anxiety and a bipolar factor contrasting psychic with somatic symptoms. An orthogonal rotation was performed and resulted in two orthogonal group factors of psychic and somatic anxiety. These two factors found by Hamilton can be compared with the factors found be Endler et al. (1962) with anxiety responses. Their first two factors were psychic responses and their third factor, residual autonomic responses, was a somatic factor. Thus Hamilton's findings with anxiety responses are quite similar to the factor analytic findings of Endler and his associates.

Ax (1964) in a review article of the experimental literature, took a theoretical overview of the goals and methods of psychophysiology. He made several points relevant to the present discussion, points which have been

demonstrated repeatedly in the experimental literature. Ax suggested that a subject's physiological response to stress is in part a function of the subject's definition of the situation. It is also in part a function of individual physiological response specificity. Both of these observations can be compared to the individual differences in trait anxiety that Endler et al. (1962, 1969) have mentioned and can be considered to corroborate their view. Ax also mentioned stimulus response specificity and the importance of response patterns. This again corroborates the experimental findings of Endler and his associates concerning the two and three-way interactions between anxiety stimuli, responses, and individual differences.

Raymond B. Cattell has been interested in using factor analysis as an approach to personality measurement for many years. Of special interest here is his factor analytic approach to the concept of anxiety. It is out of Cattell's work with anxiety that Spielberger (1966) derived his trait-state theory of anxiety. Endler et al. (1962) also owe a debt of gratitude to Cattell for stimulating them in their theorizing.

Cattell and Scheier (1958) compared the results of 13 multivariate analyses having in common the method of oblique rotation to simple structure. A variety of subjects were employed and 814 variables used which covered the known range of personality measurement in rating, questionnaire, and objective test media. A single factor, U.I. 24, was found to be well replicated over the 13 studies. The authors state that this factor's claim to the title "trait anxiety" resided in the manifest content of its variables which comform to those variables commonly associated with anxiety: tension, emotionality, and the self-rated presence of clinically accepted symptoms of anxiety. It was also the only factor which was loaded substantially by two psychiatrists' evaluations of anxiety. Other characteristics of this factor

which were revealed by an analysis of consistently loading marking variables were: a self-depreciative lack of confidence in oneself, a willingness to confess to having faults and troubles, and an irritability which apparently indicated frustration without overt aggression. This factor was not identifiable with drive in general or with specific drives, contrary to the theorizing of Spence and his colleagues (1951, 1953, 1966). U.I. 24 was statistically independent of other factored traits. Thus there was excellent evidence, in the authors' opinion, for the existence of a trait anxiety factor.

Cattell and Scheier (1959) next reported on the results of two overlapping studies which brought into a single factor analytic framework the very comprehensive range of behavior represented by 216 tests. The authors used University of Illinois students as subjects, including students who were both high and low anxious on the IPAT Anxiety scale. A total of 103 variables were measured on each subject, including 33 questionnaire scales and 70 objective test variables covering the whole known personality sphre in the realm of tests. This included objective personality tests, personality questionnaire measures, physical fitness measures, and dynamic measures of ergic strength. The entire complex was then centroid factored. Seventeen factors were extracted and rotated. One (U.I. 24) was again positively identified with trait anxiety.

Cattell (1963) described his method of discovering and delineating trait as opposed to state anxiety. For a period of 12 years he tested a wide variety of people on a number of purported observable anxiety variables. Factor analysis pointed to a single pervasive anxiety factor which Cattell labeled: "trait anxiety". Then Cattell factor analyzed several introspective anxiety factors and came up with one second order factor that correlated almost perfectly with the single factor found on the observable variables. Cattell then took a series of individuals and repeatedly tested them over

many days time. Next he factor analyzed their responses. The investigation showed that the resulting pattern for anxiety as a state is unmistakably the same species of response as that for trait anxiety. It differs in that there is some tendency for the physiological variables to load more highly on the state factor.

Cattell (Spielberger, 1966) has also tried to specify the relationship of anxiety, from his point of view, to motivation. Of interest here is his discussion of how he arrived at his theory of trait-state anxiety. A second order factor analysis of factors found from Q-data (questionnaire and consulting room introspections) yielded a general anxiety factor which Cattell labeled: QII. This second order factor has been shown to retain its form and definition across cultures and age levels. A factor analysis of T-data (objective, laboratory test performance) also yielded a clear anxiety factor, labeled: U.I. 24. A large experiment (Cattell, 1956) was then performed to determine whether the QII factor was the same functional unity as the U.I. 24 factor. The results of the experiment showed that the axes of the two factors aligned to within a few degrees.

Cattell next turned his attention to state anxiety. He defined a personality state as a broad unitary response pattern, which, because of human psychological and physiological structure, recurs in much the same form regardless of the variations in the kind and range of stimuli which have come to provoke it. By factor analyzing the responses of individual subjects over occasions (Cattell and Scheier, 1961) Cattell was able to distinguish a clear anxiety state factor, labeled: P.U.I. 9. This state factor had a close resemblance to the two trait factors previously found. Cattell firmly established however that the state factor was distinct from the trait factors. He also carefully distinguished state anxiety from effort-stress, excitation

or arousal, and autonomic activity per se. When anxiety is defined by Cattell's trait-state factors, its behavior in regard to clinical, physiological, and socio-economic criteria continues to fit the popular usage of the term "anxiety". For instance: it is significantly higher in anxiety neurotics than in normals; its measurement is significantly reduced by therapy; it rises as normals encounter threat and uncertainty; it shows a definite set of physiological associations; it changes with age; and it shows significant differences across natural cultures explicable by economic insecurity and lack of cultural integration.

Eysenck (1958) posed two very important questions concerning Cattell's factor analytic treatment of anxiety. Eysenck questioned whether the model of human behavior is additive, as assumed by factor analysis (an underlying source trait determines performance on various tests), or compensatory (an underlying source trait finds expression in various behaviors at different times). Eysenck said that the majority of the evidence in the field of personality traits was for the latter model. Eysenck also asked whether the assumption of rectilinear regression (satisfactory for factor analytic methods) was more adequate in handling the concept of anxiety than curvilinear regression. The latter model again has more experimental evidence and Eysenck cited as an example some of the work of Spence and his colleagues (1964, 1966). Eysenck's questions are indeed serious if one is treating anxiety as a unitary source trait and using factor analytic methods. However, if one breaks trait anxiety down into its component sources of variance and deals with these, as Endler and his associates have done (1962, 1969), then Eysenck's questions may no longer be as serious. At the very least, on this level of model construction and theorizing there is no clear experimental evidence as yet for or against an additive model of behavior and the assumption of

rectilinear regression such as there is on the level that Cattell uses, namely, construing anxiety as a unitary source trait.

After reviewing a good deal of the vast literature on anxiety, Spielberger (1966) and Spielberger, Lushene, and McAdoo (1970) concluded that anxiety research is characterized by semantic confusion and contradictory findings due to conceptual ambiguities in anxiety theory. Spielberger felt that much of this conceptual ambiguity was due to the indiscriminate use of the term "anxiety" to refer to two very different types of concepts: state anxiety and trait anxiety. Spielberger felt that it was extremely important in anxiety research to make the distinction between anxiety as a transitory state that fluctuates over time and as a personality trait that remains relatively stable over time. In Spielberger's opinion anxiety states should be also operationally and conceptually distinguished from the stimuli that arouse them and the behavioral and cognitive maneuvers used to reduce anxiety.

Spielberger used the analogy of the relationship between kinetic and potential energy in comparing state and trait anxiety. State anxiety, like kinetic energy, refers to an empirical process which is taking place now at a given level of intensity. Trait anxiety, like potential energy, refers to a latent disposition for a reaction of a certain type of occur if triggered by an appropriate stimulus. Anxiety states are characterized by subjective, consciously perceived feelings of apprehension and tension associated with arousal of the autonomic nervous system. Trait anxiety is characterized as an acquired behavioral disposition that predisposes one to perceive a wide range of objectively nondangerous situations as threatening and to respond to these situations with anxiety state reactions. These anxiety state reactions are disproportionate in intensity to the magnitude of the objective danger. Thus for Spielberger an external stress stimuli would lead to a cognitive

appraisal of the situation on the part of the individual. If the stimulus is cognitively appraised as threatening then an anxiety state reaction is evoked. The anxiety state reaction can then lead to behavior which will deal directly with the situation. Or the anxiety state can trigger cognitive and motoric defense mechanisms which reduce anxiety states by altering the cognitive appraisal of the situation. Trait anxiety enters in when certain stimuli, because of past learning, are perceived as very threatening and an anxiety state reaction is the response. Because of the influence of trait anxiety here the intensity of the state anxiety reaction is not proportionate to the magnitude of the objective danger.

Spielberger finally suggested that from a standpoint of a trait-state conception of anxiety the most important stimuli are those that produce differential changes in anxiety states in individuals who differ in anxiety traits. He pointed out that individuals who differ in levels of trait anxiety show differences in task performance under conditions of failure in achievement situations or ego involvement. Individuals who score high in trait anxiety appear to interpret circumstances in which their personal adequacy is evaluated as more threatening than do low trait anxiety individuals. Situations that are characterized by physical danger are not interpreted as differentially threatening by subjects high and low in trait anxiety. These differences have been experimentally born out, as Spielberger et al. (1970) have pointed out. The authors speculated that etiologically the above differences were due to high trait anxiety individuals having received excessive criticism and negative appraisals from their parents when they were young. This presumably undermined their self-confidence and adversely influenced their self-concept and thereby made them especially sensitive to situations threatening their personal adequacy. Why this sequence of events

happens only to persons high in trait anxiety or why trait anxiety measures are sensitive to such personality differences the authors do not explain. Indeed, the above differences cannot be deducted logically from Spielberger's basic trait-state anxiety theory and appear to be a function of the trait anxiety measures being used.

The present experiment is an attempt to identify situations where people differ in state anxiety. It is also an attempt to demonstrate that Spielberger's state-trait anxiety theory is valid as far as it goes, but too limited. It is limited in that his concept of trait anxiety only taps into the variance contributed by individual differences and one class of anxiety inducing situations. The variance contributed by other classes of situations and by responses is not accounted for by Spielberger's trait anxiety theory. Thus a good portion of the trait anxiety variance discovered by Endler et al. (1962) is left unaccounted for by Spielberger's trait anxiety theory.

Spielberger, Gorsuch, and Lushene (1968) reported on the development of the State-Trait Anxiety Inventory (STAI). Work was begun on the STAI in 1964 with the goal of developing a single scale that would provide objective self-report measures of both state and trait anxiety. Items on the STAI were originally derived from three widely used anxiety scales: the IPAT Anxiety Scale (Cattell and Scheier, 1963), the Taylor (1953) Manifest Anxiety Scale, and the Welsh (1956) Anxiety Scale. The items were rewritten so that without losing their essential content each item could be used with different instructions to measure both trait anxiety and state anxiety. Items measuring trait anxiety were discarded if they did not correlate highly enough with the summed z scores for the Taylor MAS and the IPAT Anxiety Scale. Items measuring state anxiety were discarded if they did not differentiate between a stressful testing situation and a relaxed testing situation. The result

of this work was a single scale, STAI (Form A), that could be administered with different instructions to measure either trait or state anxiety. It was found however that the connotations of the key words in some of the items conveyed meanings that interfered with their use as measures of both state and trait anxiety. A new scale was developed (Form X) that employed separate sets of items to measure state and trait anxiety. Only five items out of the twenty on each scale were included in both trait and state scales. Over 7,000 subjects were employed in obtaining normative data for the STAI. These subjects included college students, high school students, neuropsychiatric and medical patients, and prisoners.

The test-retest reliability of the STAI trait anxiety scale was relatively high (correlations ranged from .73 to .86). The test-retest reliability of the STAI state anxiety scale was relatively low (correlations ranged from .16 to .54), which could be expected for a measure that is influenced by situational factors. Both the state and trait scales had a high degree of internal consistency, as indicated by alpha reliability coefficients and individual item-remainder correlations. The concurrent validity of the STAI trait anxiety scale was good. Correlations with the IPAT Anxiety Scale (Cattell and Scheier, 1963) and the Taylor (1953) MAS were high (correlations ranged from .75 to .80) and moderate with the Zuckerman (1960) Affect Adjective Checklist, General form (correlations ranged from .52 to .58). Evidence bearing on the construct validity of the STAI state anxiety scale was also good. The scale successfully discriminated between a stressful exam condition and a non-stressful normal condition for over 900 college undergraduates. The authors reported on several other unpublished independent studies which added evidence to the construct validity of both the STAI trait and state anxiety scales. Correlations between the STAI trait and state scales ranged from .44

to .67 when given under non-stressful conditions. The correlations were typically higher for males than females. In contrast to non-stressful conditions, correlations between the state and trait scales were larger under conditions which posed some threat to self-esteem. The correlations between the two scales were typically lower when measured in situations characterized by physical danger. These trends in the correlations between the STAI trait and state scales could be predicted from Spielberger's trait-state anxiety theory (Spielberger, 1966, Spielberger, Lushene, and McAdoo, 1970).

In a study which is somewhat similar to the present design Hodges and Felling (1970) attempted to factor analyze anxiety inducing situations and relate them to a measure of trait anxiety. The subjects for their experiment were 141 male and 87 female undergraduate college students in an introductory psychology course. All of the subjects were administered the trait anxiety half of an early experimental form of the STAI. All subjects were also given the Stressful Situation Questionnaire which consisted of 40 items selected by the authors as having relevance to college students. Five items were selected to measure each of eight areas of anxiety provoking aspects of college life: dating, classroom participation, speech, social failure, academic failure, physical danger, pain, and squeamishness. The 40 items were correlated and the resulting matrix subjected to a minimum residual factor analysis. Four factors were extracted and subjected to a Varimax rotation (Kaiser, 1958). The first factor was loaded by items denoting physical danger, pain, and squeamishness. The second factor was loaded by items having to do with classroom participation and speech. The third factor was loaded by items having to do with social and academic failure. The fourth factor was exclusively loaded by items having to do with dating. Point-biserial correlations indicated that females were significantly more anxious than

males on the first factor but there were no significant differences for the other factors. The trait anxiety half of the STAI showed a low moderate but significent correlation with factors two, three, and four but not with the first factor. A multiple correlation of the last three factors with the trait half of the STAI yielded an R = .46, a sharp increase over the individual correlations.

Hodges and Felling pointed out that their results were consistent with Spielberger's state-trait anxiety theory. The results are also consistent with the present experimenter's predictions concerning the relationship between classes of anxiety inducing situations and Spielberger's trait-state anxiety theory. The Hodges and Felling study differs from the present design in that they subjectively developed their own scale for measuring anxiety inducing situations. They did not derive their scale empirically from subjects' responses. Unlike the present design, Hodges and Felling did not interpret Spielberger's theory in terms of the Endler et al. (1962) research. Hodges and Felling did not employ the same tests to measure trait anxiety nor did they employ any state anxiety measure. However, their results are consistent with the present experimenter's theoretical development.

Gorsuch (1969) attempted to determine whether trait anxiety changed as a function of recent states of anxiety. Gorsuch hypothesized that trait anxiety is a function of an individual's averaging or generalizing over numerous past anxiety states. Any trend toward either more or less anxiety in a number of anxiety states would affect scores on a trait anxiety measure given immediately after the anxiety states were experienced. Subjects for Gorsuch's experiment were 51 male and female college students. All subjects were administered the trait anxiety half of the STAI (Form A). Then all subjects were administered the state anxiety half of the STAI three times per week at

the beginning of the class period for four weeks. At the end of the four weeks the trait half of the STAI was readministered. State scores for the first and fourth weeks were averaged and compared. An analysis of variance showed that subjects who increased in trait anxiety showed a significant increase in state anxiety between the first and fourth weeks while those who decreased in trait anxiety showed no significant differences. Another analysis of variance was performed with the trait scores as dependent variables. The results showed that the changes in trait anxiety were not significant. Also, a X^2 was not significant for the tendency of state anxiety increasers to be trait anxiety increasers. The author concluded that the results of the study supported the hypothesis that trait anxiety is a result of averaging anxiety states and could be influenced by recent changes in those states. Gorsuch felt that state anxiety scores did not predict trait anxiety scores because trait anxiety is a part of the self-concept. Therefore if an individual perceived state anxiety to be a function of the environment rather than the self there would be no change in self-concept or trait anxiety. Gorsuch also suggested that the stability of trait anxiety scores over time is partially a function of environmental stability.

Haywood and Spielberger (1966) studied the relationship between self-report anxiety inventories (MAS) and individual physiological measures of anxiety. In reviewing the literature in the field Haywood and Spielberger pointed out that most investigators have found no relationship between the two types of tests. Where a positive relationship was found between the two the physiological measure was given both pre-stress and again during stress. Their study used the Taylor MAS as a self-report anxiety inventory and the Palmar-Sweat Index (PSI) as a physiological measure of arousal. Male undergraduates were used as subjects, half high anxious on the MAS (upper

quartile) and half low anxious on the MAS (lower quartile). All subjects were given the PSI before and during a verbal conditioning experiment, the stress condition. The authors hypothesized that before the stress condition the high and low anxious (MAS) subjects would not differ on the PSI. During the stress condition both the high and low anxious subjects would rise in their PSI scores but the high anxious more than the low anxious. The results of the experiment showed that the PSI scores for the high anxious subjects were significantly higher than the PSI scores for the low anxious subjects both before and during the stress condition. Scores for both high and low anxious subjects were significantly lower during the stress condition than before the stress condition. The authors explain their lack of results by suggesting that the pre-verbal conditioning experiment PSI test was actually given under stress conditions. A more likely explanation is that a measure such as the MAS cannot predict what situations a subject will respond to with an anxiety state reaction. If, as we are suggesting in the present research, the MAS measures individual differences rather than the variance due to situations and responses, then Haywood and Spielberger are trying to use the MAS to predict behavior in an area that it does not even measure. Even according to Spielberger's 1966 trait-state anxiety theory, a trait anxiety measure such as the MAS would not predict what stimuli a subject would respond to with an anxiety state reaction, not on the basis of an over-all score at least.

Hodges and Spielberger (1966) attempted to validate Spielberger's (1966) prediction that subjects who had high scores in trait anxiety (MAS) would have high state anxiety scores under ego threatening conditions but not under physical danger conditions. They reviewed in their article a statement by Lazarus, Deese, and Osler (1952) which has direct bearing on the work by Endler and his associates (1962, 1969). Lazarus et al. noted that

psychological stress cannot be defined by stimuli or responses alone because individual differences in motivational and personality factors cause people to respond differently to the same stress stimulus. This statement has been validated by the experimental findings of Endler et al. (1962, 1969) concerning trait anxiety. Hodges and Spielberger utilized 60 male college undergraduates who scored in the upper and lower quartiles on the MAS as their subjects. Two months prior to the experiment all subjects received a questionnaire to determine how intense their fear of electric shock was. Half of the high anxious and half of the low anxious subjects on the MAS were then run in an experiment where there was a threat of electric shock. The remaining subjects were run in an experiment where there was no threat of electric shock. The Zuckerman Adjective Checklist (Today version) was then administered to all subjects immediately after the experiment as a state anxiety measure. The threat condition produced a significant increase in subject's heart rates as compared to the no threat condition. There was no significant differences in the heart rates of high and low trait anxiety (MAS) subjects in the threat condition. But subjects in the threat condition who reported moderate to extreme fear of shock two months prior to the experiment responded with significantly greater heart rate acceleration than subjects who reported little or no fear of shock. There was also a significant correlation in the threat condition between subjects' heart rates and their scores on the Today version of the Zuckerman Adjective Checklist. The authors interpreted their results as validating Spielberger's (1966) trait-state anxiety theory. An alternative explanation is that the results with the MAS could be attributed to specific properties of the MAS rather than to Spielberger's hypothesis concerning trait anxiety. Specifically the MAS taps into the variance contributed by individual differences and only one class

of anxiety inducing situations, namely, ego threatening situations.

Johnson and Spielberger (1968) employed 48 hospitalized, male, psychiatric patients who were non-organic and literate in an experiment testing the reliabilities of state and trait anxiety measures. All subjects had administered to them three state anxiety measures (systolic blood pressure, heart rate, and the Zuckerman Adjective Checklist, Today version) and two trait anxiety measures (MAS, and the General version of the Zuckerman Adjective Checklist). The state and trait measures were given both before and after muscle relaxation training. Then the same process was repeated six to ten days later for all subjects. The authors hypothesized that the state measures would be reduced significantly after the relaxation training but would not vary over time. They hypothesized that the trait measures would not vary at all. An analysis of variance showed that all three state anxiety measures declined significantly between pre and post-relaxation training but did not vary over time. Both trait anxiety measures remained the same before and after relaxation training. But there was an unexpected significant difference in the MAS scores over time. Both trait anxiety measures correlated significantly with each other. There was a low significant correlation between blood pressure and heart rate but neither correlated significantly with the Today version of the Zuckerman Adjective Checklist. The authors interpreted the non-significant correlation between the Zuckerman and the physiological measures to mean that there are individual differences in autonomic responses to specific stress situations. This interpretation is consonant with the two and three-way interactions found by Endler et al. (1962) between stimuli, responses, and individual differences.

The goal of Hodges' (1968) study was to evaluate the effect of ego threat and threat of pain on physiological and self-report measures of state anxiety

for subjects differing in levels of trait anxiety. Hodges hypothesized that ego threat and threat of pain would lead to an increase in state anxiety. Also that the increase in state anxiety produced by ego threat would be greater for subjects who were high in trait anxiety than for subjects low in trait anxiety. Finally he hypothesized that the magnitude of the increase in state anxiety produced by threat of pain would not differ for subjects who differed in trait anxiety. These hypotheses were in accordance with Spielberger's (1966) trait-state anxiety theory. Subjects were 108 male college students, half of whom fell in the upper quartile and half in the lower quartile on the MAS. The Today version of the Zuckerman Adjective Checklist and a measure of heart rate were used as state anxiety indicators. Subjects were randomly assigned to a failure threat, shock threat, or no threat condition. The state anxiety measures were administered before subjects performed a memory task and again during the task after the threat had been delivered. The results failed to support the first hypothesis but did support the other two hypotheses. Both state anxiety measures increased significantly from rest to performance with both the threat groups and the no threat group. The author explained the rise in state anxiety with the no threat group as being due to the nature of the memory task which was threatening in itself to many subjects. Contrary to expectations the heart rate of subjects high and low anxious on the MAS did not differ across the three experimental conditions whereas their Zuckerman scores did. The author concluded from this that the Zuckerman scores were a more sensitive measure of state anxiety than heart rate was.

Johnson (1968) performed a study which paralleled in many ways Hodges (1968) study. Johnson used as subjects 48 male patients, hospitalized for less than three months. All subjects were white, between the ages of 25 and

55, diagnosed non-organic, and literate. All subjects were given relaxation training. Then their blood pressure and heart rate were obtained and they were administered the MAS and both the Today and General versions of the Zuckerman Adjective Checklist. Half of the subjects then were put through a stressful interview where they were called upon to remember traumatic events in their life. The other half received non-stressful interviews. Then all subjects were retested again on all measures. An analysis of variance revealed that all three state anxiety measures increased in the stressful interview but not in the non-stressful situation. Blood pressure and scores on the Today version of the Zuckerman Adjective Checklist increased significantly in the stressful interview situation. Neither trait anxiety measure was affected by either the stressful or non-stressful interview situation. The two trait anxiety measures were found to correlate highly with one another. Blood pressure and heart rate correlated highly with one another but neither correlated highly with the Today version of the Zuckerman Adjective Checklist. This would seem to suggest that the three measures are tapping into different sources of variance and is in agreement with the present experimenter's hypotheses concerning state anxiety measures such as the Zuckerman Adjective Checklist. The author concluded that his data supported Spielberger's trait-state anxiety theory. He felt that the lack of change in the trait anxiety measures demonstrated that they measure individual differences in anxiety proneness. This conclusion is also in agreement with the present experimenter's hypotheses concerning trait anxiety measures currently in use.

Johnson (1968) utilized non-organic psychiatric inpatients to study the relationship between trait anxiety, state anxiety, and estimations of elapsed time (TE). He predicted that TE would be affected by changes in state anxiety

levels but not by trait anxiety levels. Johnson used several trait anxiety measures, including the MAS. He also used multiple state anxiety measures including the Today version of the Zuckerman Adjective Checklist and several physiological measures. Johnson administered the state and trait anxiety measures and measured TE before muscle relaxation training and then again after the relaxation training. The results showed that the state anxiety measures correlated higher with TE in the pre-relaxation condition than in the post-relaxation condition. During the pre-relaxation condition two out of the three paper and pencil state anxiety measures, including the Zuckerman Adjective Checklist, correlated significantly with TE. In the post-relaxation condition no state anxiety measure correlated significantly with TE. Almost all of the anxiety measures and TE relationships were curvilinear. The results in general showed that TE was affected by changes in state anxiety levels but not by trait anxiety levels, as predicted.

Hodges and Spielberger (1969) attempted to evaluate the relationship between Digit Span performance and measures of trait anxiety (MAS) and state anxiety (Zuckerman Adjective Checklist). Male undergraduates were used as subjects. The subjects were divided into two groups. One group was told they were doing poorly on Digit Span and were thereby subjected to stress. The control group was told nothing. The results of the experiment were that subjects reporting high levels of state anxiety showed significant decrements in Digit Span performance. There was no difference in the Digit Span performances of high and low trait anxiety subjects. A X^2 was performed on the scores of the high and low anxious subjects in the stress and control groups. It indicated that the effect of experimental conditions on state anxiety was influenced by the level of trait anxiety. These results could be expected both in terms of Spielberger's trait-state theory of anxiety and the

experimenter's interpretation of this theory.

Sarason (1960), in a review of anxiety literature, is led to the following conclusions which are relevant to the present experiment. He felt that it is clear that anxiety measures currently in use, principally the MAS, TAQ, and Social Anxiety Questionnaire (Dixon, deMonchaux, and Sandler, 1957), are not measuring the same thing. Studies of anxiety and stress have led to a habit interpretation of anxiety: subjects scoring high and low on anxiety indicators differ in the response tendencies activated by personally threatening conditions. Low anxious persons react to threat with increased effort and attention to the task at hand. High anxious persons respond to threat with self-oriented, personalized responses. In relating anxiety to physiological measures Sarason felt that we should study patterns of physiological responding instead of one measure at a time because it is known that subjects differ in their physiological response patterns to stress conditions. Sarason's final suggestion was to vary the situations in which anxiety is measured. This should be done bacause the literature reveals that even patients diagnosed as anxiety states do not display anxiety symptoms at all times or the same pattern of symptoms all the time.

Krause (1961) has discovered, in a study of anxiety literature, six types of evidence used in detecting and measuring transitory anxiety. These are introspective reports, the response to stress, physiological signs, clinical intuition, free molar behavior, and task performance changes. After carefully considering the evidence for each approach Krause concluded that none of the six was acceptable by itself. He suggested that researchers use combinations of these approaches in order to cancel out some of the deficiencies of each individual approach.

Of special importance to the present research are Krause's remarks about

introspective reports. He said that with introspective reports error may derive from the way a person has learned to use the word "anxiety" or from a lack of acuteness in self-observation. This has led researchers to look to more "objective" signs of interior anxiety states, e.g. physiological signs. But there is no evidence of a reliable one to one relationship between a physiological sign and anxiety, e.g. injections of epinephrine do not reliably produce anxiety feelings (Barcroft, 1955). We are also not sure that more than one interior state would not cause the same physiological condition. Also confusing the issue is that there is considerable evidence that physiological response patterns differ from individual to individual in a given situation (Ax, 1953).

Krause concluded that accepting anxiety experience as an ultimate, that is, unanalyzable proof of anxiety we still have the problem of the accuracy and truthfulness of the report. Krause suggested that to help control for this problem we use subjects accustomed to introspection and reporting their feelings. He also suggested that situations be utilized that are conducive to accurate and honest reporting, e.g. where social desirability is not a factor. The present design attempts to conform, at least minimally, to Krause's suggestions concerning introspective reports. Today's college student puts a premium on analyzing his own feelings in an honest way. Also, the nature of the design does not appear to make social desirability a major issue.

With respect to the introspective reporting of anxiety and its accuracy, the work of Walker and Spence (1964) is instructive. The authors tested the hypothesis that performance on the Digit Span subscale of the Wechsler Adult Intelligence Scale (WAIS) is disrupted by anxiety. A total of 51 male and 59 female college undergraduates enrolled in introductory psychology classes

were used as subjects. Scores were available for these subjects on the Taylor Manifest Anxiety scale (MAS) and on Sarason's Test Anxiety Questionnaire (TAQ) taken earlier as part of a classroom exercise. The 110 subjects were alternately assigned to be tested under an anxiety-inducing or rapport-establishing (control) procedure. Subjects were administered the first five verbal subscales of the WAIS, including Digit Span. After the testing experimental subjects were asked if the instruction variable had disturbed them. The results showed no significant difference between experimental and control groups on Digit Span performance. But within the experimental group, those subjects who declared they had been disturbed by the instruction variable were inferior on Digit Span performance to the control subjects. This difference was significant beyond the .05 level. Performance on Digit Span of the control subjects, but not of the experimental subjects, was found to be significantly negatively correlated to TAQ scores and significantly positively correlated to MAS scores. Both correlations were significant beyond the .05 level. One of the conclusions of the authors was that if an examiner wants to determine if a subject was anxious in a testing situation he could accurately do so by simply asking the subject. The results of the experiment infer that an introspective report of anxiety would be more accurate than trying to determine the presence of anxiety from Digit Span performance.

In a partial replication of the Walker and Spence (1964) study Walker, Sannito, and Firetto (1970) also studied the effect of subjectively reported anxiety on intelligence test performance. Subjects were 39 male and 40 female college undergraduate students enrolled in introductory psychology classes. The subjects were alternately assigned to be tested under an anxiety-inducing or rapport-establishing (control) procedure. Subjects were then administered the first five verbal subscales of the WAIS, including the Digit Span

subscale. After the testing had been completed all subjects were asked how they had felt during testing. The recorded responses of the subjects were then rated as to whether they reported being anxious or not during the testing. Inter-rater agreement was perfect. Results showed that none of the mean differences on the subtests between the control-experimental and male-female subgroups were significant. The scores on four out of the five subtests, including Digit Span, were significantly higher for the non-anxious subjects than for the anxious subjects. The scores on the fifth subtest were higher for the non-anxious subjects than for the anxious subjects but the difference was not significant. The X^2 between subjects reporting they were anxious in the experimental group and subjects reporting they were anxious in the control group was not significant. In general the results of the study supported those of Walker and Spence (1964). The authors concluded that the introspective report of anxiety can be accurate and valid as an experimental procedure.

Wilensky (1957) sought to determine the degree of relatedness of 10 variables associated with the concept of anxiety. He used psychiatric ratings, ratings by ward personnel, count of sleep disturbances, pulse, blood pressure, an anxiety questionnaire, and simply asking subjects whether they felt tense. Subjects were 66 hospitalized schizophrenic male patients. The resulting correlation matrix was factored by Thurstone's complete centroid method. Two factors were extracted and the axes rotated to oblique simple structure. The correlation between the two factors was -.34. One factor was loaded highly by subjective reports of anxiety. The other factor was defined by contact with reality variables and higher blood pressure. Since he used psychotic subjects and had no clear criterion for including variables, Wilensky's results would appear to have very little significance or relevance

for the line of anxiety research included in the present study.

The purpose of a study done by Martin (1958) was to investigate the existence and generality of an individual difference dimension that could be called anxiety. Eleven measures, including the MAS and numerous performance tests were administered to 89 female college students. The tests selected were chosen because previous literature had reported that these tests were affected by the anxiety levels of the subjects. These results were then correlated. The resulting correlation matrix was generally low. A principal component factor analysis revealed eight orthogonal factors. One of these factors, which was loaded highly by most of the tests, was interpreted to be an anxiety dimension. The results indicated that individual differences in the anxiety level of the subjects accounted for a relatively small percentage of the variance of the obtained scores. The author concluded that performance on any given task is probably determined by a number of different subject characteristics beside anxiety. Martin's results are in agreement with those of Endler and his associates (1962, 1969). Endler et al. found that only about 5% of the variance of trait anxiety was accounted for by individual difference. When you consider all the other factors beside anxiety contributing to the variance on a performance task, this would make the contribution to the variance by individual differences in anxiety much less than 5%.

Martin (1959) used 98 female college students as subjects and tried to improve on his earlier (1958) study. He again administered numerous tests to his subjects including the MAS, several performance tests, and some paper and pencil tests of likes and dislikes. He then correlated the results and factor analyzed the resulting matrix. This study differed from the previous one in that the author substituted some new tasks for some of the tasks on the

older study and modified others. It also differed in that this time all subjects were subjected to stress or threat of failure. Once again the resulting correlation matrix was quite low. Eleven orthogonal factors were found. Again a factor was found that was identified as an anxiety dimension and which was quite similar to the anxiety factor on the first study. This result is not surprising since the measures used on the two studies were either identical or quite similar. The anxiety factor was found to be independent of three factors identified as intelligence, motivation in psychological experiments, and paper and pencil test-taking attitudes. In general the results of this study were quite similar to the results of his earlier study.

Bendig (1960) tried to settle a long standing argument among anxiety researchers as to whether there are two factors of anxiety and neuroticism or only one factor of emotionality. He also attempted to determine whether this factor or factors were contaminated in inventories now in use by other factors such as extroversion/introversion, social desirability, falsification, and sex differences. Bendig used 10 scales: MAS, Edward's Social Desirability Scale, Winne Neuroticism Scale, Eysenck's Introversion/ Extroversion scale, MMPI Lie scale, and four Cattell anxiety and neuroticism scales. These scales were administered to 425 male and female college students. The scores were then correlated using Pearson product moment correlations and each scale correlated with the sex dichotemy using point biserial correlations. The correlation matrix was then factor analysed using the centroid method. Each factor was tested for significance using Tucker's and Humphrey's criteria (Fruchter, 1954). The three significant factors found were rotated to orthogonal simple structure using the normalized Varimax method (Kaiser, 1958). The three resulting factors were identified as emotionality, falsification, and a sex factor. Bendig decided that it could

not be determined from this study whether or not the introversion/extroversion dimension was contaminating the emotionality factor. He then performed a second experiment, which overlapped with the first study, to clarify the contribution of the introversion/extroversion dimension. For the second experiment he used 11 inventories. These inventories were administered to 263 male and female college students using a methodology identical to the first study. Four significant factors were found this time. The first three factors of the second study were the same as the first three factors of the first study. The fourth orthogonal factor was an introversion/extroversion factor. The author concluded that there was only one factor of emotionality and that it was perhaps contaminated by social desirability but not by falsification, sex differences, and introversion/extroversion. The fact that Bendig used an orthogonal rotation of his factors precludes any possibility of determining the amount of correlation between his principal factors. An initial oblique rotation might have been used to determine this relatedness.

Suinn (1965) gave three anxiety scales to college students: the Sarason TAQ, the Sarason General Anxiety Scale, and the Taylor MAS. The scores for these scales were then correlated. All correlations were found to be significant beyond the .0001 level. The author concluded that anxiety of one type is predictive of anxiety of other types. For instance, people who are anxious facing a test will be anxious in other settings. The author's final conclusion from the above evidence is that this proves that there is a trait of anxiety. Actually, the author's conclusions seem a bit expansive based on the evidence he produces. His evidence does seem to suggest that the three scales employed are measuring the same source of variance. If Endler et al. (1962) are correct in that the Taylor MAS and scales like it do not account for situational variance, then MAS scores can hardly predict the

situations in which a person will manifest an anxiety state, as Suinn suggested.

McReynolds and Acker (1966) gave a self report test of anxiety to male psychiatric patients. The test was based on the assumption that felt anxiety is a function of the quantity of experiences which a person has been unable to cognitively and emotionally assimilate adequately. The authors drew up a list of 275 items (situations and feelings) covering 30 broad areas that the authors felt would be meaningful to psychiatric patients. The subjects were asked to report their degree of "unsettledness" for each item. The results correlated .3 with clinical ratings of anxiety on the subjects and .57 with the MAS. The authors concluded that they were measuring the causes of anxiety rather than the symptoms. Several features of this study limit its theoretical useful for the present research. The scale that the authors employed was subjectively deduced rather than empirically derived. The scale is suitable only for psychiatric patients. Lastly, in term's of Endler et al.'s (1962) three sources of variance for trait anxiety theory, the scale employed by McReynolds and Acker contained a least two sources of variance which were not distinguished. In addition to situational items the scale contained items like: "Feelings of tension".

Fenz (1967) investigated response specificity to anxiety. Using mostly items from the MAS he constructed three scales: striated muscle tension, autonomic activity, and feelings of fear and insecurity. He then administered these items to a sample of college students and patients diagnosed as anxiety neurotics. The results showed that the neurotics were significantly higher than the college students on all three scales. A centroid factor analysis was then performed. Three orthogonal factors were found for both samples. The first factor accounted for 76% of the variance for the college

sample, 67% of the variance for the neurotic sample, and was about equally loaded by the 3 scales for both samples. The second factor accounted for 15% of the variance for the college sample, 24% of the variance for the neurotic sample, and was loaded principally by the striated muscle tension scale for both samples. The third factor accounted for 9% of the variance for both samples and was loaded primarily by the feelings of insecurity scale for both samples. The stronger loadings for neurotics as opposed to the college students on the second and third factors was in accordance with the author's hypothesis concerning a greater specificity of symptoms for neurotics. In a second study Fenz administered the same three scales and the Edward's Personal Preference Schedule (1954) to samples of college students and juvenile delinquents. For both samples Fenz found that autonomic arousal was more related to inward expressions of anxiety, need for dependency, inhibition, and to conflict over hostility rather than hostility itself. Autonomic arousal was much more of a female symptom than a male symptom. Striated muscle tension was found for both samples to be more related to outward expression of anxiety, need for aggression, ideation of hostile acting-out behavior, and negatively related to inhibition. Striated muscle tension was specifically a male symptom rather than a female symptom. Fenz's research fits in nicely with the work of Endler and his associates (1962, 1969) and their hypotheses concerning anxiety response specificity. These hypotheses were based on the two and three-way interactions they found between anxiety stimuli, responses, and individual differences.

Cole, Oetting, and Sharp (1969) administered the Concept-Specific Anxiety Scale (CAS) to over 200 male and female college students. The CAS discriminates among concepts and situations in terms of their situmulus properties along an affective continuum. The CAS consists of a set of 15

bipolar adjective pairs cast in a seven interval semantic differential format. Each scale was selected on the basis of its stability in an orthogonally rotated factor matrix. The CAS can be scored for a Physiological Response factor (seven scales) and a Mood factor (four scales) as well as for total score. Subjects respond to each scale item with reference to a specific concept. The authors pointed out that there are several assumptions underlying the CAS. One assumption is that concept meaning is learned and that what is learned involves emotional and cognitive elements whose precise nature is a function of the subject's stimulus history. The CAS also assumes that affective responses to representational verbal stimuli are indicators of behavior in subsequent situations. With these assumptions in mind, the CAS measures the anxiety component which may be present as part of the meaning of any specific concept. The authors administered the CAS using three concept situations e.g. handling a spider. It was hypothesized that one situation would yield high anxiety, another would be neutral with regard to anxiety, and the third would yield low anxiety levels. The CAS total scores reflected these hypothesized differences. It is clear that this study by Cole et al. is similar in many ways to the present research. Certainly the assumptions underlying the CAS can be applied to the present research. The semantic differential technique could also have been applied to studying the factorial structure of anxiety inducing situations.

CHAPTER III

PROCEDURE

Subjects

The subjects for this experiment were 89 male and female college students enrolled in three introductory psychology courses at Loyola University. The majority of these students were freshmen.

Experimenter

The investigator served as experimenter for all subjects on all tests, except for the administrations of the state anxiety measures. Colleagues administered this scale to the subjects in group form.

Materials

The 50 item Taylor Manifest Anxiety scale (Taylor, 1953) with the MMPI K and L scales embedded, making a total of 90 items, was used as one of the trait anxiety measures. The 61 item Zuckerman Adjective Checklist (Zuckerman, 1960) was employed as one of the state anxiety measures.

The 40 item State-Trait Anxiety Inventory, Form X (Spielberger, Gorsuch, and Lushene, 1968) was used as the principal measure of both state anxiety and trait anxiety.

A list of 35 anxiety-inducing situations was drawn up by the experimenter (a copy is contained in appendix A of this study). This list was drawn from a questionnaire given by the experimenter to 16 students enrolled in an introductory psychology course at Loyola University. Half of these students received a form of the questionnaire in which examples of anxiety-inducing

situations and responses to them were given. The other half received identical questionnaires but without examples (copies of these two questionnaires are contained in appendix B of this study). No noticeable differences between the responses to these two forms was observed.

Both forms of the questionnaire stated that its purpose was to determine what makes people anxious. Subjects were then asked to give their own definition of anxiety. Next they were asked to list as many situations as possible that they found to be anxiety provoking, including the objects and/or actions involved. Then they were asked to list the anxiety response to each situation, including the physiological reactions and subjective feelings involved. Finally the subjects were asked to rate each situation and its response for the intensity of the anxiety involved on a 0-5 scale.

The experimenter then attempted to catalogue the definitions of anxiety, the anxiety inducing objects and actions, and the responses to anxiety. Anxiety definitions fell into roughly eight categories: helplessness, apprehension, frustration, unnaturalness, excitement or arousal, uneasiness, fear of something not well defined, and fear of repercussions. Responses to anxiety inducing situations yielded roughly 93 categories of responses. These responses included not only subjective feelings and physiological reactions but also maneuvers designed to reduce anxiety. Anxiety inducing objects were at first theoretically distinguished from anxiety inducing actions. There were a total of 74 categories of anxiety inducing objects and a total of 76 categories of anxiety inducing actions. It became apparent to the experimenter that the distinction between anxiety inducing objects and actions was untenable and resulted in a vast amount of duplicated effort. The two could be easily combined into one general class of anxiety-inducing situations with no loss of data. A second inspection of this combined class

of anxiety-inducing situations also revealed that many of the categories were quite similar, with only minor differences.

As stated previously, the list of 35 anxiety-inducing situations used in the present experiment was drawn from the categories of situations obtained on the questionnaire above. The list of 35 situations contains almost all of the categories from the questionnaire which had more than one response. The exceptions were those categories with more than one response which were quite similar to other categories or that were very vague conceptually. These categories were not included in the master list of 35. In addition, the list of 35 situations also includes categories from the questionnaire that had only one response. These were included on the basis of their difference from the categories containing more than one response. For the most part, these situations made reference to some physical danger and were devoid of much interpersonal significance.

Although only 16 subjects were used to derive the final list of 35 anxiety situations used in the present research, it must be remembered that this is exploratory research. In no way can the list of anxiety situations be construed as a test requiring normative and standardization data. What is important here is the breadth and scope of the anxiety situations contributed by the 16 subjects. The fact that approximately 75 different categories of anxiety situations were contributed by the 16 subjects would seem to argue that a wide sample of anxiety situations has been collected. This can be compared to the master list of 200 anxiety situations, not categories of situations, employed by Endler and Hunt (1969). If Endler and Hunt's master list of 200 anxiety situations were to be categorized it would surely reduce to a figure much less than 200 categories.

Procedure and Instructions

The Taylor MAS was administered to one classroom of subjects in group form by the experimenter at the beginning of the semester as part of classroom exercise. The subjects were told that the test was designed to measure reactivity levels to stress. The Zuckerman Adjective Checklist was administered to the same classroom of subjects in group form, again as part of the classroom exercise. The Checklist was administered by a colleague immediately prior to the first test of the semester in this class. Subjects were told that the Checklist was designed to assess their feelings at the moment.

The state anxiety half of the STAI, Form X, was administered by colleagues of the experimenter to all three classrooms of students enrolled in introductory psychology courses. This included the one classroom which received the Taylor MAS and the Zuckerman Adjective Checklist earlier. The state anxiety half of the STAI was administered immediately prior to an examination on the professors' lectures later in the academic semester. Subjects were told that the state anxiety measure was part of an experiment at the University to determine their feelings at the moment, immediately before an academic test. Subjects were also instructed on the importance of accurate reporting and the importance of their cooperation in making the experiment a success.

The list of 35 anxiety-inducing situations was given to students who volunteered for the experiment for credit (experimental credits needed to complete the introductory course) along with the trait anxiety half of the STAI, Form X. Twenty seven subjects (18 male, 9 female) from the classroom that received the MAS, the Zuckerman Adjective Checklist, and the state anxiety half of the STAI volunteered to complete the questionnaire containing

the trait half of the STAI and the list of 35 anxiety-inducing situations. Sixty two subjects (39 male, 23 female) from the two classrooms that only received the state anxiety half of the STAI volunteered to complete the questionnaire containing the list of 35 anxiety inducing situations and the trait half of the STAI. Only the scores from those subjects (89) who volunteered to complete the questionnaire containing the list of 35 anxiety-inducing situations were used in the final statistical analyses. Thus, except for the list of 35 anxiety-inducing situations and the trait anxiety half of the STAI, the N for the other tests varied with how many of the final 89 subjects were present for the tests.

When they took the final two test measures subjects were first asked to complete the trait anxiety measure as quickly and accurately as possible. Subjects were instructed to report how they generally felt about the items rather than how they felt about them specifically at the moment. Subjects were then told that the purpose of the rest of the experiment was to determine what made college students anxious. They were asked to complete the 35 item form carefully and with a good deal of thought. Subjects were told that some form of feedback on what they did would be provided and they were thanked for their cooperation.

All subjects were provided with the eight classes of anxiety definitions from the questionnaire mentioned previously. They were told that this was how their fellow students defined anxiety. Subjects were then asked to indicate for each situation how much anxiety they experienced in that situation. A scale from 1-4 was provided for this purpose. A score of 1 meant no anxiety at all was experienced in the given situation. A score of 2 meant a little anxiety was experienced in the situation. A score of 3 meant the subject experienced a moderate amount of anxiety in the situation. A

score of 4 meant the subject experienced a great deal of anxiety in the situation. Subjects circled one number in the scale for each situation.

For each situation the subjects were also asked to write down their anxiety responses to that kind of situation. This included their subjective feelings and physiological reactions with examples of both being given to the subjects. Subjects were asked to pay particular attention to whether their anxiety responses changed for different situatuons. These anxiety responses will be principally used in future research.

CHAPTER IV

RESULTS

A total of 89 subjects (57 male, 32 female) completed the questionnaire containing the list of 35 anxiety-inducing situations. Three subjects failed to respond to a total of five items among the 35 situations. These five missing values were deleted in a pairwise manner in the statistical analysis rather than by removing all the scores for the three subjects.

Table 1 contains the number of subjects who completed each of the 35 anxiety-inducing situations along with the means and standard deviations of each situation or variable.

The scores from the 35 anxiety-inducing situations were intercorrelated using Pearson product moment correlations. A principal component factor analysis without iterations (Nie, Bent, and Hull, 1970) was then performed on the resulting correlation matrix. Unities were inserted in the main diagonal of the correlation matrix. A principal component solution was employed instead of a classical factor analysis because the experimenter made no assumptions concerning the underlying structure of the variables.

A total of 35 orthogonal unrotated factors were derived using the above solution. Table 2 contains the eigenvalue of each unrotated factor, the percentage of the total variance accounted for by each factor, and the cumulative percentage of the variance.

A variety of orthogonal rotation techniques: quartimax, varimax, and equimax, and an oblique rotation were used on the unrotated factor matrix. The number of factors was also varied with each rotation in order to arrive

TABLE 1

Number of Subjects Responding to each Variable (Anxiety Inducing Situations) with the Means and Standard Deviations of each Variable

Variable	N	Mean	S.D.
VAR 1	89	3.02	.74
VAR 2	89	2.51	.97
VAR 3	89	2.87	.87
VAR 4	89	2.82	.89
VAR 5	89	3.22	.89
VAR 6	88	1.41	.75
VAR 7	89	2.64	.99
VAR 8	89	2.61	.96
VAR 9	89	2.67	.89
VAR 10	89	3.02	.90
VAR 11	89	1.60	.75
VAR 12	88	2.38	1.29
VAR 13	89	2.85	.90
VAR 14	89	1.81	.94
VAR 15	89	2.12	.96
VAR 16	89	2.91	.85
VAR 17	89	2.36	.80
VAR 18	89	3.06	.77
VAR 19	89	2.24	.88
VAR 20	87	3.71	.68
VAR 21	89	3.02	.85
VAR 22	89	1.28	.62
VAR 23	89	2.49	.89
VAR 24	89	1.66	.74
VAR 25	89	1.31	.67
VAR 26	89	2.01	.75
VAR 27	89	1.48	.64
VAR 28	89	2.17	1.06
VAR 29	89	2.06	.99
VAR 30	89	2.17	.88
VAR 31	88	1.80	1.00
VAR 32	89	1.63	.86
VAR 33	89	2.96	.85
VAR 34	89	1.80	.89
VAR 35	89	2.00	1.06

TABLE 2

Eigenvalues, Percentage of the Total Variance, and Cumulative Percentage of the Variance of the Orthogonal Unrotated Factors

Factor	Eigenvalue	Pct. of Var.	Cum. Pct. of Var.
1	6.14	17.5	17.5
2	2.75	7.8	25.4
3	2.32	6.6	32.0
4	1.92	5.5	37.5
5	1.74	5.0	42.5
6	1.69	4.8	47.3
7	1.52	4.3	51.6
8	1.44	4.1	55.7
9	1.30	3.7	59.4
10	1.14	3.3	62.7
11	1.10	3.2	65.9
12	.99	2.8	68.7
13	.94	2.7	71.4
14	.93	2.7	74.0
15	.83	2.4	76.4
16	.77	2.2	78.6
17	.72	2.1	80.7
18	.68	1.9	82.6
19	.63	1.8	84.4
20	.60	1.7	86.1
21	.58	1.7	87.8
22	.51	1.4	89.2
23	.49	1.4	90.6
24	.47	1.3	92.0
25	.38	1.1	93.1
26	.36	1.0	94.1
27	.34	1.0	95.1
28	.30	.9	95.9
29	.28	.8	96.7
30	.26	.7	97.5
31	.24	.7	98.1
32	.21	.6	98.7
33	.17	.5	99.2
34	.15	.4	99.6
35	.13	.4	100.0

at the most simplified and logically cohesive rotated factor matrix possible.

The experimenter selected for further consideration a five factor equimax rotation. An equimax (Saunder, 1962) rotation was chosen because the experimenter had no a priori reason for wanting to simplify either the rows or the columns of the factor matrix. So a compromise between row and column simplification (equimax) was chosen. A five factor rotation was chosen for further consideration for a variety of reasons. First of all, according to Guttman (1955), given the present 35 variables the maximum number of meaningful orthogonal common factors which can be extracted should be eight. Using Meyer's (1971) more stringent criteria, the maximum number of meaningful orthogonal common factors which can be extracted using 35 variables should be four. The five factor equimax rotation chosen for further consideration yields three easily interpretable factors and two somewhat ambiguous factors. Secondly the five factor equimax rotation was chosen for further consideration because it kept the factor order that the majority of the rotations yielded while reducing the extraneous factor loadings on the five interpretable factors. In effect this made these five factors more clear in interpretation.

Table 3 contains the equimax rotated factor matrix with decimal points omitted of the 35 anxiety-inducing situations along with their communalities and the measures of sampling adequacy. Loadings have been rounded off to two decimal places.

An inspection of Table 3 indicates that the rotated factor loadings show a good approximation to simple structure. Roughly 33% of the loadings have absolute magnitudes of .10 or less, 55% are .20 or less, and 27% of the loadings are significant (.30 or greater). Roughly 60% of the variables have a factorial complexity of one or load highly on only one factor. Virtually all of the remaining variables have a factorial complexity of two or load

TABLE 3

Rotated Orthogonal Factor Loadings, Communalities, and Measures of Sampling Adequacy (Decimal Points Omitted)

Variable	Fac.1	Fac.2	Fac.3	Fac.4	Fac.5	h^2	MSA
VAR 1	06	04	-04	24	60	42	91
VAR 2	60	19	14	13	03	43	89
VAR 3	-07	07	13	69	07	51	84
VAR 4	11	59	-14	09	02	38	93
VAR 5	31	23	11	03	08	17	89
VAR 6	04	11	31	36	-30	33	72
VAR 7	10	38	46	-06	-05	37	89
VAR 8	49	-05	21	35	-30	50	87
VAR 9	58	42	-06	15	-06	53	94
VAR 10	61	12	19	15	30	54	93
VAR 11	35	-09	-14	65	16	60	86
VAR 12	02	19	14	04	38	20	79
VAR 13	12	13	00	45	28	31	92
VAR 14	20	27	12	56	-07	44	79
VAR 15	78	08	02	24	-04	68	93
VAR 16	-03	44	00	27	47	48	91
VAR 17	01	59	08	38	00	49	89
VAR 18	22	68	-01	07	26	59	88
VAR 19	18	26	42	-09	16	31	88
VAR 20	-02	37	05	-40	43	49	65
VAR 21	06	41	24	-03	43	41	91
VAR 22	-12	-18	72	16	-05	59	79
VAR 23	16	42	52	-09	08	49	93
VAR 24	28	10	12	51	22	41	90
VAR 25	02	-08	44	22	13	27	87
VAR 26	27	22	23	16	16	22	95
VAR 27	59	-02	04	-13	25	43	81
VAR 28	28	-25	08	-04	57	47	84
VAR 29	-15	18	34	12	25	25	80
VAR 30	61	-06	03	21	10	43	92
VAR 31	29	-06	38	27	-15	32	73
VAR 32	28	16	58	-04	-02	44	86
VAR 33	02	72	09	07	08	54	89
VAR 34	07	-00	35	13	25	21	89
VAR 35	11	-24	61	08	36	58	84

highly on just two factors. The range of communalities is from .17 to .68. The mean communality (the total variance of a variable accounted for by the combination of all common factors) of the 35 variables is .42.

Kaiser, Meyer, and Olkin (Kaiser, 1970) have developed a formula (MSA) to measure the sampling adequacy of factor analytic data matrices. They followed Guttman's suggestion that given correlation matrix R, we should always look at R^{-1} in order to assess the sampling adequacy of the data for factor analytic purposes. Guttman in turn demonstrated that the matrix R^{-1} should be near diagonal for factor analysis to be an appropriate tool. The Kaiser, Meyer, and Olkin formula, MSA, employs R^{-1}. MSA can be defined for any variable and measures to what extent a given variable "belongs to the family" psychometrically. MSA is a function of four main variables. MSA improves as: the number of variables increases, the effective number of factor decreases, the number of subjects increases, and the general level of correlations increases. In general you do not have really good factor analytic data until the overall MSA is greater than .80. You only have excellent data when the MSA is greater than .90.

Table 3 reveals that the MSA level for the 35 variables ranges from .65 to .95. The overall MSA for the entire sampling is .88. This indicates that the data is very good for purposes of factor analysis, almost excellent, according to the Kaiser, Meyer, and Olkin formula.

It is assumed for purposes of the present discussion that factor loadings .30 or greater are significant. Factor loadings ranging from .30 to .50, which account for 9% to 25% of the variance of a variable, are considered to be moderate factor loadings. Factor loadings greater than .50, which account for more than 25% of the variance of a variable, are considered to be high factor loadings.

The variables or situations which load highly on Factor 1 are variable 2: "Meeting strangers", variable 9: "Talking with someone you want to impress", variable 10: "Going for a job interview", variable 15: "Going out on a date", variable 27: "Talking to someone of another race", and variable 30: "Going to a party or social gathering". It is clear from this multitude of high loadings that Factor 1 is an interpersonal anxiety situation factor.

Factor 2 is loaded highly by variable 4: "Being criticized by someone", variable 17: "Having to make a decision between doing two things", variable 18: "Having too little time to do something", and variable 33: "Having a term paper due". The next highest loading variable (.44) on Factor 2 is variable 16: "Failing to finish an assignment". From the above loadings it appears that Factor 2 is determined by situations which pose some threat to self-esteem through the possibility of failure. The type of failure involved here is task failure rather than failure in an interpersonal situation.

The variables which load highly on Factor 3 are variable 22: "Crossing a bridge", variable 23: "Seeing someone you do not want to see", variable 32: "Being in large crowds", and variable 35: "Being in high places". Variables which have moderate loadings on Factor 3 are variable 6: "Taking a boat ride", variable 7: "Arguing with parents", variable 19: "Not having enough money", variable 25: "Seeing and hearing lightening and thunder", variable 29: "Thinking about your own death", variable 31: "Flying in an airplane", and variable 34: "Another person repetitively tapping their foot". Almost every variable among the 35 which has to do with a situation of physical danger loads highly on Factor 3. It appears that Factor 3 is primarily a physical danger factor. However Factor 3 is not purely a physical danger factor because of the numerous loadings of situations not having anything to do with

physical danger e.g. variables 19, 23, and 34. There appears to be no clear pattern to the non-physical danger situations loading on Factor 3. Therefore Factor 3 is somewhat ambiguous in meaning.

Factor 4 is loaded highly by variable 3: "Waiting for something to take place", variable 11: "Taking part in an experiment", variable 14: "Driving an automobile", and variable 24: "People coming to you for advice". Variables with moderate loadings on Factor 4 are variable 6: "Taking a boat ride", variable 8: "Competing in games", variable 13: "Thinking about your own future", and variable 17: "Having to make a decision between doing two things". Factor 4 is the only one of the first five factors that has a significant negative loading, variable 20: "Having a loved one in danger". It appears that Factor 4 is delineated by situations concerning anticipation or expectation where personal effort is likely to be involved. The significant negative loading by variable 20 indicates that Factor 4 is not just an expectation or anticipation factor alone but also involves possible personal effort on the part of the one who is doing the anticipating.

The fifth factor is slightly ambiguous in meaning. It is loaded highly by only two variables, variable 1: "Taking a test", and variable 28: "Talking to the police". Taking into consideration only these two variables it would appear that Factor 5 is an authority situation factor. However, numerous variables load moderately on Factor 5. These are variable 10: "Going for a job interview", variable 12: "Taking drugs", variable 16: "Failing to finish as assignment", variable 20: "Having a loved one in danger", variable 21: "Seeing someone who is hurt", and variable 35: "Being in high places". Some of the variables with moderate loadings on Factor 5 are also situations which would involve a confrontation with authority, e.g. variables 10 and 16. Other variables which load moderately on Factor 5, e.g. variables 20 and 21, appear

to be situations primarily involving a loss of control on the part of the one in the situation. Thus Factor 5 can be only tentatively labelled an authority situation factor.

Rotations with more than five factors show that the sixth and rest of the remaining factors are highly ambiguous in nature as far as interpretation is concerned. Very little meaningful data could be extracted by a further consideration of these remaining factors.

An oblique rotation was also performed on the data in order to examine a solution which allowed for correlated factors. The particular oblique solution used was the Harris and Kaiser (1964) orthoblique method. This method uses orthogonal transformations of a given matrix, in this case a quartimax rotation, to obtain oblique factor-analytic solutions involving correlated factors. Harris and Kaiser's general framework allows one to obtain all possible factor-analytic solutions, orthogonal and oblique, for a given common factor space.

Hakstian (1971) compared four widely used oblique factor transformations, including the Harris-Kaiser orthoblique method, to establish which produced solutions best exemplifying simple structure. The four solutions were compared by using three relatively objective sets of criteria and five varying sets of data. The author concluded that the Harris-Kaiser rotation, in its various forms, was superior to the other three oblique rotations and produced solutions most closely exemplifying simple structure. For factorially simple data the author recommended the independent cluster version of the Harris-Kaiser rotation. For complex data, the P'P proportional to ϕ, with an equimax rather than a varimax rotation, was recommended. Since complexity can seldom be predicted Hakstian also recommended performing both Harris-Kaiser solutions and selecting the cleanest and most interpretable. Both Harris-Kaiser

solutions were performed on the present experimental data and the P'P proportional to ϕ with a quartimax rotation was chosen for further consideration. The quartimax rotation is the rotation used by Harris and Kaiser (1964) themselves.

Table 4 contains the oblique primary factor pattern matrix, the primary factor intercorrelation matrix, and the squared multiple correlations with decimal points omitted and all figures rounded off to two decimal places.

An inspection of the pattern matrix in Table 4 shows that the variables that load significantly on Factor 1 and 3 are identical to those that load significantly on these same factors in the equimax rotation (Table 3).

Factor 2 was labelled as a: "Threat to self-esteem through task failure" factor from the equimax rotation. Two variables no longer load significantly on Factor 2 when the oblique rotation is used. These variables did load significantly with the equimax rotation. These two variables do not fit in with the above interpretation of Factor 2, namely, variable 20: "Having a loved one in danger". and variable 21: "Seeing someone who is hurt". Variable 16: "Failing to finish an assignment", which does fit the above interpretation also drops its significant loading with the oblique rotation. Variable 14: "Driving an automobile", loads significantly on Factor 2 with the oblique rotation but not with the equimax rotation. The net result of these loading changes between the oblique and equimax solutions is to perhaps strengthen a little the original interpretation of Factor 2 made with the equimax rotation.

With Factor 4 variables 1 and 16 load significantly using the oblique rotation but not with the equimax rotation. On the other hand, variables 6, 8, and 17 load significantly on Factor 4 with the equimax rotation but not with the oblique rotation. The interpretation of Factor 4 remains the same

TABLE 4

Oblique Primary Factor Pattern Matrix, Primary Intercorrelation Matrix, and Squared Multiple Correlations
(Decimal Points Omitted)

	Variable	Fac.1	Fac.2	Fac.3	Fac.4	Fac.5	SMC
Factor Pattern	VAR 1	01	-17	-09	42	57	71
	VAR 2	61	18	08	-07	-11	67
	VAR 3	-16	05	15	67	-12	74
	VAR 4	10	64	-27	07	04	64
	VAR 5	31	20	07	-09	02	73
	VAR 6	-01	19	38	12	-49	48
	VAR 7	03	33	53	-34	-15	65
	VAR 8	51	05	22	07	-53	68
	VAR 9	61	49	-21	-01	-15	70
	VAR 10	61	-01	13	01	15	77
	VAR 11	35	-10	-23	70	-01	69
	VAR 12	-04	02	13	07	37	48
	VAR 13	07	04	-05	50	17	69
	VAR 14	15	31	08	42	-26	64
	VAR 15	84	13	-09	03	-22	73
	VAR 16	-11	29	-07	37	45	74
	VAR 17	-07	61	02	29	-09	72
	VAR 18	18	62	-14	04	26	83
	VAR 19	11	14	48	-29	07	65
	VAR 20	-05	19	01	-32	57	58
	VAR 21	-02	21	24	-06	41	72
	VAR 22	-23	-29	95	-13	-27	62
	VAR 23	07	31	60	-38	-03	65
	VAR 24	23	02	08	46	04	66
	VAR 25	-07	-21	56	07	-05	56
	VAR 26	23	14	22	03	04	60
	VAR 27	63	-12	-02	-21	21	64
	VAR 28	28	-49	07	06	54	53
	VAR 29	-25	03	41	06	18	54
	VAR 30	65	-08	-04	09	-05	68
	VAR 31	26	-05	45	-00	-36	48
	VAR 32	22	08	68	-38	-20	66
	VAR 33	-04	71	02	-02	07	77
	VAR 34	-00	-16	42	04	13	49
	VAR 35	01	-49	78	-08	17	62
Factor Inter-correlations	Fac.1	1.00	19	40	34	24	
	Fac.2	19	1.00	40	22	36	
	Fac.3	40	40	1.00	47	36	
	Fac.4	34	22	47	1.00	07	
	Fac.5	24	36	36	07	1.00	

with the oblique solution as with the equimax solution: "Situations of anticipation or expectation where some possible personal effort might be involved".

With Factor 5 variables 10 and 35 do not load significantly using the oblique rotation whereas they do using the equimax rotation. Interpretation wise, the net effect is the same and Factor 5 retains its interpretation as an authority factor with a strong component of loss of control.

The pattern matrix of Table 4 reveals that roughly 57% of the variables have a factorial complexity of one. The remaining 43% of the variables have a factorial complexity of two.

An inspection of the intercorrelation matrix in Table 4 shows that no factor correlates highly with any other factor. Factor 1 correlates moderately with Factors 3 and 4. Factor 2 correlates moderately with Factors 3 and 5. Factor 3 correlates moderately with all of the other factors and highest with Factor 4. Factor 4 correlates moderately with factors 1 and 3. Factor 5 correlates moderately with Factors 2 and 3. Factor 4 and Factor 5 are almost orthogonal to one another.

It can be seen from the intercorrelation matrix that the five factors are fairly unique in that their intercorrelations are low to moderate. This explains why the significant factor loadings on the equimax factor matrix and the oblique primary factor pattern matrix are quite similar.

Table 5 lists the means and standard deviations of the various state and trait anxiety measures and the total score for the 35 anxiety-inducing situations along with the number of subjects responding to each.

Table 6 lists the Pearson product-moment correlations between the various anxiety measures, the number of cases involved, and the level of significance reached by the correlations.

TABLE 5

Means, Standard Deviations, and Number of Subjects Responding to State and Trait Anxiety Scores and Total Score for Anxiety Situations

Test	N	Mean	S.D.
Total Score for Anxiety Inducing Situations (Total)	89	81.36	12.44
STAI State (State)	85	44.02	11.47
STAI Trait (Trait)	87	41.70	8.45
Zuckerman Adjective Checklist (Z)	26	11.23	6.11
Taylor Manifest Anxiety Scale (MAS)	25	18.92	8.15

TABLE 6

Correlations Between Anxiety Measures, the Number of Cases Involved, and Level of Significance Reached

Tests	Correlation	N	Significance
Total X State	.23	85	.017
Total X Trait	.37	87	.001*
Total X Z	.58	26	.001
Total X MAS	.25	25	.236*
State X Trait	.57	85	.001
State X Z	.29	23	.093
State X MAS	.39	22	.035
Trait X Z	.55	24	.003
Trait X MAS	.55	23	.003
Z X MAS	.17	24	.218

* indicates two-tailed test of significance

The two critical correlations in Table 6 are the ones between the total score for the anxiety situations and the STAI trait scores and that between the total score for the anxiety situations and the Taylor MAS scores. It was predicted that neither of these correlations would be significant. As can be seen from Table 6 the correlation between the total score for anxiety situations and the MAS scores did not reach significance (.24 level). However, the correlation between the total score for anxiety situations and the STAI trait scores did reach significance at the .001 level.

One would expect a significant correlation between the two state anxiety measures and between the two trait anxiety measures. The correlation between the STAI trait scores and the MAS scores was significant (.003 level). Unexpectedly the correlation between the STAI state scores and the Zuckerman Adjective Checklist scores did not reach the .05 level of significance (.09 level).

In order to test for the predicted relationships between the state and trait anxiety measures and the various situation factors special subscales were constructed. This was done with both the equimax and the oblique solution. These subscales consisted of all variables or situations that loaded significantly (.3) on a given factor.

Table 7 contains the list of variables that made up each factor subscale along with the means and standard deviations for these subscales using the equimax solution.

The factor subscales were then correlated with the two trait anxiety measures and the two state anxiety measures. Table 8 lists the Pearson product-moment correlations between the factor subscales and the various state and trait anxiety measures, the number of cases involved, and the level of significance reached by the correlations for the equimax solution.

TABLE 7

Variables Making Up Equimax Factor Subscales
Along with Means and Standard Deviations

		Mean	S.D.
Factor 1 = Variables:	2,5,8,9,10,11, 15,27,30	21.40	4.83
Factor 2 = Variables:	4,7,9,16,17,18, 20,21,23,33	28.76	4.82
Factor 3 = Variables:	6,7,19,22,23,25, 29,31,32,34,35	20.82	5.12
Factor 4 = Variables:	3,6,8,11,13,14, 17,24	17.25	3.96
Factor 5 = Variables:	1,10,12,16,20, 21,28,35	22.43	4.03

TABLE 8

Correlations Between Factor Subscales and State and Trait Anxiety Measures, Number of Cases Involved, and Level of Significance Reached for Equimax Solution

Tests	Correlation	N	Significance
Fac. 1 X State	.14	85	.10
Fac. 1 X Trait	.25	87	.01
Fac. 1 X Z	.53	26	.003
Fac. 1 X MAS	.14	25	.26
Fac. 2 X State	.16	85	.06
Fac. 2 X Trait	.26	87	.007
Fac. 2 X Z	.24	26	.12
Fac. 2 X MAS	.35	25	.04
Fac. 3 X State	.02	85	.42
Fac. 3 X Trait	.30	87	.004*
Fac. 3 X Z	.59	26	.001
Fac. 3 X MAS	.21	25	.16
Fac. 4 X State	.28	85	.005
Fac. 4 X Trait	.33	87	.001
Fac. 4 X Z	.37	26	.03
Fac. 4 X MAS	.10	25	.32
Fac. 5 X State	.10	85	.18
Fac. 5 X Trait	.14	87	.10
Fac. 5 X Z	.57	26	.001
Fac. 5 X MAS	.29	25	.08

* indicates two-tailed test of significance

Factor 2 was interpreted to represent situations that posed a threat to self-esteem through the possibility of task failure. Thus, it also represents situations that pose a threat to goal achievement. It was predicted that a factor that posed a threat to self-esteem through failure would correlate positively with the two trait anxiety measures. It was also predicted that a factor posing a threat to goal achievement would correlate positively with the two state anxiety measures. An inspection of Table 8 shows that the Factor 2 subscale did correlate significantly with the two trait anxiety measures. The Factor 2 subscale failed to correlate significantly with the Zuckerman Adjective Checklist and just barely failed to reach the .05 level of significance in its correlation with the STAI state scores.

It was also predicted that if a factor was found that represented a threat of physical danger this factor would not correlate significantly with the STAI trait scores. Factor 3 was interpreted to represent primarily (though not purely) a physical danger factor. An inspection of Table 8 reveals that contrary to prediction the Factor 3 subscale and the STAI trait scores did correlate significantly (.004 level). The Factor 3 subscale and the MAS, the other trait anxiety measure, did not correlate significantly using a more stringent one-tailed test of significance.

The Factor 4 subscale correlated significantly with both state anxiety measures. This could be expected since Factor 4 represents situations involving anticipation or expectation where personal effort will be involved and both state anxiety measures were given immediately preceeding an academic test. The STAI trait scale correlated significantly with every factor subscale except Factor 5, the authority factor. The Zuckerman Adjective Checklist correlated significantly with every factor subscale except

Factor 2, as previously noted.

Table 9 contains the list of variables that made up each factor subscale along with the means and standard deviations for these subscales using the oblique solution.

The factor subscales were again correlated with the four state and trait anxiety measures. Table 10 lists the Pearson product-moment correlations between the factor subscales and the state and trait anxiety measures, the number of cases involved, and the level of significance reached by the correlations for the oblique solution.

Once again, Factor 2 represents a threat to self-esteem through task failure and thereby also a threat to goal achievement. An inspection of Table 10 where correlated factors were employed reveals that the Factor 2 subscale correlated significantly with both state anxiety measures and with both trait anxiety measures, as predicted. Factor 3 subscale, representing physical danger situations, again correlated significantly with the STAI trait scale (.004 level), contrary to prediction. The Factor 3 subscale did not correlate significantly with the other trait anxiety measure, the MAS.

The Factor 4 subscale correlated significantly only with the STAI state scale and not with the Zuckerman Adjective Checklist scores. Once again the STAI trait scale correlated significantly with all the factor subscales except the Factor 5 subscale. The Zuckerman Adjective Checklist scores correlated significantly with every factor subscale except the Factor 4 subscale, the anticipation factor.

TABLE 9

Variables Making Up Oblique Factor Subscales
Along with Means and Standard Deviations

		Mean	S.D.
Factor 1 = Variables:	2,5,8,9,10,11, 15,27,30	21.40	4.83
Factor 2 = Variables:	4,7,9,14,17, 18,23,33	20.81	4.14
Factor 3 = Variables:	6,7,19,22,23,25, 29,31,32,34,35	20.82	5.12
Factor 4 = Variables:	1,3,11,13,14, 16,24	16.72	3.45
Factor 5 = Variables:	1,12,16,20,21, 28	17.40	3.23

TABLE 10

Correlations Between Factor Subscales and State and Trait Anxiety Measures, Number of Cases Involved, and Level of Significance Reached for Oblique Solution

Tests	Correlation	N	Significance
Fac. 1 X State	.14	85	.10
Fac. 1 X Trait	.25	87	.01
Fac. 1 X Z	.53	26	.003
Fac. 1 X MAS	.14	25	.26
Fac. 2 X State	.20	85	.03
Fac. 2 X Trait	.30	87	.002
Fac. 2 X Z	.32	26	.05
Fac. 2 X MAS	.35	25	.04
Fac. 3 X State	.02	85	.42
Fac. 3 X Trait	.30	87	.004*
Fac. 3 X Z	.59	26	.001
Fac. 3 X MAS	.21	25	.16
Fac. 4 X State	.36	85	.001
Fac. 4 X Trait	.34	87	.001
Fac. 4 X Z	.28	26	.08
Fac. 4 X MAS	.03	25	.43
Fac. 5 X State	.10	85	.17
Fac. 5 X Trait	.07	87	.25
Fac. 5 X Z	.46	26	.009
Fac. 5 X MAS	.35	25	.04

* indicates two-tailed test of significance

CHAPTER V

DISCUSSION

The five anxiety inducing situation factors that were found in the present experiment are clearly similar to factors found in previous factor analytic research. Thus the first anxiety situation factor found by Endler et al. (1962) was concerned with threats to interpersonal status and the achievement of goals. This factor from the Endler research corresponds to the first two factors of the present experiment: Interpersonal anxiety situations and situations which pose a threat to self-esteem through the possibility of task failure. The second anxiety situation factor found by Endler et al. (1962), namely, an inanimate danger factor, corresponds to the third factor of the present experiment, namely, a physical danger factor. The fourth and fifth factors of the present experiment, the anticipation factor and the authority factor, are unique in relation to the Endler et al. study. While confirming the results of the earlier Endler et al. research the present experiment goes beyond this and specifies anxiety situation factors more precisely. It also adds to the total number of discernable anxiety situation factors. The confirmation of the earlier Endler et al. anxiety situation factors is made all the more important by the fact that the two studies differed in the anxiety situations that were employed, in the factor analytic techniques that were used, and in the rotational techniques that were employed.

The present factor analytic results also confirm the findings of Basowitz et al. (1955) of two kinds of anxiety: shame and harm anxiety. Shame anxiety

was characterized by a concern on the part of the person that he would fail out of a task situation and not measure up to internalized ideals or external expectations. Shame anxiety is clearly quite similar to the second anxiety situation factor of the present study which is concerned with a threat to self-esteem through the possibility of task failure. Harm anxiety is theoretically close to the third factor of the present study, a physical danger factor. The results of the present study of course go well beyond the Basowitz et al. study in that it specifies many other anxiety situation factors.

The relationship of the present study to the results obtained by Hodges and Felling (1970) is somewhat unclear. Though the Hodges and Felling design is in many ways similar to the present design, they carefully chose their anxiety situations to measure eight preselected areas that they thought would be relevant to college life. Not unexpectedly, the factors they obtained reflected these subjectively preselected areas. Their first factor was loaded by items denoting pain, physical danger, and squeamishness and corresponds roughly to the third factor of the present experiment, the physical danger factor. Their second factor was loaded by items having to do with classroom participation and speech. Variables in the present experiment that overtly had to do with classroom participation and speech generally loaded on the first factor, the interpersonal anxiety factor. Hodges and Felling's third factor was loaded by items having to do with social and academic failure. This third factor of Hodges and Felling does not correspond to any one factor in the present research and appears to be conceptually unclear. Social failure situations in the present design invariably load on the first factor, the interpersonal anxiety situations. Academic failure situations in the present design generally load on the second factor which represents situations

which pose a threat to self-esteem through the possibility of task failure. Hodges and Felling's fourth factor was loaded exclusively by items having to do with dating. Dating situations in the present research loaded on the first factor, the interpersonal anxiety situation factor. The results from the present experiment do not confirm or deny the results obtained by Hodges and Felling. Rather the present research uses three factors to account for the variance that Hodges and Felling use four factors to account for and perhaps does so in a more conceptually clear way than Hodges and Felling.

Hypothesis 1 and 2 stated that the total scores for the anxiety situations would not correlate significantly with either the STAI trait scores or the Taylor MAS scores. Table 6 reveals that the second hypothesis was confirmed in that the correlation between the total score for the anxiety situations and the MAS scores was not significant. The first hypothesis was not validated however because the correlation between the total score for the anxiety situations and the STAI trait scores was significant at the .001 level. This finding is all the more surprising since the correlation between the STAI trait scores and MAS scores was significant at the .003 level. One alternate explanation for this finding is that the variance for the total score for anxiety situations is largely accounted for by one factor, namely, situations that pose a threat to self-esteem through failure. Since the STAI trait scale is known to have a positive relationship with such a factor (Hodges and Felling, 1970), this would account for the significant correlation between the STAI trait scores and the total score for the anxiety situations. However, this explanation does not seem to be very plausible when one consideres the relatively low correlations among the five factors in the factor matrix (Table 4). Also, one factor in the present factor analysis, Factor 2, appears to be very close conceptually to the factor with which the

STAI trait scale is known to have a positive relationship. That is, it is characterized by situations which pose a threat to self-esteem through the possibility of task failure. Yet Factor 2 correlates moderately with only two other factors in the factor matrix. Thus situations which pose a threat to self-esteem through failure can hardly account for the majority of the variance for the total anxiety situations score.

A more plausible explanation for the significant correlation between STAI trait scale and the total score for anxiety situations is based on the nature of the STAI trait scale. The present experimenter hypothesized that the STAI trait scale tapped into the variance contributed by individual differences in anxiety proneness and only one type of anxiety situation, situations which posed a threat to self-esteem through failure. It was hypothesized that the STAI trait scale would not tap into the variance contributed by another type of anxiety situation, situations which pose a threat of physical danger. This relationship between the STAI trait scale and these two types of anxiety situations has been demonstrated experimentally (Hodges and Felling, 1970). The present experimenter has reasoned that theoretically, according to Spielberger's state-trait anxiety theory, there is no reason for this relationship to hold true. That this relationship has been experimentally demonstrated to hold true appears to be an artifact of the specific trait anxiety measure being employed. Theoretically any trait anxiety measure such as the STAI trait scale should tap into the variance contributed by any type of anxiety situation with which the individual has had experience in the past. The present research suggests that the STAI trait scale does tap into the variance contributed by a wide range of anxiety situations. An inspection of Table 8 and 10 reveals that the STAI trait scale correlates significantly with every anxiety situation factor except Factor 5, the authority situation. The

present experimental findings suggest then that the STAI trait scale is perhaps a better measure of trait anxiety than even Spielberger himself has thought. In addition to tapping into the variance contributed to trait anxiety by individual differences in anxiety proneness the present research suggests that the STAI trait scale also taps into the variance contributed by a wide range of anxiety inducing situations. The STAI trait scale therefore measures two of the three main sources of variance for trait anxiety posited by Endler et al. (1962): individual differences and situations. It does not tap into the variance contributed by anxiety responses, the third important source of variance for trait anxiety posited by Endler and his associates.

If one uses Spielberger et al.'s (1966, 1968, 1970) definition of trait anxiety as reflecting past learning that in some way determines individual differences in anxiety proneness to specific situations, then the present experimental findings suggest that the STAI trait scale is an excellent measure of trait anxiety. On the other hand, the present research findings confirm previous experimental evidence (Hodges and Spielberger, 1966; Spielberger, 1966) that the Taylor MAS taps into the variance contributed by only one type of anxiety situation, namely, situations posing a threat to self-esteem through failure. The Taylor MAS correlated significantly only with Factor 2 using the equimax rotation (Table 8) and with Factors 2 and 5 using the oblique rotation (Table 10). Factor 2 is characterized by situations which pose a threat to self-esteem through the possibility of task failure. In terms of Endler et al.'s (1962) theory concerning the major sources of variance contributing to trait anxiety, the Taylor MAS would not be as good a measure of trait anxiety as the STAI trait scale. This is because the MAS measures almost exclusively only one of the three major sources of variance for trait anxiety, namely, individual differences in

anxiety proneness. It also measures only one type of anxiety inducing situation and not the full range of anxiety inducing situations.

An inspection of Table 6 shows that the STAI trait scale correlates significantly with the STAI state scale (.001 level) and with the Zuckerman Adjective Checklist scores (.003 level). This is not an altogether unexpected finding. The correlation between the STAI trait scale and the STAI state scale was of the order of .57. This value is well within the range of correlations given by Spielberger, Gorsuch, and Lushene (1968) for the intercorrelations of these two measures when given under non-stressful conditions. The correlation coefficient might have been higher yet since Spielberger et al. report that they obtained higher correlations when the STAI state scale was given under stressful conditions posing a threat to self-esteem. In the present experiment the STAI state scale was given under just such conditions.

The high correlations between the STAI trait scale and the two state anxiety measures might explain two unexpected findings from Table 6. These are the significant correlations between the total score for anxiety situations and the STAI state scale (.017 level) and the Zuckerman Adjective Checklist scores (.001 level). The present experimenter hypothesized that both state anxiety scales tapped into the variance contributed by individual differences in anxiety proneness and the variance contributed by the specific anxiety situation in which the state anxiety measure was given. Following this line of reasoning one would not expect a significant correlation between total anxiety situation score and the state anxiety measures. However, high correlations between the STAI trait scale and the two state anxiety measures could possibly explain such a relationship if the state and trait measures shared common sources of variance.

An inspection of Tables 8 and 10 reveals that both the STAI trait scale and the MAS correlated significantly with Factor 2, the factor characterized by situations which pose a threat to self-esteem through the possibility of task failure, for both the equimax and oblique solutions. The predictions made in the third and fourth hypotheses are therefore confirmed. Table 8 and 10 reveal that for both the equimax and oblique solutions the STAI trait scale also correlated significantly with Factor 3, the physical danger factor. This finding fails to confirm the fifth hypothesis. One possible explanation for the above results was offered earlier and was based on the fact that the STAI trait scale correlated significantly with all the anxiety situation factors except Factor 5 for both the equimax and oblique solutions. This explanation suggests that the STAI trait scale not only tapped into the variance contributed to trait anxiety by individual differences but also tapped into the variance contributed by anxiety situations of all types. This explanation follows the theorizing of Endler et al. (1962) concerning the three major sources of variance contributing to trait anxiety. This would explain why the STAI trait scale unexpectedly correlated significantly with the third factor.

Also to be taken into consideration concerning the significant correlation between the STAI trait scale and Factor 3 is the fact that Factor 3 was somewhat ambiguous in interpretation. Table 4 also reveals that the third factor was the only one to correlate moderately with all the other factors in the intercorrelation matrix. Both these facts suggest that Factor 3 is not purely a physical danger factor. Perhaps if Factor 3 had been more clearly and certainly a physical danger factor it would not have correlated significantly with the STAI trait scale.

Hypotheses 6 and 7 stated that there would be a significant correlation

between a factor representing a threat to goal achievement and both state anxiety measures. Factor 2, which was interpreted to be a factor representing a threat to self-esteem through the possibility of a task failure, would appear to be clearly a factor representing a threat to goal achievement. An inspection of Table 8, where factor subscale scores were based on the equimax loadings, shows that Factor 2 just barely failed to correlate significantly with the STAI state scale (.06 level). Factor 2 definitely failed to reach significance in its correlation with the Zuckerman Adjective Checklist scores (.12 level). Table 10, where factor subscale scores were based on the oblique loadings, reveals that Factor 2 correlated significantly with both the STAI state scale (.03 level) and the Zuckerman Adjective Checklist scores (.05 level). These results can be considered to have confirmed the sixth hypothesis which stated that there would be a positive correlation between a factor representing a threat to goal achievement and the STAI state scale. The results are ambiguous concerning the seventh hypothesis which stated that there would be a positive correlation between a factor representing a threat to goal achievement and scores on the Zuckerman Adjective Checklist. The hypothesized relationship holds when a solution employing correlated factors is used. The hypothesized relationship does not hold when a solution employing orthogonal or uncorrelated factors is used. That the two state anxiety measures differ somewhat in their relationship to Factor 2 is not surprising when one considers that the two state anxiety measures did not correlate significantly with one another (Table 6). The significant correlation between the STAI state scale, administered before an academic examination, and a factor representing a threat to self-esteem through the possibility of task failure can be considered to add to the construct validity of the STAI state scale (1968).

Table 8 and 10 also reveal that the only other factor subscale besides Factor 2 that the STAI state scale correlated significantly with is Factor 4 which represents situations of anticipation or expectation where personal effort may be involved. This correlation could be expected since the STAI state scale was given immediately preceeding an academic examination, certainly a situation of anticipation where personal effort is to be involved. This correlation between the STAI state scale and Factor 4 can also be considered to add to the construct validity of the STAI state scale (1968).

On the other hand, the other state anxiety scale, the Zuckerman Adjective Checklist, correlated significantly with every factor subscale except Factor 2 when the equimax solution was used (Table 8). When the oblique solution was used (Table 10) the Zuckerman Adjective Checklist correlated significantly with every factor subscale score except Factor 4. Factors 2 and 4 are precisely the factors that one would expect a state anxiety measure given before an academic examination to correlate significantly with. On the basis of this evidence it would appear that the Zuckerman Adjective Checklist (1960) is not a very sensitive or discriminating measure of anxiety states. The present research indicates that the STAI state scale (1968) is a far superior measure of state anxiety in its ability to discriminate between anxiety situations than the Zuckerman Adjective Checklist. One might then expect the non-significant correlation between the two state anxiety measures revealed by Table 6.

In conclusion, the present experimental results tend to be supportive of the examiner's interpretation of Spielberger's (1966, 1968, 1970) trait-state anxiety theory in terms of the Endler et al. (1962) theory concerning the three major sources of variance for trait anxiety. Spielberger's concept of trait anxiety accounts for only two of the three major sources of variance

for trait anxiety posited by Endler and his associates: individual differences in anxiety proneness and anxiety situations. The third source of variance for trait anxiety posited by Endler and his associates, anxiety responses, is not accounted for by Spielberger's concept of trait anxiety. Spielberger's own STAI trait anxiety scale (1968) is an excellent measure of his own concept of trait anxiety in that it appears to tap into the variance contributed to trait anxiety by individual differences in anxiety proneness and a wide variety of anxiety situations. The Taylor MAS (1953) is a poorer measure of Spielberger's concept of trait anxiety in that it taps into the variance contributed to trait anxiety by individual differences in anxiety proneness and only one type of anxiety situation, situations which pose a threat to self-esteem through failure.

Spielberger's concept of state anxiety would appear to account for individual differences in anxiety proneness and the particular situation which defines the anxiety state. Once again, Spielberger's own STAI state anxiety scale (1968) is an excellent measure of his own concept of state anxiety in that it is an excellent discriminator of anxiety situations. The Zuckerman Adjective Checklist (1960) is a relatively poorer measure of Spielberger's concept of state anxiety in that it is not a good discriminator of anxiety situations.

CHAPTER VI

SUMMARY

A total of 89 college students rated a list of 35 empirically derived situations for the amount of anxiety induced in each situation. Various subsets of subjects among the 89 also completed four state and trait anxiety measures: the Zuckerman Adjective Checklist (1969), the Taylor MAS (1953), and the state and trait halves of the State-Trait Anxiety Inventory or STAI (Spielberger, Gorsuch, and Lushene, 1968).

A principal component factor analysis with unities in the main diagonal was performed on the correlation matrix resulting from the list of 35 anxiety inducing situations. A five factor equimax (Saunders, 1962) rotation and a five factor orthoblique (Harris and Kaiser, 1964) rotation were performed.

The first rotated factor was identified as an interpersonal anxiety situation factor. The second factor was defined by situations that pose a threat to self-esteem through the possibility of task failure. The third factor was somewhat ambiguous but appeared to be principally a factor defined by situations of physical danger. The fourth factor was interpreted to represent situations of anticipation or expectation where personal effort might be involved. The fifth factor was somewhat ambiguous in meaning but had strong loadings by situations where interactions with authority figures were involved.

The STAI trait scale correlated significantly (.001 level) with the total score for anxiety situations but the MAS scores did not (.24 level). Both trait anxiety scales correlated significantly with the second anxiety

situation factor using factor subscales from both the equimax and oblique rotations, as predicted. The STAI trait scale correlated significantly with the third situation factor, the physical danger factor, using both the equimax and oblique rotations, contrary to predictions. In general, the STAI trait scale correlated significantly with every situation factor except the fifth factor whereas the MAS correlated significantly only with the second and fifth factors. Finally, the STAI state scale correlated significantly (.03 level) with the second factor, which was interpreted to represent a threat to goal achievement, when the oblique rotation was used. The Zuckerman Adjective Checklist scores did also (.05 level). When the equimax rotation was used the correlation between the STAI state scale and the second factor just barely failed to reach significance (.06 level) whereas the correlation between the Zuckerman Adjective Checklist scores and the second factor was definitely non-significant (.12 level).

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APPENDIX A

Name:_____

ANXIETY SCALE #1

This scale is designed to find out the specific situations in which college students feel anxious.

You are first asked to read through the definitions of anxiety below. These definitions were supplied by your fellow students and represent their own personal definitions of anxiety.

Next you are asked to go through the 35 situations listed below and circle one number to the right. This number represents how much anxiety you typically or generally feel in the given situation. Number "1" represents no anxiety in the situation; number "2" a little anxiety; number "3" a moderate amount of anxiety; number "4" represents a great deal of anxiety in the situation. Please take your time and give the task some thought.

Finally, you are asked to describe for each situation your anxiety response in that specific situation. This includes your subjective feelings (e.g. tense all over, confusion, helplessness, etc.) and physiological reactions (e.g. sweating, faster heart beat, headache, diarrhea, nausea, etc.). Please pay particular attention to whether your anxiety responses change for different situations.

Once again, please take your time and be as careful and thorough as possible. Thank you very much for your cooperation.

ANXIETY DEFINITIONS: feelings of helplessness, apprehension, frustration, unnaturalness, excitement, uneasiness, fear of something not well defined, fear of repercussions for impending action.

	ANXIETY			
	None	Little	Moderate	Great Deal
1. Taking a test _____	1	2	3	4
2. Meeting strangers _____	1	2	3	4
3. Waiting for something to take place __	1	2	3	4
4. Being criticized by someone _____	1	2	3	4

	ANXIETY			
	None	Little	Moderate	Great Deal
5. Giving a speech _____	1	2	3	4
6. Taking a boat ride _____	1	2	3	4
7. Arguing with parents _____	1	2	3	4
8. Competing in games _____	1	2	3	4
9. Talking with someone you want to impress	1	2	3	4
10. Going for a job interview _____	1	2	3	4
11. Taking part in an experiment _____	1	2	3	4
12. Taking drugs _____	1	2	3	4
13. Thinking about your own future _____	1	2	3	4
14. Driving an automobile _____	1	2	3	4
15. Going out on a date _____	1	2	3	4
16. Failing to finish an assignment _____	1	2	3	4

		ANXIETY			
		None	Little	Moderate	Great Deal
17.	Having to make a decision between doing two things _____	1	2	3	4
18.	Having too little time to do something	1	2	3	4
19.	Not having enough money _____	1	2	3	4
20.	Having a loved one in danger _____	1	2	3	4
21.	Seeing someone who is hurt _____	1	2	3	4
22.	Crossing a bridge _____	1	2	3	4
23.	Seeing someone you do not want to see	1	2	3	4
24.	People coming to you for advice _____	1	2	3	4
25.	Seeing and hearing lightning and thunder _____	1	2	3	4
26.	Being questioned by another _____	1	2	3	4
27.	Talking to someone of another race ___	1	2	3	4
28.	Talking to the police _____	1	2	3	4

		ANXIETY			
		None	Little	Moderate	Great Deal
29.	Thinking about your own death _____	1	2	3	4
30.	Going to a party or social gathering	1	2	3	4
31.	Flying in an airplane _____	1	2	3	4
32.	Being in large crowds _____	1	2	3	4
33.	Having a term paper due _____	1	2	3	4
34.	Another person repetitively tapping their foot _____	1	2	3	4
35.	Being in high places _____	1	2	3	4

APPENDIX B

Name: _____

This is a questionnaire designed to determine what makes individuals anxious. Very little is known about individual differences in anxiety and new knowledge in the area would be of tremendous help to workers in the mental health field. This questionnaire is a new approach to the subject and is based on the premise that individuals know what makes them anxious and can be trusted to report this with accuracy.

You will first be asked to give a definition of anxiety. This should be your own personal definition or what you feel anxiety is for you.

Then you will be asked to list as many specific situations as you can that are anxiety provoking for you. Please be as specific as possible concerning the situation, including the objects and/or actions involved.

Next for each situation you will be asked to describe your anxiety response in that specific situation, in-other-words, your physiological reactions and feelings.

Finally you will be asked to rate this situation and anxiety response for the intensity of the anxiety. The scale is 0-5, with 0 meaning no anxiety and 5 meaning the most anxiety you have ever experienced.

Please take your time and be as careful and thorough as possible. Thank you.

Anxiety definition: _____

_____

1. Situation: _____ Intensity 0 1 2 3 4 5

_____

1. Response: _____

_____

2. Situation: _____ 0 1 2 3 4 5

_____

2. Response: _____

_____

Name: _____

This is a questionnaire designed to determine what makes individuals anxious. Very little is known about individual differences in anxiety and new knowledge in the area would be of tremendous help to workers in the mental health field. This questionnaire is a new approach to the subject and is based on the premise that individuals know what makes them anxious and can be trusted to report this with accuracy.

You will first be asked to give a definition of anxiety. This should be your own personal definition or what you feel anxiety is for you. Note, anxiety is to be distinguished from fear.

Then you will be asked to list as many specific situations as you can that are anxiety provoking for you. Please be as specific as possible here, including objects (e.g. father, academic tests, crowds, strangers, high places, etc.) and/or the actions (e.g. talking about sex, flying in a plane, arguing with someone, being criticized, etc.) involved.

Next for each situation you will be asked to describe your anxiety response in that specific situation. This would include your subjective feelings (e.g. tense all over, confusion, helplessness) and physiological reactions (e.g. sweating, faster heart beat, headache, diarrhea, lightheaded, nausea, etc.).

Finally you will be asked to rate this situation and anxiety response for the intensity of the anxiety. The scale is 0-5, with 0 meaning no anxiety and 5 meaning the most anxiety you have ever experienced.

Please take your time and be as careful and thorough as possible. Thank you.

Anxiety definition: _____

_____

1. Situation: _____ Intensity 0 1 2 3 4 5

_____

1. Response: _____

_____

2. Situation: _____ 0 1 2 3 4 5

_____

2. Response: _____

_____

APPROVAL SHEET

The Dissertation submitted by Anthony Paul Gillette has been read and approved by members of the Department of Psychology.

The final copies have been examined by the director of the Dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the Dissertation is now given final approval with reference to content and form.

The Dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

December 16, 1971
Date

Robert C. Nicolay
Signature of Advisor