THE EFFECTS OF MANIFEST ANXIETY ON TWO INDICES OF MEANINGFULNESS: NOBLE'S m AND SEMANTIC DIFFERENTIAL POLARIZATION

BY

ROBERT R. TRIMBLE

Bachelor of Science
Kansas State Teachers College
Pittsburg, Kansas
1950

Master of Science
Kansas State Teachers College
Pittsburg, Kansas
1957

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Thesis Approved:

Roy Glaketone
Thesis Adviser

Ralph J. Kahn

W. J. Evans

Harry K. Bobbitt

J. R. Boggs
Dean of the Graduate School

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CHAPTER I

THE PROBLEM

Orientation to the Problem

The meaningfulness of verbal symbols has long been recognized as a salient variable in tasks of learning and retention. Most often its parameters have been manipulated as independent variables in some kind of paired associate or concept learning task. In this study, two indices of meaning (meaningfulness) are the dependent variables and the personality characteristic of manifest anxiety is the independent variable. Because of the considerable confusion attending the terms, meaning, and meaningfulness in the psychological literature, these terms will be used somewhat interchangeably, despite the predilection of a particular investigator for one or the other in his own work. For example, Osgood speaks of meaning; Noble of meaningfulness.

From the outset it must be made clear that psychological and not philosophical or semantic connotations of meaning are the frame of reference herein.

Meaningfulness has recently been defined (Koen, 1962a) as "the condition or state of having meaning." Such a definition is circular and leaves the term still undefined. However, no commonly accepted definition of meaning is extant among psychological literature today.

Despite this situation, meaningfulness has been traditionally operationalized in terms of association value (Glaze, 1928; Hull, 1930; Krueger, 1934). However, association value for Glaze was the percentage of Ss who verbalized an association to a nonsense syllable within a specified time period; for Hull and Krueger it meant number of verbal associates elicited by a stimulus word. A related associative index was developed by Mandler (1956). Using Glaze-type nonsense syllables, he developed an f scale of associative frequency (the mean number of associations written in thirty seconds) and a p scale of associative prepotency (the tendency for Ss to emit the same response to a given syllable). Chronologically, the transition seems to have been from a measurement of association value as percentage of Ss who responded to the stimulus to the number of associations given by a subject to the stimulus.

Noble (1952a) has contributed to the latter conception of meaningfulness, and it is Noble's m which is one of the major considerations in this investigation. Noble defined meaningfulness in terms of a conditioned habit-strength type of relationship between a verbal symbol and its associated responses. In this context, he assumed an isomorphism between processes symbolized as S-H-R and S means R. Therefore, within the framework of Hull's theory (Hull, 1943) a stimulus element S_X may be connected through prior training to a class of conditioned responses R_1, R_2, $R_3 \ldots R_n$. This S-multiple R relationship in mediated by a class of habit strength H_1, H_2, $H_3 \ldots H_n$ resulting from the conditioning process. Assuming equality of the Hs, the

stimulus element, S_x, has an equal probability of eliciting any one of the given Hs and its associated R. Therefore, S_x may elicit H_1 and R_1 or H_n and R_n. In other words, this is the typical competing response situation in which each R has an equal probability of occurrence following the presentation of S_x. If the Hs represent differing amounts of habit strength, the situation is the same except that a hierarchy of habits is posited. Noble says:

> Sincy by logical analysis, meaning is a relation between terms, let us define the meaningfulness of this situation as the number of Hs subsisting between S and the several Rs taken together. More specifically, the particular meanings of S_x are: H_1, H_2, $H_3 \ldots H_n$, and different conceptual combinations of these Hs yielded different numbers of meanings (Noble, 1952a, p. 422).

The index of stimulus meaning (m) settled upon by Noble is operationally defined as the frequency of continued written word associations made by Ss within a 60-second time interval (Noble, 1952a; Noble and Parker, 1960). He has made it manifestly clear that he is not concerned with such qualities of the continued associations as their relevance, prepotency, or connotations (Cofer and Musgrave, 1963). Frequency of continued written associations is the hallmark of m.

An S-R approach of a somewhat different character has been advanced by Osgood (Osgood, 1952; Osgood, Suci and Tannenbaum, 1957). He referred to meaning as a conditioned representational mediation process. Such a process makes of the usual S-R paradigm a two stage model. He says:

> The first stage, which we may call decoding, is the associations of signs with representational mediators, i.e., "interpretations." The second stage, which

> we may call encoding, is the association of mediated self-stimulation with overt instrumental sequences, i.e., "expression of ideas." (Osgood et al., 1957, p. 8).

According to such a view, the meanings which different persons ascribe to the same signs is a function of the different experiences of the person with the thing signified. Such experiences provide a residual, cognitive, representational component manfested by the person in making responses of meaningfulness.

In order to measure representational meaning, Osgood devised an instrument called the Semantic Differential (Osgood, 1952). With this instrument, a word or concept is rated on a series of bi-polar adjectival scales, e.g., bad-good, active-passive, etc. The ultimate purpose of the ratings is the location of the word or concept in semantic hyperspace. This space is defined in terms of direction and distance from a common origin, the middle category of a scale. Direction in semantic space has typically been obtained via a factor analysis of the scale ratings, and is a function of the extent to which these scales tend to measure some unitary, abstract quality or factor associated with the concept. Three basic, factorially distinct qualities have typically emerged: evaluation, potency and activity (Osgood et al., 1957). Distance in semantic meaning refers to the deviation from the neutral point on the bi-polar scale toward one or the other scale extremity. Such a scale is diagrammed below:

Bad 1 : 2 : 3 : 4 : 5 : 6 : 7 Good

Segments of the scale are typically quantified as above, or by label-

ing the middle category "0" and the categories to the left as -1, -2, -3 proceeding from the middle category, and the segments to the right, +1, +2, and +3. Thus, a word rated at "1" or "-3" would denote the quality of extreme badness, and the reverse for ratings at the opposite end of the scale. A concept eliciting a check mark on the scale at the "4" position may be termed neutral with respect to badness or goodness, or neither good, nor bad, or "meaningless." Use of the latter term in this context does not mean the same thing as having no meaning. Rather, it refers to intensity of meaning, with words rated at either extreme on a scale possessing the greatest amount. Whatever the rating of a person checking the scales, his responses are presumed representative of the meaning that has been conditioned to that stimulus word.

Based on the above rationale, Jenkins (1960) formalized the parameter of meaning called polarization. Verbally, it is "the extent to which the profile for a given concept deviates from a completely neutral profile" (Jenkins, 1960, p. 274). It has also been considered as an index of intensity or emotionality of meaning (Koen, 1962a, 1962b; Staats and Staats, 1959). It is distinct from semantic differential distance in that it does not depend upon direction from the neutral point, only extent of deviation from the neutral point. Along with Noble's m, it is polarization in which this study is chiefly interested. They are the dependent variables, and have been shown to be correlated but separate indices of meaningfulness (Staats and Staats, 1959).

The independent variable chosen for this investigation is manifest anxiety as measured by the Taylor Manifest Anxiety Scale (Taylor, 1951,

1953). The MAS has been hailed as a measure of drive level in the Hull-Spence tradition (Taylor, 1956; Spence, 1958), and has been implicated as the best single measure of an emotionality factor pervading a number of anxiety and neuroticism inventories (Bendig, 1960). In this study that duality of interpretation will be kept in mind.

As a measure of drive level, Taylor (1951) demonstrated that high-scoring MAS subjects conditioned more rapidly than low-scoring Ss in an eyelid conditioning situation. Other evidence adduced from eyelid, shock-threat, and verbal conditioning studies has been in general agreement (Taylor, 1951; Spence and Beecroft, 1954; Spence and Farber, 1954; Spence, 1958; Taffel, 1955). Therefore, if meanings, or some aspects of meaning, are conditioned, and if the MAS measures conditionability, some relationship between manifest anxiety and meaning may be logically assumed. Furthermore, another connection via the drive concept has been suggested: "It does not seem unreasonable to suspect that performance on D [drive] scales and numbers of associations to nonsense syllables may have some covariance" (Kausler and Trapp, 1959, p. 154). For the purpose of this research, the wording needs to be changed only to the extent of substituting the term "words" for "nonsense syllables."

Similarly, if the MAS is an indicator of emotionality (Spence, 1958; Bendig, 1960), a logical relationship between it and an index of emotionality or intensity of meaning is also indicated.

Little or no research has apparently been aimed directly at discovering the relationship between manifest anxiety and either Noble's

m or polarization.

Statement of the Problem

The problem investigated in this study is the relative effect of varying levels of manifest anxiety on Noble's m and semantic differential polarization, two related but separate aspects of meaningfulness. As previously noted, both Noble (1952a) and Osgood (1952, 1957) hold that verbal meaning is in some way a function of conditioned S-R learning. More recently, Staats and Staats (1958, 1959) have adopted the corroborative position that meanings are acquired via the conditioning process and constitute conditioned responses. However, two different response characteristics of meaningfulness are involved; Noble asserts that number of associations are the elements conditioned; Osgood and the Staats aver that it is semantic meaning--representational mediating response tendencies manifested by semantic ratings --that is conditioned.

If the meanings of words are conditioned, and if the MAS measures conditionability (via drive level), then Noble's m may logically be expected to vary as a function of manifest anxiety. That is, such variance may be expected if number of verbal associates is some function of conditioning, or if drive operates not with respect to conditionability, but as an energizer of response tendencies. It is these tendencies which are manifested as m.

Likewise, if the MAS reflects emotionality, and polarization is an index of intensity of meaning (or emotionality perceived in words,

the question of a relationship between the kinds of emotional meaning learned by a subject and reflected on the semantic differential and MAS score is raised. Hypothetically, if word meanings are conditioned, and if a person's measured emotionality (anxiety) enters into the conditioning process as a contiguous stimulus element in the total stimulus situation, then a high anxious S might rate word meanings with greater intensity of meaning than a low anxious one because of the presence and attachment of greater emotion to the response via the conditioning process.

More specifically, the problem posed may shed light on the following questions:

(1) Will the association value (m) of verbal stimuli be influenced by level of an individuals's manifest anxiety? If so, it could be because of S's greater conditionability or because of his greater drive level.

(2) If such a relationship exists, does it hold across varying levels of words known to possess differential m values? Evidence exists that suggests that drive level (manifest anxiety score) interacts with task difficulty to produce differential effects (Ramond, 1953; Montague, 1953). If the different levels of stimulus words used herein can be considered tasks of different difficulty, then some interaction between anxiety and word group is plausible.

(3) If MAS scores reflect emotionality, will the intensity of meaning (polarization) of given verbal stimulus be affected by it? For example, will high anxious Ss perceive more intensity of meaning

in words than Ss of moderate or low anxiety?

(4) If anxiety affects perceived intensity of meaning, how are words of different known polarization affected?

General Hypothesis

The general hypothesis is that manifest anxiety may bear some relationship to indices of verbal meaningfulness. As a drive variable, it may account for greater response strength in the number of associations made to stimulus words. Considered as an emotional variable, manifest anxiety may logically be expected to influence a person's semantic rating of words in terms of their perceived intensity of meaning. That is, high anxious Ss may see more intensity of meaning in words than low anxious Ss.

Specific Hypotheses

Specifically, this study attempts to investigate the following hypotheses:

(1) In terms of the null hypothesis, it is expected that high, moderate and low anxiety groups will display no differences on Noble's m.

(2) There will be no difference between anxiety groups on stimulus words of different m value.

(3) High, moderate and low anxiety groups will display no differences in their ratings of intensity of meaning (polarization) on the semantic differential.

(4) The different anxiety groups will display no difference on polarization across groups of words of different known levels of polarization.

Since the above are stated in terms of the null hypothesis, significant statistical results will lead to the rejection of that hypothesis, indicating actual statistical differences between groups.

Implications of the Hypotheses

It is a well-established fact that the meaningfulness of stimulus materials influence verbal learning and retention. If manifest anxiety is found to have an effect on indices of meaningfulness such as *m* and polarization, then a more rigorous control of that personality variable in experiments of a verbal nature would be indicated. Also, a more thorough and careful study of how or why it influences meaningfulness and learning would be necessary. What is attempted here is merely an effort to discover any functional relationship that may exist between manifest anxiety and meaningfulness.

If no effects are observed, then it may simply tell us that drive, emotionality, or whatever the MAS measures does not influence the perceived or conditioned meaningfulness of verbal symbols as far as Noble's *m* and polarization as indices of meaningfulness are concerned.

Terms

Throughout this paper, manifest anxiety as measured by the Taylor Manifest Scale will be designated interchangeably as anxiety or mani-

fest anxiety. The Taylor scale itself may be referred to as the MAS.

The terms meaningfulness and meaning are also utilized interchangeably, since there is no commonly accepted psychological reason to make a distinction.

The symbol, m, is used exclusively as a reference to Noble's conception and measurement of meaningfulness.

The terms polarization and intensity of meaning both refer to rated deviations from the neutral category on the semantic differential.

Beyond these major referential terms, notation and form will follow that prescribed by the American Psychological Association throughout this paper. The designation of subject as S and experimenter as E are two of the more prominent of such prescribed conventions.

CHAPTER II

RELATED RESEARCH

There is virtually no research on the relationship of manifest anxiety to the specific dependent variables of this study. Therefore, the focus in this chapter is upon the literature that is most closely related to the issues and variables involved. Initially, the research regarding the origin, uses, and psychometric properties of m and polarization will be considered. Following that, representative literature concerning the relationship between m and polarization, the conditioning of meaning, and finally, the effects of anxiety upon verbal learning and association will be reviewed.

Noble's m

In Chapter I m was defined as a conditioned habit-strength type relationship between S and R where an isomorphism was assumed between S-H-R and S means R. The psychological connotation of that assertion may be more fully explained by reference to Noble's primary work.

> The present analysis does not assert meaning and habit strength to be identical concepts, although they have some common properties. Meanings are postulated to increase in number not as an exponential growth function of the number of particular-S-particular-R reinforcements--as in Hull's theory--but rather as a

> simple linear function of the number of particular-S-multiple-R connections established. Now in terms of excitatory strength (E), where $E = H \times D$, a specific "energized" meaning may best be regarded as an unspecified supraliminal value of effective excitatory strength ($\bar{E}$), where $\bar{E} = E - I$. To strengthen $\bar{E}$ beyond the value of the limen (L) required for reaction evocation (R) may alter R_p, R_a, R_n, or R_t, but the qualitative fact that S sometimes evokes R is unaltered. This is the psychological connotation of the assertion; S means R (Noble, 1952a, p. 423).

Since the number of R's (word associates) was presumed to be proportional to the number of supraliminal $\bar{E}$'s, frequency of response was proposed as the rational index of stimulus meaning (m). The procedure utilized in deriving m was as follows. A list of 96 stimulus words was administered to a sample 119 airmen Ss at Lackland Air Force Base, San Antonio, Texas. The list contained approximately 20 per cent paralogs (dissyllabic words in the form of nouns, e.g., ROMPIN), 35 per cent infrequent two-syllable nouns chosen from the Thorndike-Lorge word list (1944), and 45 per cent frequent items. Infrequent items were those found to appear in canvassed written sources less than one time out of every four million words, e.g., ULNA; frequent items were those appearing more than one time per million words, e.g., KITCHEN. Ss were allowed 60 seconds during which they wrote their associations to the stimulus words. The procedure was virtually the same as employed in this study, except that several testing periods were necessary to cover the 96 - item list. Therefore, the procedure is not repeated here, but is detailed in Chapter III. Noble's results yielded an index of m for each of the stimulus words; it was the grand mean number of acceptable written responses given by all Ss to a given word. This

list of word values has become known as the m scale (Noble, 1952a), or the Montana scale of meaningfulness (Noble and Parker, 1960). The latter work represents a restandardization and cross-validation of the m scale on a college rather than a military sample. It also included the computation of median values as well as mean values. The college sample was, as might be expected, found to be more fluent than the military sample, which resulted in significantly higher m values in the 1960 study. However, the correlation of the 1960 and the 1950 scales was still very high--.97 for mean values and .96 for median values.

In the 1960 work, Noble and Parker commented upon the effect of E's scoring on the accuracy and precision of m.

> The concept of accuracy may be thought of as a property of measures of central tendency reflecting (inversely) the operation of constant or systematic errors (e.g., scoring criteria). Precision, on the other hand, may be regarded as a property of measures of variability reflecting (inversely) the presence of variable or random errors (e.g., behavior oscillation) (Noble and Parker, 1960, p. 329).

In general, they suggested that the accuracy, but not the precision of the scale was affected by "enlightened editing."

Reliability of the m scale. The reliability of Noble's m scale has been the subject of at least four investigations (Noble, 1952a; Rocklyn, Hessert and Braun, 1957; Noble and Parker, 1960; Cieutat, 1962). In the original study, Noble had the following to say about his procedures and results in determining appropriate group to group reliability.

Since the sampling distribution of r is skewed for

> large values, Fisher's Z-transformation was used to estimate the mean intergroup reliability coefficient of the m-scale: $r_{mm} = 0.975$. It may be pointed out that a between groups reliability coefficient is the appropriate statistic to compute in this case since it was E's aim to determine the consistency of different response samples to the same stimuli. A more conventional reliability coefficient--such as one defined by the test-retest, split-half, or the alternate form procedure--would not have evaluated this particular relationship (Noble, 1952a, p. 427).

The above study was carried out on a military sample. In 1960, Noble and Parker undertook a restandardization of the m scale utilizing a college sample. The intergroup correlational method was again employed and a reliability coefficient of .994 was obtained. The correlation of m values for the 1950 and 1960 sample was .97 when considering mean number of associations per S and .96 for median values. This constitutes a significant cross-validation of the m scale and clearly indicates a rather striking stability between two different samples across ten years in time.

Adding to the above reliability characteristics, Rocklyn, Hessert, and Braun (1957) found that selected m items from the 1950 scale produced high correlations (.92 to .96) across groups differing widely in age (20 to 66 years) and educational level (eighth grade to college).

Cieutat (1962), using inexperienced E's and a sample of 54 Ss, found rather different m values for 24 selected items because of more lenient scoring procedures. However, when values were ranked, high stability was indicated ($r = .95$). He concluded,

> The present data, with those reported by Rocklyn, et al., (1957) and by Noble and Parker (1960), demonstrate high stability and generality of m values as an index of the relative association

power of verbal items (Cieutat, 1962, p. 398).

Usefulness of the m scale. Noble's development of the m scale was not an end in itself. It was an instrument intended for the identification, quantification and control of variables operative in verbal learning situations. In an early study (Noble, 1952b) demonstrated that increasing m value of stimulus verbal materials facilitated serial learning. More recently, m has been used to study the learning of paired associates (Noble and McNeely, 1957; Noble, Stockwell and Pryer, 1957). As an example of the use of m in paired associate learning, the Noble-McNeely study is described. It was undertaken in order to confirm the prediction that (a) the rate of acquisition of single verbal habits would be a positive function of m, and (b) that an interaction would occur between meaningfulness and ability to learn. First, 90 college Ss learned a practice list of 10 pairs of three-syllable adjectives arranged in five different random sequences. Each sequence constituted a trial. S learned the practice list to a criterion of 8 out of 10 correct responses. This was considered adequate to control the learning-to-learn factor. The m values of the paired associates represented m values ranging from .29 to 8.54 in 10 approximately equal-interval steps. Eighteen equated lists of 10 paired associates each were randomly distributed so that five Ss learned each list. Each S practiced for 20 trials with his list. On the first trial, S merely read the paired words aloud. On the second trial, anticipations of the correct response words were attempted. Following all trials, the percentage of correct responses associated with words of the various

scaled m values was computed. As expected, rate of acquisition was a positive function of m, and the curves showing the percentage of correct responses described a positive acceleration with decreasing m value. Difficulty as measured by total errors was found to be an inverse monotonic function of m, and variability decreased with increasing meaningfulness. Reactivity to m interacted with ability to learn, confirming the second prediction. By also controlling individual differences and presentation order of the items, the Es were able to evaluate more clearly than in the serial method of verbal learning the nature of the difficulty-meaning relationship for specific S-R connections.

The m scale method has also provided a manner of scaling the meaningfulness of consonant-vowel-consonant (CVC) material (Noble, Stockwell, and Pryer, 1957). As in an unpublished endeavor by Noble at Louisiana State University in 1955, Ss were asked for comparative judgments of number of associations evoked by CVC's on a five-point rating schedule (labeled None, Below Average, Average, Above Average, Very Many). From this five-point rating scale, median values were computed on a psychological scale of normal deviate units. The derived meaningfulness scale has been designated the m scale. When correlated with $\bar{m}$ values established upon the same CVC's, positive and significant correlations have been reported (Noble, 1952a; Noble, Stockwell, and Pryer, 1957; Underwood and Schulz, 1960).

Noble's m and other variables. Association values of CVC's (defined in the Glaze tradition as relative frequency of report of one or

more associations) have been found to be a nonlinear, probability function of m (Noble, 1961) thus establishing a relationship between association value, the traditional psychological parameter of meaningfulness, and m. In addition, m has been shown to be related to familiarity of the stimulus unit (Cofer and Musgrave, 1963; Noble, 1960), to rated emotionality of dissyllables (Noble, 1958), to difficulty of pronunciation of CVC's, and to self-predicted learning speed of verbal stimuli (Underwood and Schulz, 1960).

More important to the present investigation, m has been shown to be correlated with semantic differential polarization (Jenkins and Russell, 1956). This relationship will be discussed later in this chapter.

The m scale has been useful in the present study in that words from Noble's 1960 list were selected in order to give E some control over the association value of the stimulus words. By utilizing words of different known m levels, it was possible to study the effects of anxiety over those levels. Such a procedure was also designed to discover whether anxiety and word level interacted in producing m.

Polarization

Polarization is a relatively new dimension of semantic meaning formalized by Jenkins (1960). As noted in Chapter I, it is defined as the extent to which a semantic differential profile for a given concept deviates from a completely neutral profile, the latter being a profile on which a concept is rated at the neutral category on all bi-polar

scales. The formula for the computation of polarization (designated D_4 by Jenkins) is given in Chapter III. What Jenkins did was take the words and ratings from the atlas of semantic profiles (Jenkins, Russell, and Suci, 1958), a list of 360 concepts rated by 540 Ss on 20 semantic differential scales, and compute polarization values for them. In so doing, he used only the scores from 14 of the scales, the scales loading most heavily on the three principal semantic factors, evaluation, potency, and activity. Eight scales contributed to evaluation, and three each to potency and activity. Polarization purportedly measures the intensity of meaning conveyed by a given concept to a given individual. Koen (1962a, 1962b) has also considered it an index of emotionality in words. Very few studies involving polarization have as yet appeared in the psychological literature.

One recent study in which polarization appeared as the independent variable was undertaken by Kjeldergaard and Higa (1962). They were interested in ascertaining the influence of polarization values of words upon Ss' ability to recognize them following an initial presentation. Twenty high frequency words were chosen from the semantic atlas (Jenkins, 1960). These words were projected on a screen along with 58 others by means of a slide projector at the rate of one every five seconds. After the presentation, Ss were given a mimeographed list of 175 words and told to check those words that had been projected onto the screen. Polarization values for the 20 words of primary interest were known. The product-moment correlation between degree of polarization and the per cent of Ss correctly recognizing the previously

exposed pertinent words was .59 ($p. < .01$). The investigators interpreted their finding as indicative that degree of polarization is a significant factor in short term recognition value of words. Coupled with the finding of Dicken (1958) that polarization was highly related to the amount of generalization from one list to a related list in a transfer study, the above authors aver that polarization may well be another dimension to be considered seriously in verbal learning studies.

Reliability and metric properties of the semantic differential. Pertinent to polarization are the reliability and metric properties of the semantic differential from which polarization is derived. Osgood et al, (1957) argue that the proper criterion of reliability for semantic differential data is not the conventional test-retest type of correlation, but score reproducibility. In their words,

> perfect reliability exists only when the scores on a second testing are identical with those obtained on the first testing, and deviation from this criterion represents some degree of unreliability. (p.127).

The problem evolved into one of discovering a procedure which communicates degree of reproducibility, or conversely, the amount of discrepancy between test and retest. Their review of a series of studies on (1) joint distribution of test and retest scores, (2) error of measurement (probability of obtaining deviations from test to retest), and (3) probability limits for obtaining deviations of certain size, is an impressive array of information (too extensive for inclusion here) indicating high degree of reliability. In a reliability experiment involving 112 Ss, they report that for all types

of scale items a difference of more than two scale units may be considered significant at approximately the five per cent level. That is, deviations this large occur only about five per cent of the time when randomly selected subjects repeat their judgments of randomly selected items.

Additionally, their summarization of the studies dealing with relevant scaling assumptions leads to the following statement:

> Considering...an [obtained] approximate equality of intervals between scales and a similar placement of origins across scales, it seems reasonable to conclude that the scaling properites assumed with the semantic differential have some basis other than mere assumption (Osgood et al., 1957, p. 152).

The Relationship of m and Polarization. Some investigators have studied the relationship of polarization to Noble's m. As early as 1956 Jenkins and Russell had found that intensity of meaning as measured by the semantic differential was correlated with m. Although Osgood et al., (1957) have insisted that meaning and m involve different processes, those investigators established a relationship between intensity of meaning and m.

> It was hypothesized here that meaningful words would elicit many extreme ratings on the semantic differential and meaningless words would tend to elicit few such ratings. Accordingly, the semantic differential profiles for Noble's concepts were analyzed in terms of their deviations from the neutral scale positions..
>
> The hypothesis was in general well substantiated. The correlation between the size of D [deviations from the neutral point] and Noble's m was +.71. This represents the first connecting link between what seemed at the outset to be two entirely different ways of talking about psychological meaning (Jenkins and Russell, 1956, p. 7).

Taking note that the relationship between word association (m) and intensity of meaning (polarization) had been indicated, Staats and Staats (1959) set out to explain it. They reasoned that:

> A stimulus word gets its meaning, in part, because each time it is paired with another word the meaning of the response word is conditioned to the stimulus word. This also strengthens the associations between stimulus word and response words (Staats and Staats, 1959, p. 138).

Therefore, a positive correlation between the meaning of stimulus words and the meaning of the words associated with them would also be expected. To verify this hypothesis, they selected ten words for which both word association and semantic differential data were available (Jenkins, Russell, and Suci, 1957). These words were included in a folder with 40 words of unsystematic meaning, randomly arranged, and given to 46 Ss to rate on the good-bad scale of the semantic differential. Three weeks later the same Ss rated the meaning of the first twenty word associates of each of the experimental words. A rank order correlation coefficient was computed between the mean meaning scores obtained in their study and those of Jenkins, Russell, and Suci. The correlation was .99. The relationship between the meaning of the stimulus word and the meaning of their word associates was assessed via the rank order correlation of their respective meaning scores on the evaluative factor. The coefficient was .90, significant at beyond the .01 level.

Their results support the contention that the meaning of the associates of a stimulus word is related to the meaning of the word itself. They also point up a link between m and intensity of meaning.

> The more often the stimulus word is paired with its associates, the stronger will the direct associations become. At the same time, the meaning of the associates will be more strongly conditioned to the stimulus word, i.e., the stimulus word will acquire more intense meaning (Staats and Staats, 1959, p. 150).

By the same process, manifest anxiety, if it does affect one aspect of meaning, may logically be expected to affect other related aspects, hence the assumption of this research that it may affect the related indices of meaning, m and polarization. The above quotation is explicit in implicating frequency of S-R instances as the mediator of the relationship between m and semantic meaning.

Another study relating m and polarization was carried out by Koen (1962a). The purpose of his research was to discover the effects of frequency of usage and emotionality of words on those two indices of meaning. Forty college undergraduate Ss were given 30 neutral and 30 emotional words for evaluation in terms of m and polarization. The significance of the contribution of the independent variables was assessed via comparisons of simple and multiple correlations. The hypotheses tested and the results are described in the following quotation:

> Two hypotheses were strongly supported by the results. Frequency of usage and m were found to be significantly related for all words. As predicted, a significant connection was obtained between m and polarization for neutral but not for emotional words. The prediction that frequency of usage is an important correlate of polarization for neutral but not for emotional words failed to be supported unequivocally by the results. It is concluded that frequency of usage is related to polarization indirectly through its correlation with association values. The factor of emotionality produced no important differences in m ratings, while

> polarization proved very sensitive to the presence of that factor in the stimuli (Koen, 1962b, p. 178).

An additional suggestion of his results was that the affective quality of words used in psychological experiments may be an important enough variable to be considered for specific controls. This suggestion was based upon the finding that emotional words may be less understandable than neutral words. Supportive of this, Koen (1962b), had found (in an undocumented reference to an unpublished study) that verbal material phrased in neutral descriptive terms tended to be better recalled than the same information expressed in emotionally loaded terms. "Emotionality well may be a dimension tending to introduce noise into a communication channel and thus to result in decreased efficiency of transmission" (Koen, 1962b, p. 186-187).

When the effect of manifest anxiety upon polarization is considered, one merely shifts from the study of the emotionality inherent in a word to that inherent within the personality which may affect or interact with the emotionality in words. If such is the case, it would seem to be logical to assert that two possible sources of emotionality may influence the cognitive processes. The attention of the present study is upon the extent to which anxiety (emotionality) of S affects the intensity of meaning or polarization. Certainly it is not a new thought that anxiety affects cognitive performance. But if an anxious S does happen to ascribe greater emotionality to verbal stimuli, and if emotionality of the stimuli are detrimental to learning, word recognition or other cognitive behaviors, there is more reason to give experimental credence and support to the

often-heard complaint that a person's anxiety level affects his cognitive or academic performance.

Conditioned Meaning

It has been stated repeatedly that meaning is a function of S-R conditioning or learning. While nothing directly was done to condition meaning in this investigation, it was assumed that such a process had occurred and was reflected in the responses of the Ss in the study. The feasibility of such an assumption calls for some kind of experimental support.

Staats and Staats (1957) performed one of the classic series of experiments establishing the conditionability of meaning. Working within the framework of Osgood's meaning rationale, they inferred that if meaning may be considered a response, the same expectation should be applied to meaning as other responses, viz., it could be conditioned to any contiguously presented stimuli. Therefore, they presented S with a nonsense syllable paired with a word having a specified meaning component on each of a series of conditioning trials. On each trial the nonsense syllable was paired with a different word, but one which loaded highly on one of the semantic differential factors. Three experiments were run: one where the words loaded on evaluative meaning, one with words loading on activity, and the final one with words of high potency. The procedure was to visually present a nonsense syllable to each group of Ss 18 times, each time paired with the auditory presentation of a different word possessing a common meaning component.

For example, the nonsense syllable YOF was paired with words of positive evaluative meaning. Six syllables were used. Two groups were employed, so that a comparable group received YOF (and the additional syllables paired with words of negative evaluative meaning. Following the conditioning phase, S was given a small booklet containing each nonsense syllable arrayed one to a page. Accompanying each syllable was the pleasant-unpleasant semantic differential scale. Ss were told how to mark the scale, and asked certain questions indicating their awareness of the purpose of the experiment. Data for Ss who displayed awareness were eliminated from the analysis. The remaining data from the three experiments were analyzed as a 2 X 2 latin square design. For experiment I an F-test indicating the conditioning of evaluative meaning was significant at the .001 level. F-tests for experiments II and III were significant at the .05 and .06 levels respectively. The experiments provided significant evidence that meaning responses had been conditioned to the nonsense syllables. Additional research has confirmed the conditioning of semantic meaning to nonsense syllables (Staats, Staats, Heard and Nims, 1959), to national and proper names (Staats and Staats, 1958a) and meaningful words (Staats, Staats and Biggs, 1958).

In the present study, it was assumed that the character of not only semantic meaning, but also of associative meaning (m) has been conditioned in a similar manner, but under non-experimental, accretive, everyday conditions of learning. Such an assumption is consonant with Noble's rationale for m. Beyond this, it was assumed that possession

by S of some degree of manifest anxiety as a chronic characteristic (Spence, 1958) might affect manner of acquiring and expressing meanings. In other words, the study assumes the conditionability of more than one aspect of meaningfulness and hypothesizes a differential effect resulting from different levels of drive or emotionality manifested via measured anxiety.

Anxiety and Verbal Learning

One of the initial investigations of the effects of anxiety on verbal learning was carried out by Ramond (1953). The setting for his research was as follows. Taylor (1951) had demonstrated that high manifest anxiety Ss conditioned more readily than low manifest anxiety Ss in an eyelid conditioning situation. That result was corroborated in a subsequent study (Spence and Taylor, 1951). However, in a study of the effects of anxiety upon serial learning, those authors added another variable to the thickening plot surrounding manifest anxiety (Taylor and Spence, 1952); they found that in a simple learning situation where only a single S-R tendency existed, higher drive (anxiety) would lead to a higher level of response, but in more complex learning situations, where a hierarchy of competing response tendencies seemed to be involved, the effect of higher drive level depended upon the strength of the correct response tendency compared with the strength of competing response tendencies. Therefore, high drive often led to poorer performance by energizing the competing responses to greater excitatory strengths than correct response tendencies. Ramond's

study investigated the relationship between drive level (MAS scores) and performance in a simple trial-and-error learning situation where control of number and strength of competing responses was attempted. Two groups of Ss were selected on the basis of high and low scores, respectively, on the Taylor MAS. The relative strength of the correct response in the response hierarchy was controlled by (1) forcing S to choose one of only two available responses on each stimulus presentation and (2) by making one of the two available responses stronger than the other. The procedure was to present simultaneously three two-syllable adjectives, one on the left and two on the right, in the aperture of a Hull-type memory drum. On eight out of sixteen presentations in one trial the stronger response alternative (word associate more closely related to the stimulus word) was reinforced, and on the other eight, which were randomly interspersed with the first eight, the weaker response (word associate of less association value) was reinforced. S had to learn to associate the "correct" response word (on the right) with the stimulus word (on the left). Thirty-two trials were given. Results indicated that (a) low anxious Ss responded correctly significantly more often than did anxious Ss on those occasions when the weaker response was correct, and (b) low and high anxious Ss did not differ significantly on those presentations when the stronger response was correct. Ramond concluded that "the effects of differences in drive depended...upon whether the correct response was the stronger or weaker in the hierarchy" (Ramond, 1953, p. 124).

In a related study, Montague (1953) compared the ability of

high and low anxious groups to learn nonsense syllables different in association value and intralist similarity. He found a significant interaction with low anxious Ss superior to high on the most complex or difficult task and the reverse on the least complex task.

Sarason (1960), in a review of findings where anxiety scales were used, noted that despite such positive findings as those noted above, not all studies have indicated non-contradictory or consistent results.

One study of a contradictory nature with possible, although indirect, relevance to the present study was carried out by Saltz and Hoehn (1957). Noting that in the studies cited above (Taylor and Spence, 1952; Ramond, 1953; Montague, 1953), an increase in response competition is accompanied and confounded by an increase in difficulty level of task, they attempted to control those variables. In one experiment, competing and non-competing verbal materials (nonsense syllables) which had been equated for difficulty of learning for non-anxious Ss were selected. Ss had to learn two nine-item lists--one containing items of high association value (many competing responses) and the other of low association value--to a criterion of one perfect recitation. Groups of 45 Ss were involved. The prediction was that the anxious Ss should do more poorly on the competing material than on the noncompeting, since their increased drive should increase the strength of erroneous, competing responses. Results did not sustain the prediction ($t = .907$) and the null hypothesis could not be rejected.

In the second experiment, a comparison of the performance of Ss of different anxiety on easy but competing material with that on difficult but non-competing material was undertaken. The prediction was that anxious Ss should learn faster than nonanxious S when competition was lessened and difficulty was increased. The results were again contrary to the prediction and significant at the .05 level, although both anxiety groups encountered trouble in learning the difficult list of zero association value nonsense syllables. They concluded that their findings gave no conclusive idea as to how difficulty affects the performance of high anxious Ss.

Although Ss were given nothing to learn in the present experiment, one of the variables may be concerned with the possibility of an interaction between anxiety and m at the various m levels of the stimulus words employed. Montague (1953) found a significant interaction between manifest anxiety and task difficulty with low manifest anxiety Ss superior to high on the most complex or difficult task, and the reverse on the least complex. If the writer's high m words are considered an easy task and the low m words a difficult one, the expectations would be that low anxiety Ss in this study should do better than high anxiety Ss on the low m (difficult) words, and that high anxiety Ss would be superior on the high m (easy) words.

The implications of the Saltz and Hoehn (1957) experiments for this study are different. Their results imply that no difference in response tendencies of high and low anxiety Ss when learning high association value material (analogous to high m words) as compared to low

association material (low m words) would be expected. This follows from their failure to confirm prediction that anxious Ss would do more poorly on the high rather than the low association words. Such results were interpreted by them to be contradictory to drive theory. However, Taylor (1958) asserts that certain features of their study make it difficult to interpret clearly, and offers further evidence that a difference between high and low anxious Ss would be expected, despite difficulty of the task, in favor of the high anxious Ss. The question in this study is not only whether differences in manifest anxiety will affect m, but also whether it will have differential effects at varying levels of m. A finding of no difference in MAS at total or separate levels of m would tend to parallel the findings of Saltz and Hoehn and go against drive theory, all considerations being equal. (It must be kept in mind that no strict comparability between the studies cited above and this one are possible since all of them vary in terms of design, stimulus materials, etc.)

Manifest anxiety and word association. One of the experimental tasks in the present study (Noble's m) calls for S to give written word associations to stimulus words during one minute intervals. This task is not greatly unlike one imposed upon S in a study by Davids and Eriksen (1955). They tested a hypothesis similar to one proposed in Chapter I. Their hypothesis was that high manifest anxiety as an indicator of high drive level should produce larger numbers of associations given in response to stimulus words in a chained word association test as a result of more suprathreshold responses. Pursuant

to testing that hypothesis, forty male undergraduate Ss were instructed to write down as many associations as possible during a 20-second time interval to each of 100 stimulus words. Following this session they took the Taylor MAS. For the comparison of difference between means for the high and low manifest anxiety groups, the investigators reported a t of 3.21, which is significant beyond the .001 level for a one-tailed test. They also reported a Pearson product-moment correlation of .45 between manifest anxiety scores and number of associations. Independence of such results from dependence upon intellectual ability (college entrance examination score and grade point average) suggests that scores on the anxiety scale were independent of intelligence.

Implications for the present study are that a similar result might be expected on the m variable although chained associations are not involved and a longer interval of 60 seconds is.

The study reviewed above (Davids and Eriksen, 1955) was concerned with quantity of association as related to manifest anxiety. Another investigation of a relationship between manifest anxiety and association tendencies dealt not with quantity of association, but quality of association. Trapp and Kausler (1955) presumed that high MAS scorers would produce a higher proportion of negatively toned associations to nonsense syllables than low scorers. This was based upon clinical evidence that high anxious Ss often give associations that are negatively toned. They administered 320 nonsense syllables to 43 male and female Ss representing extreme scorers on the MAS. They found that the response patterns of the 21 high MAS scorers gave a sig-

nificantly greater proportion of negatively toned associations as adjudged by two staff psychologists ($t = 5.75$, $p. < .001$). They postulated no confounding of results due to the possible effect of the sex variable, and concluded that "MAS scores do reflect differential associative tendencies" (Trapp and Kausler, 1959, p. 388). Although their study is somewhat tangential to this research, an indirect implication of the above findings for this study is that semantic differential ratings on the evaluative factor may be lower (toward the low end of the evaluative scales) for high anxiety Ss than for low anxiety Ss.

Summary

In this chapter the investigator has attempted to describe the origin and rationale of Noble's m, it's psychometric characteristics, the usefulness of the m scale and its relationship to other variables. A similar procedure was pursued with respect to polarization. Subsequent to that, a relationship between m and polarization as found in the psychological literature was established. The observation that both are conditioned meaning responses, and that meaning may in fact be conditioned suggested that both may be similarly affected by manifest anxiety. Since conditioned meaning is a form of verbal learning and some research is extant concerning anxiety and verbal learning, some representative studies of this area were reviewed. The evidence is contradictory as to whether anxiety and difficulty of task interact in influencing verbal learning. However, the

evidence relating MAS to quantity and quality of word association is more directly suggestive, although this study is more concerned with the former than with the latter.

CHAPTER III

DESIGN AND METHODOLOGY

This chapter will deal with the design of the study, the selection of subjects, descriptions of the instruments appropriate for the investigation, and the procedure followed in administering and scoring the protocols.

Design of the Study

Experimental design. In order to study the effects of manifest anxiety on m and polarization, three samples of 20 Ss each were selected on the basis of high, moderate or low MAS score. Because there was certain evidence that MAS and sex interact to produce differential behavioral effects (Kerrick, 1954; Goldstein, 1961; Burke, 1963), the sex variable was controlled through sample selection.

Since a measure of verbal ability was available, and on the assumption that verbal ability might affect the meaningfulness parameters considered herein,[1] it was treated as the covariate in the analysis of covariance. Thus E attempted to acquire more rigorous experimental control of two possibly significant sources of variation

in the dependent variables.

It was assumed that the effects of manifest anxiety on the dependent variables might not be uniform across levels of m and polarization; therefore three groups of stimulus words were chosen for the purpose of discovering the effects of anxiety at different levels of association value and intensity of meaning. Such a procedure enabled the study of the effects of manifest anxiety over different levels of the m and polarization continua, and also made possible the investigation of any interaction effects that might occur.

Statistical design. The statistical design called for two separate statistical procedures in the analysis of the data. The first of these was the use of the analysis of covariance (Steel and Torrie, 1960) to test the effects of manifest anxiety of m and polarization with verbal ability statistically controlled; the second was the use of the analysis of variance to test for interaction effects. Since anxiety, m and polarization levels were predetermined and Ss were not selected at random, the fixed model for the analysis of variance was deemed appropriate.

Hypotheses regarding the possibility of interaction of anxiety and word levels were tested by the analysis of variance of treatments arranged in a 3 X 3 factorial design. The three levels of anxiety constituted one treatment, and the three levels of words made up the other treatment. Due to stimulus word selection, significance of the main effect of treatment B (word level) was anticipated. The investigator's primary interest in this analysis was in the main effect of A (anxiety)

and any interaction effect that might occur between A and B.

Selection of Subjects

Ss selected for the study were female students enrolled in Psychology 213 (Introductory Psychology) at Oklahoma State University during the Fall Semester of 1964-65. They were chosen from a group of over 1000 students who had taken the MAS, the verbal section of the Cognitive Reference Kit (Educational Testing Service, 1963) and other tests at the beginning of the semester. High and low MAS Ss were selected from the upper and lower 10 per cent of the entire distribution of manifest anxiety scores. Ss for the moderate anxiety group were selected from students who scored between 18 and 20 on the MAS.

Only female Ss were chosen for the study because of the indication in certain studies that males and females demonstrate different patterns of response where the MAS was used as an independent variable (Goldstein, 1961; Burke, 1963). This procedure was intended to give a greater degree of experimental control over the manifest anxiety variable.

After the names and scores of students in the high, moderate and low anxiety categories were obtained, E contacted potential Ss at the beginning of their psychology classes to request their participation in the study. S was not compelled to participate if she did not care to do so. No one declined to make an appointment for an experimental session. However, three Ss were either late or failed to appear at the contracted time, and they were replaced by other S having comparable

anxiety scores. Descriptive statistics for the sample groups appear in Table I.

TABLE I

DESCRIPTIVE STATISTICS FOR SAMPLE GROUPS

Anxiety Group	MAS Score Range	Mean
High	30-41	34.40
Moderate	18-20	18.95
Low	5-10	7.90

The experiment was conducted in Room 207 of Gunderson Hall on the OSU campus. Experimental groups ranged in size from two to thirteen, and experimental sessions were conducted during the weeks of December 7 to 11, 1964 and January 11 to 15, 1965. Approximately 40 to 45 minutes were necessary for completion of the experimental tasks.

The Instruments

Noble's m. Fifteen words from Noble's list of 96 dissyllabic words (Noble and Parker, 1960) were chosen so that five were homogeneous with respect to high association value (m), five were of moderate m and five of low m. The words and their m values based on Noble's and Parker's norms, appear in Table II. The five high m words and the five low m words were the highest and lowest actual words on the m scale.

The moderate words were those having values approximating the mean of the 96 words. The fifteen words thus included in the instrument constituted a sampling of the stimulus words at the three most disparate points on the m scale.

Each of the fifteen words was mimeographed one to a page. Below the stimulus word appeared two columns of twelve spaces each making a total of twenty-four spaces per page. Alongside each space the stimulus word was presented. The purpose for this was to limit the pos-

TABLE II

STIMULUS WORDS USED IN OBTAINING m
AND THEIR EMPIRICAL m VALUES

Word	$\bar{m}$
High association words	
Kitchen	11.72
Army	11.27
Money	10.87
Garment	9.96
Office	9.77
Moderate association words	
Quota	6.04
Tartan	5.88
Pallor	5.68
Entrant	5.66
Bodice	5.65
Low association words	
Icon	3.95
Matrix	3.93
Gamin	3.90
Ulna	3.48
Ferrule	3.41

sibilities of failure of set and the likelihood of S's tendency to free associate. The fifteen pages, along with a page containing the practice words ham and democrat were stapled together to form a booklet. Care was taken to see that the words were shuffled so as to avoid any order of presentation effect.

Polarization. For securing data with the semantic differential, Osgood et al., (1957) have recommended that E select scales which represent the principal orthogonal factors in semantic space. The three most commonly identified orthogonal factors in semantic space are evaluation, potency and activity. If only one bipolar adjectival scale for each factor were chosen, alignment or reliability of that measure might be suspect; therefore, three scales are usually selected to represent each factor, although E may select more. Whatever scales are selected, they should load as highly as possible on the factor represented and as low as possible on other factors. The scales, the factors they represent, and their factor loadings as obtained by Jenkins (1960) appear in Table III.

In order to avert possible consequence of sequence effects in the presentation of the scales with the various words to be rated, five random arrangements of the scales were made and one word at each of the three stimulus word levels (high, moderate, and low polarization) was randomly assigned to each order.

Concepts to be rated on the semantic differential for polarization were selected from the tables prepared by Jenkins (1960) so as to assure homogeneity of polarity at each of the three levels. The

TABLE III

SEMANTIC DIFFERENTIAL SCALES, FACTORS AND FACTOR LOADINGS

Factor	Scale	Factor Loading		
		I	II	III
Evaluative (I)	Good-bad	1.00	.00	.00
	Beautiful-ugly	.52	-.29	-.02
	True-false	.50	-.03	-.01
Potency (II)	Hard-soft	-.24	.97	.00
	Masculine-feminine	-.14	.47	.03
	Strong-weak	.30	.40	.10
Activity (III)	Active-passive	.17	.12	.98
	Fast-slow	.01	.26	.35
	Excitable-calm	-.15	.03	.26

words selected and their polarization ratings as obtained by Jenkins appear in Table IV. The high and low valued words represent the extreme values of polarization for the 360 words listed. Mean polarization for the total list is 5.42. Words of moderate polarity selected for the study have a combined mean of 5.43 and were purposely chosen because of their location at the middle part of the polarization continuum. Therefore, the stimulus words represent the polarization continuum at three disparate levels.

After the words and scales were selected and each word was assigned one of the five random scale orders, the word and accompanying scales were typed on mimeograph dittos. The concept to be rated ap-

TABLE IV

STIMULUS WORDS USED IN OBTAINING POLARIZATION AND THEIR EMPIRICAL POLARIZATION VALUES

Word	Polarization
High Value	
God	8.35
Doctor	8.15
War	7.85
Happy	7.85
Success	7.67
Moderate Value	
Health	5.59
Blue	5.58
Hand	5.53
Trouble	5.31
Art	5.14
Low Value	
Full	3.51
Winter	3.49
Low	3.18
Dream	2.96
Dark	2.91

peared at the top of the page, and the nine semantic scales were below it. On each ditto the individual semantic scales were again randomized so that the adjectives defining any particular scale would appear sometimes on the right and sometimes on the left hand side of the form. Copies were then mimeographed and assembled into booklets comprised of the fifteen stimulus words and one initial trial word, music. As the sheets were assembled into booklets, they were shuffled in order to further minimize order or sequence effects.

Procedure

Administration of the instruments. After Ss arrived at the room where the experiment was conducted, they were seated at one of the tables distributed around the periphery of the room. Care was taken to see that crowding was avoided. Ss were seated so that they faced E and so that at least one chair-space intervened between each S. Word association (Noble's m) booklets were distributed face down along with an instruction sheet. Ss were asked to read the instructions with E. After reading the instructions aloud, E instructed the Ss to associate to the first practice word. The standard interval of 60 seconds was allotted, followed by a rest interval of 15 seconds. An ordinary stop watch was used by E in the timing process. After associating to the first practice word, S was allowed to repeat the procedure utilizing a second practice word. Subsequent to the practice session, Ss were instructed to begin associating to the test words in the booklet. At the end of each 60-second test interval, "Stop" was sounded. At the end of the 15-second rest period, the signal to begin associating to the next word was given. (E merely said, "next word.") This procedure was repeated until the last stimulus word was completed. The booklets were then collected preparatory to the carrying out of the second experimental task.

A copy of the instructions and practice sheet are included in Appendix A.

After the word association booklets were collected, the booklets containing words and semantic differential scales for elicitation

of polarization data were distributed. S received the instrument face down and was again asked to write his name on the back of the booklet and await further instructions. Along with the booklet S was given a page of instructions. E read these instructions with S after a brief explanation of the nature of the task. Following this, they were helped in rating the concept charity on four sample semantic scales. Next, they were told to rate the word music for practice. After that, important parts of the instructions were re-emphasized, and the Ss were told to begin rating the fifteen experimental words. As each finished, she was dismissed. No time limit was assigned for completion of this task, although Ss had been instructed to perform it in an orderly, seriatum manner without puzzling over individual words or going back over their responses.

A copy of the instructions and practice sheet appear in Appendix B.

Scoring. The word association protocols obtained in connection with the determination of m were scored in the manner specified by Noble (1952a). The three criteria for unacceptable responses were:

1. Illegible responses
2. Perseverative responses (repetitions)
3. Failures of set: (a) free or tangential associations, e.g., Lemur---Dorothy, Hope, Faith Charity and (b) clang or alliterative associations, e.g., Kaysen--- caisson, casein, Casey, casement.

As recommended by Noble, the general rule of giving S the benefit

of the doubt in questionable cases of response was also invoked.

Total m score for a given word was the total number of acceptable responses made by S to that word. The scores for the five words at a given m level were then summed for analysis at the various levels.

The semantic differential protocols yielded two kinds of data in the scoring procedure--polarization and semantic distance. The former was of major import for this study, but the latter data were also analyzed. The basic measurement on the semantic differential is the digit value of a check mark (x) placed in one segment of the seven segment bipolar scale. Typically, and in this study, the categories are numbered from one to seven with the end of the scale defined by the least or most negative member of the bipolar pair of adjectives designated one, and the opposite extreme of the scale, defined by the most or most positive member, designated seven (e.g., bad was quantified as one, good as seven, false as one, true as seven, etc.). Such a scaling procedure enables the computation of polarization according to the following formula:

$$\text{Polarization} = \sqrt{\sum_{i}^{n}(x - 4)^2}$$

Verbally, polarization is the square root of the squared deviations from the neutral point of a given scale summed over all scales on which the word is rated. As previously stated, this parameter was formalized by Jenkins (1960) who designated it as a measure of intensity of meaning.

Total polarization was computed by summing across the nine semantic scales on which each concept was rated. Factor polarization

was computed by summing across the three scales which contributed to each orthogonal factor.

Semantic distance (d) was obtained by merely summing the absolute values (one to seven) of the scales for a given word. Total distance and distance for each individual semantic factor were obtained as in the procedure for polarization. Semantic distance profiles for the stimulus words appear in Appendix C.

All raw data were taken to the OSU Computing Center where the information was punched on IBM cards prepatory to processing by the IBM 1410 computer used in making the statistical analyses.

Footnotes

[1]The suggestion to co-vary verbal ability for polarization was empirically based on the results of Kerrick (1954) indicating significant differences in scale checking behavior on the semantic differential. Ss low in verbal ability showed greater polarization or tendency to check the extreme one or seven categories. The reason for co-varying verbal ability with regard to m was on the basis of the assumption that Ss of higher ability might be expected to know more associates since a large vocabulary is normally associated with measures of high verbal ability. Also, Noble (1952a) and Mandler and Huttenlocher (1956) have provided evidence supporting Noble's assertion that individual differences in verbal ability interact with m suggesting a correlation between associative fluency and verbal ability.

CHAPTER IV

RESULTS

The analyses of variance and covariance were the main statistical tools used in testing the effects of manifest anxiety on Noble's m and polarization. Hypothesis one stated that "it is expected that high, moderate and low anxiety groups will display no differences on Noble's m.

Table V indicates that the obtained F value in the analysis of covariance was less than 1.00 (d.f. = 1 and 56). Therefore, the null hypothesis cannot be rejected and it must be concluded that manifest anxiety, with verbal ability controlled, had no effect upon m. So little variance in m was attributable to verbal ability, as measured by the Cognitive Reference Kit, that the conventional analysis of variance would have been just as effective in revealing differences between anxiety groups as the analysis of covariance.

Hypothesis three similarly stated that "high, moderate, and low anxiety groups will display no differences in their ratings of intensity of meaning (polarization) on the semantic differential." Reference to Table VI reveals the results of the analysis of covariance used in the test of that hypothesis. Again, no basis for

TABLE V

ANALYSIS OF VARIANCE AND COVARIANCE
FOR EFFECTS OF ANXIETY ON m

Source of Variation	d.f.	SS:XX	SCP:XY	SS:YY	$(XY)^2/XX$	MS:YY	F
Total	59	5034.18	2368.32	71118.18	1114.17		
Anxiety	2	122.23	51.17	92.63	21.08	46.31	< 1.00
Error	57	4911.95	2317.15	71025.55	1093.08	1246.06	
Anxiety (Adj.)	2			71.55		35.77	< 1.00
Error (Adj.)	56			69932.46		1248.79	

TABLE VI

ANALYSIS OF VARIANCE AND COVARIANCE FOR
EFFECTS OF ANXIETY ON POLARIZATION

Source of Variation	d.f.	SS:XX	SCP:XY	SS:YY	$(XY)^2/XX$	MS:YY	F
Total	59	5034.18	-2204.64	16410.57	965.49		
Anxiety	2	122.23		439.28		219.66	< 1.00
Error	57	4911.95	-2013.94	15971.29	825.73	280.20	
Anxiety (Adj.)	2			289.52		144.76	< 1.00
Error (Adj.)	56			15145.56		270.46	

rejecting the null hypothesis of no differences between anxiety groups on the polarization variable was forth-coming ($F = < 1.00$, d.f. = 1 and 56). Therefore, even though the suggestion of a possible effect of verbal ability on scale-checking of the semantic differential had been noted (cf. footnote to Chapter III), insignificant variance in polarization in this study was attributed to it. Manifest anxiety showed no significant effect upon polarization.

Hypotheses two and four predicted that there would be no differences between anxiety groups across groups of stimulus words at three different levels of m and polarization. Analyses of covariance were carried out for both dependent variables at the three levels. Six separate analyses were necessitated. Consistent with the findings of no difference for anxiety groups on m and polarization over all words, no anxiety groups demonstrated a statistically significant difference on m or polarization at any specific stimulus word level. All F values were well below those required for significance at the .05 level, with most of them being less than 1.00.

The above analyses of covariance offered no test of the possibility of interaction between anxiety and word levels (task difficulty) as suggested by certain researchers (Ramond, 1953; Montague, 1953; Saltz and Hoehn, 1957; Spence, 1958). In order to provide a test of interaction, the data were analyzed in terms of 3 X 3 factorial arrangement of treatments: three levels of anxiety by three levels of words. The separate analyses for m and polarization appear in Tables VII and VIII. These analyses confirmed the findings of the analyses of covariance in

TABLE VII

ANALYSIS OF VARIANCE ON THE EFFECTS OF ANXIETY ON m

Source	d.f.	SS	MS	F
Total	179	73965.39		
A (Anxiety)	2	30.88	15.44	< 1.00
B (Word levels)	2	41818.31	20909.16	112.67**
AB (Interaction)	4	390.36	97.59	< 1.00
Error	171	31725.84	185.53	

TABLE VIII

ANALYSIS OF VARIANCE FOR THE EFFECTS OF ANXIETY ON POLARIZATION

Source	d.f.	SS	MS	F
Total	179	10400.82		
A (Anxiety)	2	146.43	73.21	1.82
B (Word levels)	2	3204.03	1602.01	39.73**
AB (Interaction)	4	156.60	39.15	< 1.00
Error	171	6893.77	40.31	

showing that no significant differences existed between anxiety groups

on m and polarization. The tests of interaction were negative, revealing no basis for rejecting the hypothesis of no difference in the effects of anxiety at the various word levels ($F = < 1.00$, d.f. = 4 and 171). Therefore, not only does anxiety not affect m or polarization, but there is no indication of an interaction effect between it and word level. The word level factor is highly significant, but this was predetermined in the experimental design by the selection of stimulus words from disparate levels of the m and polarization continua.

Further analyses of the effects of anxiety on polarization by semantic factors was contraindicated by the foregoing evidence. Inspection of the breakdown of mean polarization for individual words, semantic factors and anxiety groups (Appendix D) indicates no appreciable differences in the polarization responses of the various anxiety groups on the three semantic factors. The largest mean difference was between high and low anxiety Ss on the evaluative factor for the low word group (mean = 3.12 for high anxious Ss and 2.29 for low anxious Ss). A t test of the difference between those means was not significant ($t = 1.84$, d.f. = 19, $p. < .10$). Therefore, since other mean differences were smaller and standard deviations were more or less homogeneous, it was concluded that there was no justification for making further tests of differences.

Since the data for semantic distance (d) were available, an adjunctive analysis of the effects of anxiety on d was suggested. Semantic distance is calculated from the absolute scale values assigned to each semantic scale. It indicates direction from the neutral

point on the semantic scales from which ratings deviate. Thus, low values (toward one) define the least or most negative term on the bipolar scale (e.g., bad on the bad-good scale), and high values (toward seven) define the most or most positive term (e.g., active on the passive-active scale). This measure is more informative in content than polarization, which merely indicates degree of deviation from the neutral point on a semantic scale regardless of direction. Therefore, word profiles for the 15 stimulus words and the nine semantic scales have been prepared for the three anxiety groups and appear in Appendix C.

The analysis of d involved twelve separate analyses of variance; four for each of the three orthogonal factors in semantic space, evaluation, potency, and activity. Results of these analyses appear in Tables IX, X and XI. For each factor an analysis at each of the three stimulus word levels was carried out, plus an over-all analysis for all stimulus words. A graphic illustration of response by anxiety groups to the three word groups appears in Fig. I.

On the highly polarized words (GOD, DOCTOR, WAR, HAPPY, SUCCESS), differences in d due to anxiety effects appeared. These differences were found for the potency and activity factors. Low anxious Ss ascribed less potency to the stimulus words than high or moderate anxiety Ss ($F = 3.96$, d.f. = 2 and 57, $p. < .05$). Closer examination of the profiles showed two relatively interesting and highly specific differences. Low anxious Ss tended to rate the word, GOD, more toward the masculine end of the feminine-masculine scale than did the high

TABLE IX

ANALYSIS OF VARIANCE DATA FOR THE EFFECTS OF ANXIETY ON SEMANTIC DISTANCE (d) - EVALUATIVE FACTOR

Source	d.f.	SS	MS	F
		Highly Polarized Words		
Total	59	2284.90		
Anxiety	2	124.23	62.12	1.639
Error	57	2160.75	37.91	
		Moderately Polarized Words		
Total	59	2970.73		
Anxiety	2	21.23	10.62	< 1.00
Error	57	2949.50	51.75	
		Low Polarized Words		
Total	59	4289.33		
Anxiety	2	136.13	68.07	< 1.00
Error	57	4153.20	72.86	
		All Words		
Total	59	15098.18		
Anxiety	2	156.53	70.32	< 1.00
Error	57	14941.55	262.13	

TABLE X

ANALYSIS OF VARIANCE DATA FOR THE EFFECTS OF ANXIETY ON SEMANTIC DISTANCE (d) - POTENCY FACTOR

Source	d.f.	SS	MS	F
		Highly Polarized Words		
Total	59	1390.18		
Anxiety	2	169.73	84.87	3.96*
Error	57	1220.45	21.41	
		Moderately Polarized Words		
Total	59	3386.73		
Anxiety	2	8.63	4.32	< 1.00
Error	57	3378.10	59.27	
		Low Polarized Words		
Total	59	4342.58		
Anxiety	2	66.03	33.02	< 1.00
Error	57	4276.55	75.03	
		All Words		
Total	59	11316.73		
Anxiety	2	555.63	277.82	1.472
Error	57	10761.10	188.79	

TABLE XI

ANALYSIS OF VARIANCE DATA FOR THE EFFECTS OF ANXIETY ON SEMANTIC DISTANCE (d) - ACTIVITY FACTOR

Source	d.f.	SS	MS	F
		Highly Polarized Words		
Total	59	5435.65		
Anxiety	2	693.30	346.65	4.17*
Error	57	4742.35	83.20	
		Moderately Polarized Words		
Total	59	3522.58		
Anxiety	2	202.53	101.27	1.74
Error	57	3320.05	58.25	
		Low Polarized Words		
Total	59	6944.73		
Anxiety	2	369.43	184.72	1.60
Error	57	6575.30	115.36	
		All Words		
Total	59	23267.60		
Anxiety	2	3427.20	1718.60	4.94*
Error	57	19830.40	347.90	

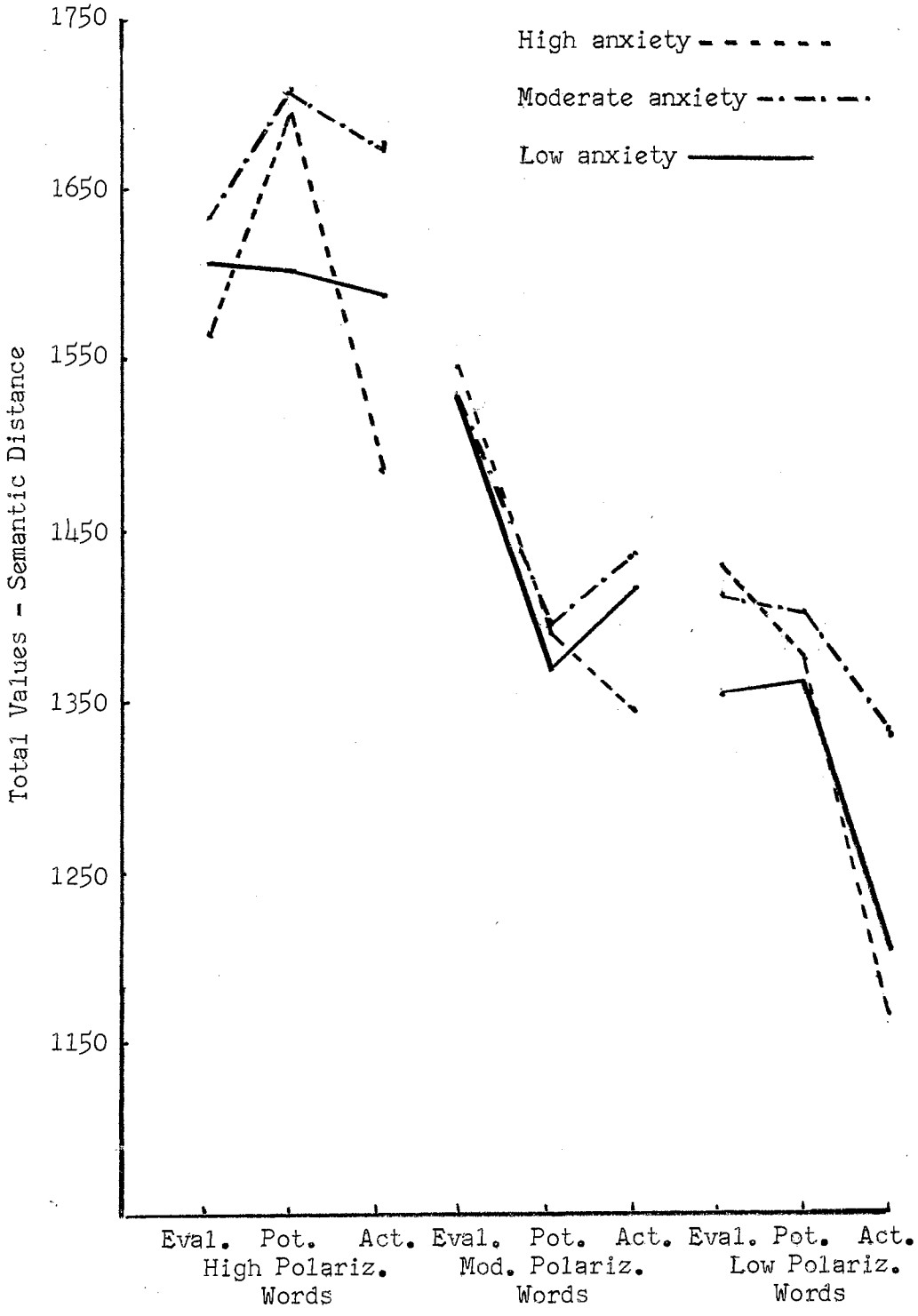

Fig. 1 Effects of Anxiety on Semantic Distance for Three Semantic Word Groups of Different Polarization

and moderate anxiety Ss who rated it more toward the neutral point. A median test (Siegel, 1956), designed to test the hypothesis that the various anxiety groups came from a population having the same median, yielded a Chi square of 11.14, d.f. = 2, $p. < .01$. The other difference was that low, along with moderate anxious Ss, tended to rate DOCTOR more toward the neutral point on the soft-hard scale than did high anxious Ss, who rated it more toward the hard end of the scale (Chi square = 7.48, d.f. = 2, $p. < .05$ on the median test). Both of these specific results contributed to the potency factor difference. On the activity factor, high anxious Ss ascribed significantly less activity to the highly polarized words than the moderate or low anxious Ss ($F = 4.17$, d.f. = 2 and 57, $p. < .025$).

When all stimulus words were taken into consideration, the only significant difference due to manifes anxiety was found for the activity factor ($F = 4.94$, d.f. = 2 and 57, $p. < .025$). Therefore, anxiety did affect the way Ss rated the stimulus words on d, with moderately anxious Ss tending to ascribe more activity to words than the other groups, but with high anxious Ss rating the words markedly lower than the other two groups. Figure 1 shows that for all word groups, the high anxious Ss consistently rated the stimulus words lower on the activity factor (calm-excitable, passive-active and slow-fast semantic scales). The effect was particularly noticeable on the highly polarized, more emotional words.

CHAPTER V

DISCUSSION

Noble's m

It was hypothesized in this study that manifest anxiety might logically be expected to affect Noble's m, an index of conditioned meaningfulness operationally defined as the number of continued written word associations to stimulus words recorded in 60 seconds. Two possibilities seemed plausible in support of this hypothesis: (1) manifest anxiety, as an indicant of drive level, might be related to the conditionability of Ss as Taylor (1956) and Spence (1958) have implied, or (2) MAS scores as indicators of drive might lead to a greater energization of response tendencies producing more associative responses (Trapp and Kausler, 1959; Davids and Eriksen, 1955). The work of Ramond (1953), Montague (1953), Taylor (1956), and Saltz and Hoehn (1957) suggested that related considerations were the relative correctness or incorrectness of the response tendencies in the response hierarchy and the difficulty of the task involved. These related considerations often led to an observed interaction of manifest anxiety with those variables, indicating that the effects of anxiety were not simple or uniform at all stimulus levels in more com-

plex learning or performance situations.

The findings of this study were that manifest anxiety had no effect upon m, even when verbal ability, sex of S or task difficulty (word level) were controlled. Whether these results indicate that manifest anxiety did not affect conditionability of Ss or simply did not differentially energize them is difficult to ascertain because the two processes are confounded in the manner of most learning-performance situations. Further research will be necessary to answer this question. No satisfactory theory of why Ss of high anxiety condition more rapidly than Ss of low anxiety has been posited by the researchers active in that area. For the purpose of this study, consideration of the possible effects of manifest anxiety in energizing responses of an associative nature would seem to be most straightforward and meaningful. When viewed in this context, the results reported herein appear contradictory to the prediction that Ss of different drive level (MAS) would give different numbers of responses in the m task. Such a prediction would have, in general, indicated that high anxiety Ss would give more associative responses to the stimulus words than low anxiety Ss, everything else being equal. The results also contradict the assertion of Trapp and Kausler (1959) that performance on a scale purporting to measure drive may have some covariance with number of associations to stimulus words, and are at variance with the findings of Davids and Eriksen (1955) that manifest anxiety and number of word association responses are positively related. Some of the discrepancies between the latter study and this one may be due to differences in the designs

and procedures of the two, since they were not comparable in every detail. Those investigators administered the MAS immediately following the word association task instead of measuring the anxiety at a time when the experimental task itself could not have had any possible effects upon the MAS score. Therefore, the high relationship between manifest anxiety and word association revealed in their study could have been partly due to the arousal of anxiety brought on by the experimental situation. To insure less possibility of such a situational interaction, this investigator chose a measure of anxiety taken at a time remote from the experimental task, on the assumption that such a measure of anxiety might be more typical or characteristic of the individual as a reliable indicant of chronic anxiety (drive) level and not confounded with situational stress.

Considering the various levels of stimulus words as comparable to different levels of task difficulty, the finding of no interaction between anxiety and word level again contradicts drive theory in demonstrating that high anxiety Ss did not give more associations than low Ss on high m (easy) stimulus words, and less on low m (difficult) words (Montague, 1953). Instead, the results of this study are consistent with the observations of Saltz and Hoehn (1957) that anxiety level and task difficulty do not interact to produce differential response outputs for the various anxiety groups over different levels of task difficulty. Therefore, this study, as theirs, does not support drive theory.

Polarization

The discussion of a relationship between anxiety and polarization is made difficult by the fact that no previously conducted research provides a structure for relating these variables. This investigation devolved upon the suggested possibility of a relationship due to the linkage of anxiety and emotionality (Spence, 1958; Bendig, 1960) and the consideration of polarization as an index of intensity or emotionality of meaning (Jenkins, 1960; Koen, 1962a, 1962b). One other reason for undertaking the study derived from the following hypothetical possibility; if word meanings are conditioned, and if a person's measured emotionality (anxiety) enters into the conditioning process as a contiguous stimulus element in the stimulus complex attending the acquisition of meaning, then a high anxious S might rate word meanings with greater intensity of meaning than a low anxious one because of the attachment of greater emotion to the conditioned response. An alternative possibility is that the more emotional person (high anxiety) might be expected to perceive more emotion in words than the low anxiety person, and might project that emotion via semantic ratings.

The results of the study indicate that manifest anxiety has no apparent effect upon polarization. Therefore, either the above possibilities are not feasible, or the design and procedures in this study were inadequate to test them.

One of the most marked shortcomings of the present study is perhaps in the use of the MAS as an index of drive or emotion. Although

Spence and Taylor assert that the MAS is an index of emotionally based drive it is only fair to observe that the construct validity necessary in establishing it as such has been attacked (Jessor and Hammond, 1957). All that can be said here is that whatever it measures, the MAS has no apparent effect upon the two indices of meaningfulness investigated.

One possible implication of the results is that regardless of the amount of chronic emotionality (anxiety) resident within the individual during the conditioning of meanings, variables such as number of experiences with a concept, context within which it is learned, and other variables are of greater import in the ultimate determination of word meanings.

Semantic Distance (d)

The interesting findings in this study stemmed from a subsidiary analysis of the semantic differential data scored for semantic distance (d). As far as this investigator could ascertain, there is again no available research to structure the discussion. Therefore, the nature of any observation or explanation offered here must be largely ad hoc.

Results revealed that manifest anxiety was related to the measures of d ascribed to the stimulus words on certain semantic factors. Words of high polarization (emotionality) provided the main focus. On those words two differences appeared: (1) low anxious Ss rated them more toward the lower end of the potency scales (soft-hard, weak-strong, feminine-masculine) than high or moderate MA Ss, and (2) high anxious

Ss perceived significantly less activity in them than the low or moderately anxious Ss. The latter result also extended to the analysis of all stimulus words. One problem in the interpretation of these findings is apparent when one considers what is meant by a lower rating on the semantic scales. If one group tended to rate a concept at the "7" end of a semantic scale, and another at the "4" or neutral point on the scale, the former indicates a preference for a strongly positive connotation of the word or a greater amount of the quality defined by the scale; the latter, rather than indicating the opposite (as would be the case if the rating were at the "1" end of the scale), may really indicate neutrality or meaninglessness with respect to the semantic scale. In other words, the concept GOD may be rated at the "7" end of the feminine-masculine scale indicating definite maleness associated with the meaning of GOD, but if rated at the "4" point, the indication might not necessarily be one of less masculinity, but merely one indicating that GOD is neither male or female. This resultant of the relativity of scale ratings must be kept in mind in the interpretation of d.

In view of that limitation, all that may be said of the first finding is that low anxious Ss, in rating the words higher on the potency scales, apparently either saw more hardness, strongness and masculinity in the stimulus words, or were less uncertain about the presence of a definite polarity in the semantic quality of those words than the other anxiety groups. Sarason (1960) notes that several investigators believe the MAS to be a measure of susceptibility to threat. Invoking

this interpretation, it is possible to hypothesize that less-threatened (low anxiety) Ss were able to attribute more extreme hardness, strongness and masculinity to words than the more threatened Ss. The author can conceive of no meaningful interpretation of the result if the MAS is considered only as a measure of emotional drive.

The second finding, that high anxious Ss rated the highly polarized words as well as all stimulus words significantly lower on the semantic factor of activity, calls for another explanation. In his original thinking about the study, the author wondered if high anxious Ss, usually thought to be highly and overtly active people, might not perceive more activity in words than their low anxious counterparts. That speculation was not supported. It is possible that such an outcome is occasioned by some compensatory or homeostatic tendency in high anxious individuals to reduce their activity level by seeing in things (among which are word meanings) less activity than those who are not anxious; hence, would not have a similar need. Such an interpretation is admittedly speculative, but not unreasonable.

Apparently, d is a bit more sensitive as an index of semantic meaningfulness than polarization. This may be due to the fact that directionality of the semantic rating is sacrificed for extremeness of deviation from the neutral category on the latter index. Therefore, polarization is actually more limited than d because d not only indicates intensity, but direction as well.

The discrepancy in the findings of no significance on polarization and some significance on d is apparently explained by the off-setting

directional tendencies masked by manner of computing polarization.

One further comment upon the d results indicates the necessity for considering three and not two levels of manifest anxiety. On the observed difference in the activity factor between anxiety groups, it was not a case of high anxious Ss rating words low on the activity factor, and low anxious Ss rating them high. Instead, on all groups of stimulus words, it was the moderately anxious Ss who ascribed the most activity to them. In fact, their d ratings on all factors, across all levels of stimulus words, tended to place them at or near the top in every instance. Just what this means, or what it indicates is difficult to say without further investigation. It obviously means that they tend to be more positive than high or low anxious Ss in their ratings of words on the semantic differential. It also indicates the possibility of curvilinearity in certain behaviors as a function of manifest anxiety, with extremes of anxiety operating to produce decremental or attenuating tendencies, and moderate anxiety acting incrementally or without attenuation.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The Issue

Noble's m and semantic differential polarization are two indices of verbal meaningfulness that are considered to be a function of classical S-R conditioning. Noble's m is a measure of associative meaning, and polarization purportedly is an index of intensity or emotionality of meaning. The Taylor Manifest Anxiety Scale has been hailed as a measure of drive and of emotionality. As an indicant of drive, manifest anxiety has been found to affect various types of conditioned behavior. In this study it was assumed that manifest anxiety (drive) might logically affect m, the number of word associations given by an S in 60 seconds. As an indication of emotionality, it was assumed that it might affect the intensity of meaning conditioned to words. Therefore, the general hypothesis of this investigation was that manifest anxiety might account for greater or lesser response strength manifested in the number of associations made to stimulus words and might influence the intensity of meaning ascribed to words via semantic rating.

Method

Sixty female Ss were selected on the basis of score on the MAS. Twenty Ss were in each of three anxiety groups: high, moderate, and low. Verbal ability was controlled statistically through the use of the analysis of covariance. All Ss were given 15 stimulus words representing three levels of the m scale. They were also required to rate 15 stimulus words representing three levels of polarization on the semantic differential. These ratings yielded two types of information: polarization and semantic distance (d) for the three levels (high, moderate, and low) of the stimulus words. By utilizing various stimulus levels in studying the variables, the effects of manifest anxiety over the m and polarization continua could be assessed. Semantic distance was of subsidiary importance in the investigation.

Hypotheses and Findings

It was hypothesized that there would be no differences between anxiety groups on the m and polarization variables. The expectation for rejection of those hypotheses would lead to the inference that manifest anxiety does make a difference in influencing those indices of meaningfulness. No significant differences in anxiety groups on either of the two variables were found. Similarly, the hypothesized expectation that manifest anxiety might act differently at the different stimulus levels was not supported. Therefore, the only warranted conclusion is that the MAS, whether it measures drive, emo-

tionality or whatever, has no influence on Noble's m and semantic differential polarization.

A subsidiary analysis revealed that manifest anxiety did affect ratings of semantic distance. Low anxious Ss ascribed higher potency ratings to the highly polarized words than did the other groups. High anxious Ss rated all three groups of stimulus words lower on the activity factor than the other groups, with moderately anxious Ss ascribing the greatest amount of activity to the words.

Suggestions for Future Research

One of the problems in a study like the one undertaken here is the use of a paper-and-pencil type inventory as an indicant of drive or emotionality. A more direct test of the hypothesis that drive or emotionality affects such response measures as m or polarization calls for the use of more direct indices of those independent variables. Just what an appropriate index of drive might be is difficult to say, as that has been a perennial problem of psychologists in the study of human behavior. On the other hand, there are more direct measures of emotionality which might be invoked in the study of polarization. For example, an investigation of the effects of emotionality on polarization might take the following form. Using such well-known indices of emotionality as the GSR, heart rate, blood pressure, etc., establish a base-line of response for each S utilizing stimulus words of an emotional and/or non-emotional nature. Following this, present a series of experimental words of controlled emotionality or intensity

of meaning, while simultaneously measuring all or certain of the suggested indices of emotionality. Such a procedure should enable a more direct assessment of the effects of, or relationship between, experienced and perceived emotionality in word meanings.

Another research possibility would be presented through a replication, with variations, of Staats and Staats (1957) classic experiment on the conditioning of various components of semantic meaning. Controlling for sex and intelligence, it would be feasible to subject Ss of different levels of manifest anxiety to the conditioning procedures used by the Staats in order to see whether manifest anxiety has any relationship to the conditionability of the three major characteristic semantic factors--evaluation, potency, activity. The results of the present study showed that Ss of varying levels of manifest anxiety did rate certain words differently on certain of those factors. Would they also condition differentially to those factors? An answer to that question would go further in the direction of establishing whether Ss of different anxiety level do, in fact, perceive or respond (via conditionability) differently to words.

Going considerably beyond the scope of the present study, but utilizing the m and polarization variables, it would be interesting to discover more about the effects of those meaningfulness parameters on verbal learning. It is very probable that the m value for any given stimulus word would be positively related to the time taken in learning that word or concept in some experimental situation. That only reiterates what is already known about the relationship of meaning-

fulness (as association value) and learning. That is, words found to possess lower m values would probably be learned less rapidly than those of higher values. But what about the polarization values of those same concepts? Would such a parameter have anything to do with ease or rapidity of learning? Koen (1962b) has implied that more emotional words are less meaningful or communicable than less emotional words because of some kind of interference in the learning or communication process. The aforegoing considerations raise questions concerning the learnability of words or concepts with calculated polarization differences. It would, therefore, be possible to control for intelligence and other crucial variables while manipulating polarization as an independent variable to discover its effects on time or number of trials to learn specified lists or passages. Much has been done with association value (analagous to m), but very little has as yet been done with polarization. Similarly, more exploratory endeavor needs to be directed at an assessment of the importance of d (semantic distance) in verbal learning. Again, nothing presently known to the author has been carried out. Perhaps it is a trivial variable. If so, even that should be known; if not, then it will join other word characteristics as a sufficiently important variable to be dealt with in studies of verbal learning.

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APPENDIX A

APPENDIX A

INSTRUCTIONS FOR NOBLE'S m

This is a test to see how many words you can think of and write down in a short time.

You will be given a key word and you are to write down as many other words which the key word brings to mind as you can. These other words which you write down may be things, places, ideas, events or whatever you happen to think of when you see the key word.

For example, think of the word "king." Some of the words or phrases which "king" might bring to mind are:

queen	Kingdom
King Cole	England
ruler	imperial
Sky-king	kingfish

No one is expected to fill in all the spaces on a page, but write down as many words as you can which each key word calls to mind. Be sure to think back to the key word after each word you write down because the test is to see how many other words the key word makes you think of. To help you, the key word is repeated alongside each space.

I will tell you when to turn the page and begin your associations to the next word, and you will stop on my signal. Do not turn to the next word until I tell you to begin.

There will be a few words with which you may not be familiar, and your associations may not come readily. Handle these words in the same way as the others, putting down whatever words do come to mind.

SAMPLE WORDS

HAM	HAM
HAM	HAM
HAM	HAM
HAM	HAM
HAM	HAM
HAM	HAM
HAM	HAM
HAM	HAM
HAM	HAM
HAM	HAM
HAM	HAM

METAL	METAL
METAL	METAL
METAL	METAL
METAL	METAL
METAL	METAL
METAL	METAL
METAL	METAL
METAL	METAL
METAL	METAL
METAL	METAL
METAL	METAL

APPENDIX B

APPENDIX B

INSTRUCTIONS FOR THE SEMANTIC DIFFERENTIAL

The purpose of this test is to measure the meanings of certain things to people by having them judge them against a series of descriptive scales. In taking this test, please make your judgments on the basis of what these things mean to you. On each page of the accompanying booklet you will find a different concept to be judged and beneath it a set of scales. You are to rate the concept on each of these scales in order.

Now if you will look at your instruction sheet, I will explain what you are to do. (The description of the use of the scales was then read aloud. Duplicate scales were written on the blackboard and the rating operation demonstrated.) To show how the meanings of words can be measured on these scales, let us cooperate in rating the concept, "charity." (Responses from several different subjects were elicited in rating the words on the sample scales.)

Remember that it is important that you place your check-marks in the middle of the space shown above--not on the boundary. Be sure to check every scale for every concept--do not omit any. Never put more than one check-mark on a single scale. Do not look back and forth through the booklet--make each item a separate and independent judgment.

(The subjects were then told to rate the word "music" on the practice sheet.)

Now turn to the next page and begin rating the words in order. It is best to work right through at a fairly good speed without puzzling over individual items. First impressions are desired, but please do not be careless--we want true impressions.

INSTRUCTIONS

Here is how to use the scales:

If you feel that the concept at the top of the page is very closely related to one end of the scale, you should place a check-mark or "X" as follows:

weak_X_:____:____:____:____:____:____strong

or

weak____:____:____:____:____:____:_X_strong

If you feel the concept is quite closely related to one or the other end of the scale (but not extremely), place your check-mark as follows:

passive____:____:____:____:____:_X_:____active

or

passive____:_X_:____:____:____:____:____active

If the concept seems only slightly related to one side as opposed to the other (but is not really neutral), place your check-mark as follows:

good____:____:_X_:____:____:____:____bad

or

good____:____:____:____:_X_:____:____bad

If you consider the concept to be neutral on the scale, both sides of the scale equally associated with the concept or if the scale is completely unrelated to the concept, place your check-mark in the middle space:

confusing____:____:____:_X_:____:____:____clear

The direction toward which you check, of course, depends upon which of the two ends of the scale seems most characteristic of the thing you are judging.

IMPORTANT:

1. Place your check-mark in the middle of the space--not on the boundaries.

2. Be sure to check every scale for every concept. Do not omit any.

3. Never put more than one check-mark on a scale.

4. Do not look back and forth through the booklet--make each item a separate and independent judgment.

Sample Scales

Rate the following concept on these scales:

MUSIC

GOOD____:____:____:____:____:____:____BAD

EXCITABLE____:____:____:____:____:____:____CALM

FAST____:____:____:____:____:____:____SLOW

BEAUTIFUL____:____:____:____:____:____:____UGLY

ACTIVE____:____:____:____:____:____:____PASSIVE

WEAK____:____:____:____:____:____:____STRONG

HARD____:____:____:____:____:____:____SOFT

MASCULINE____:____:____:____:____:____:____FEMININE

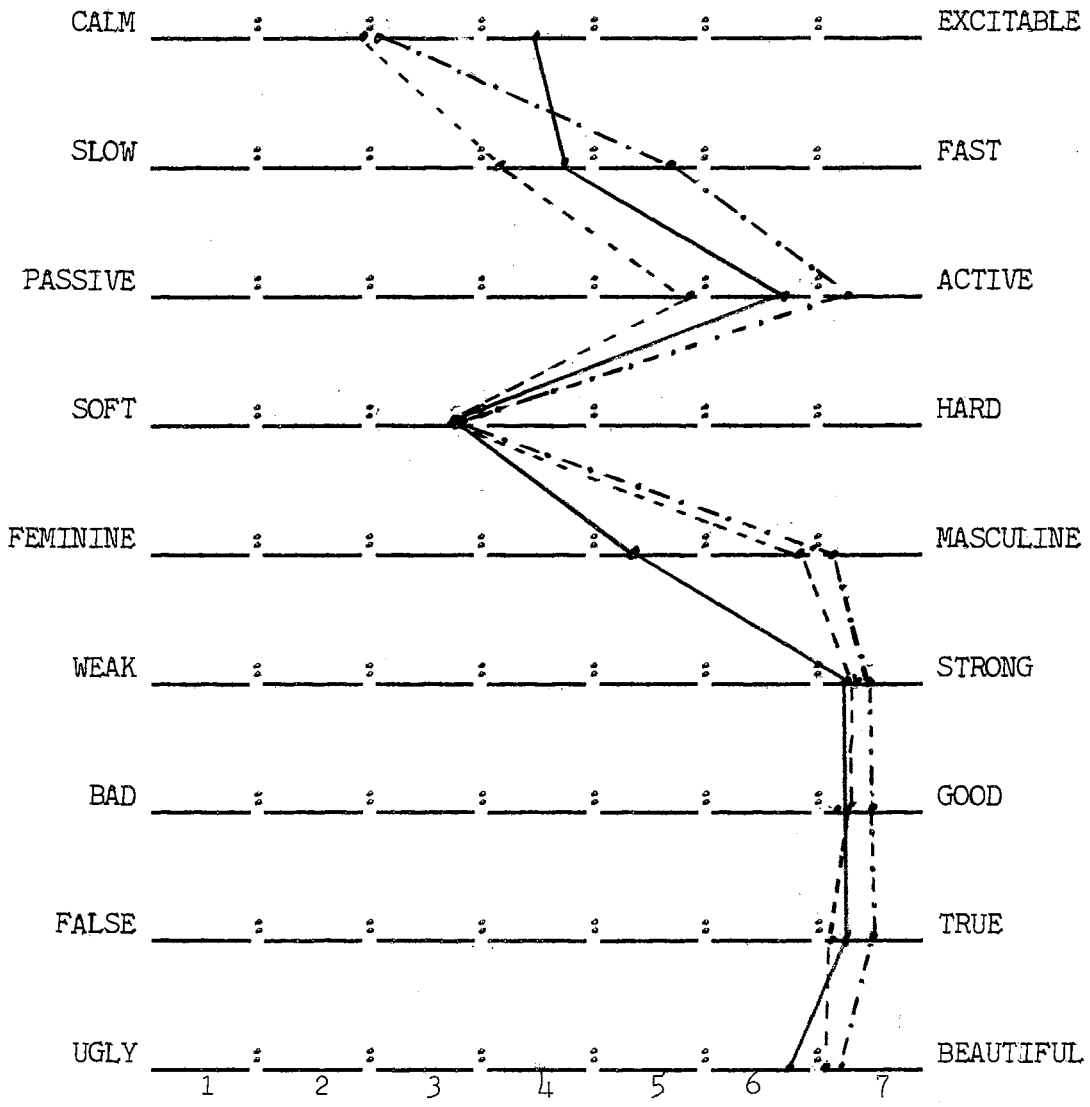
TRUE____:____:____:____:____:____:____FALSE

APPENDIX C

APPENDIX C

SEMANTIC PROFILE

GOD

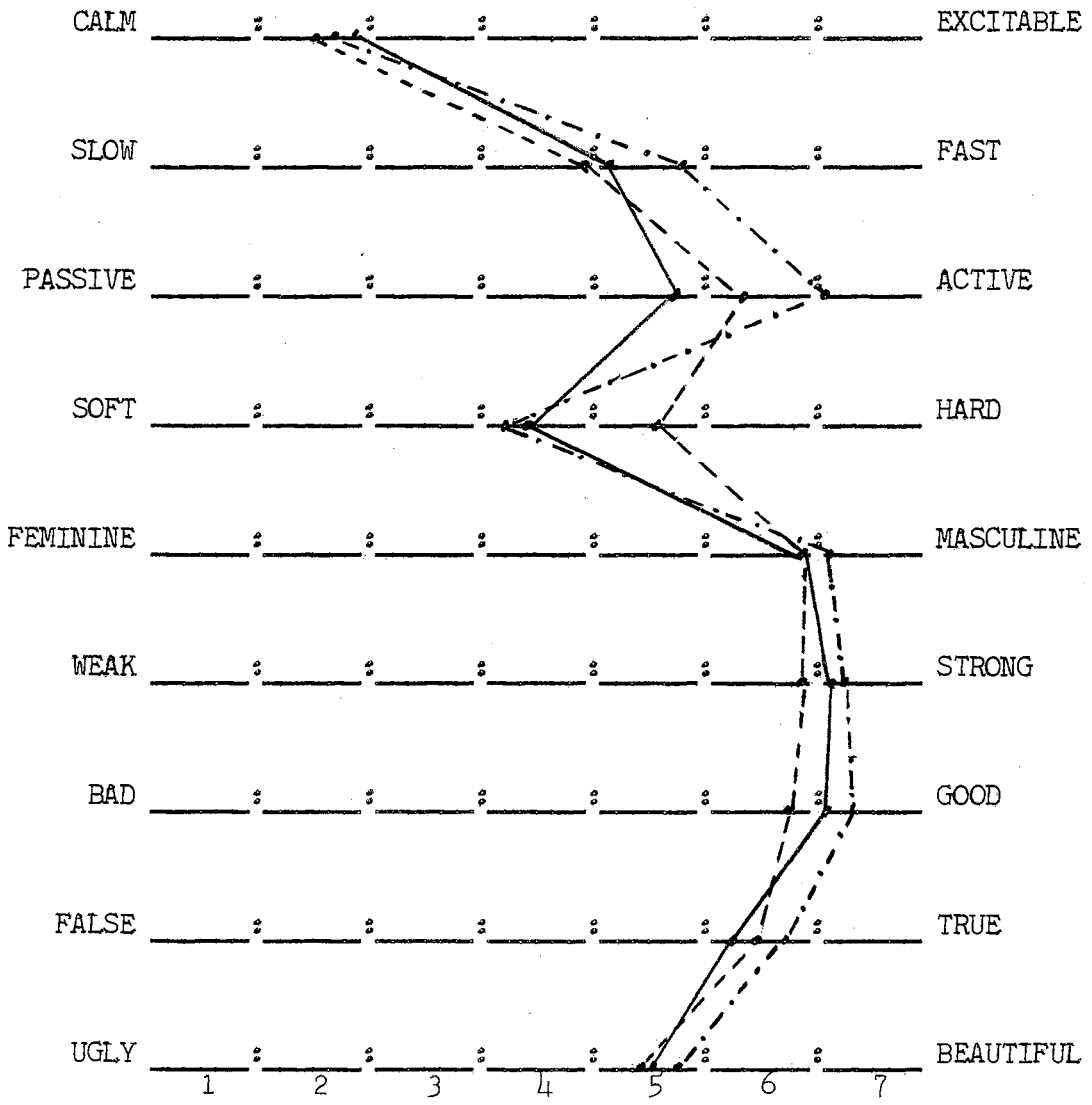


High Anxiety Ss----- Moderate Anxiety Ss-.-.-. Low Anxiety Ss ——

APPENDIX C

SEMANTIC PROFILE

DOCTOR

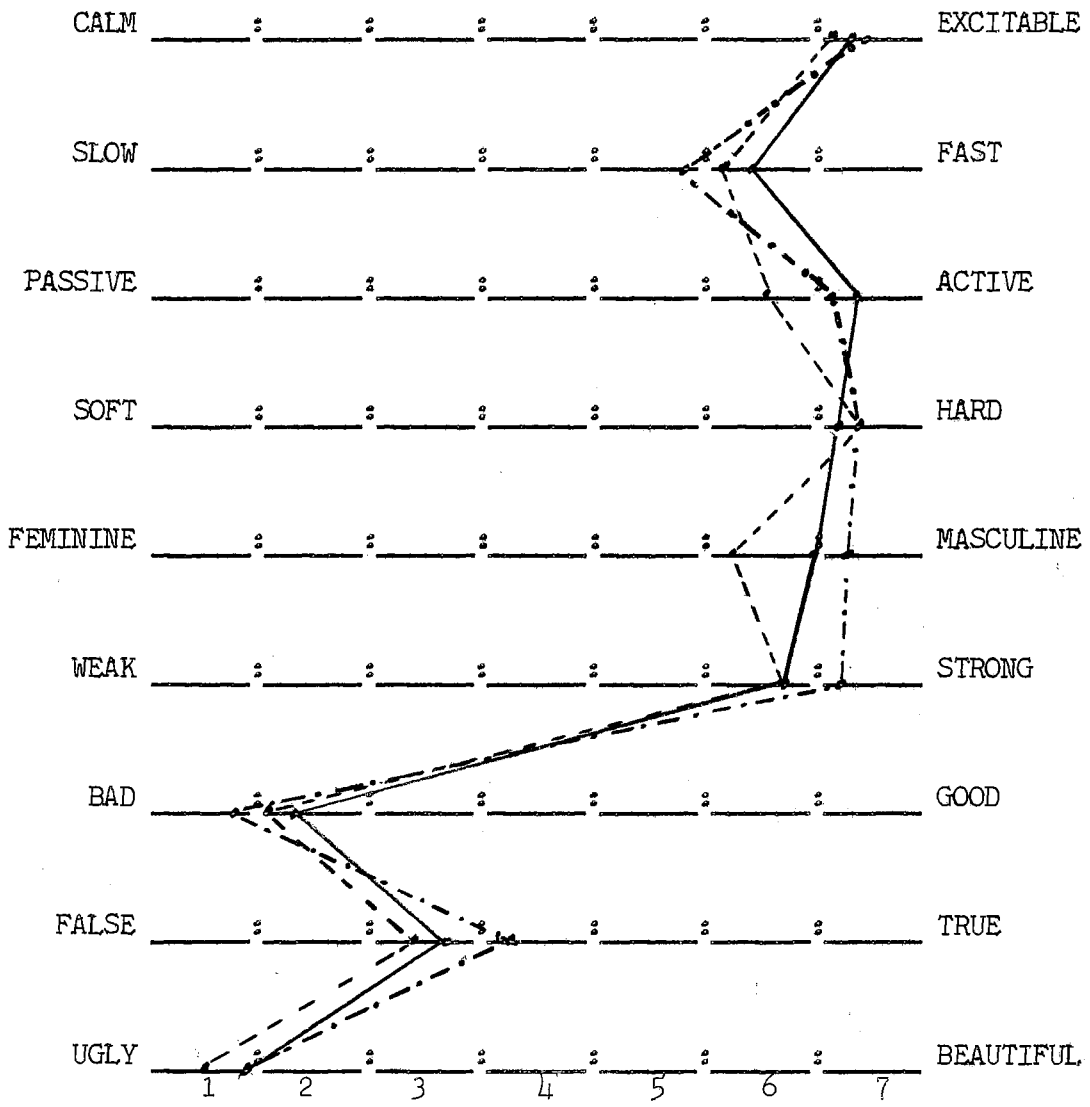


High Anxiety Ss----- Moderate Anxiety Ss-·-·-· Low Anxiety Ss——

APPENDIX C

SEMANTIC PROFILE

WAR

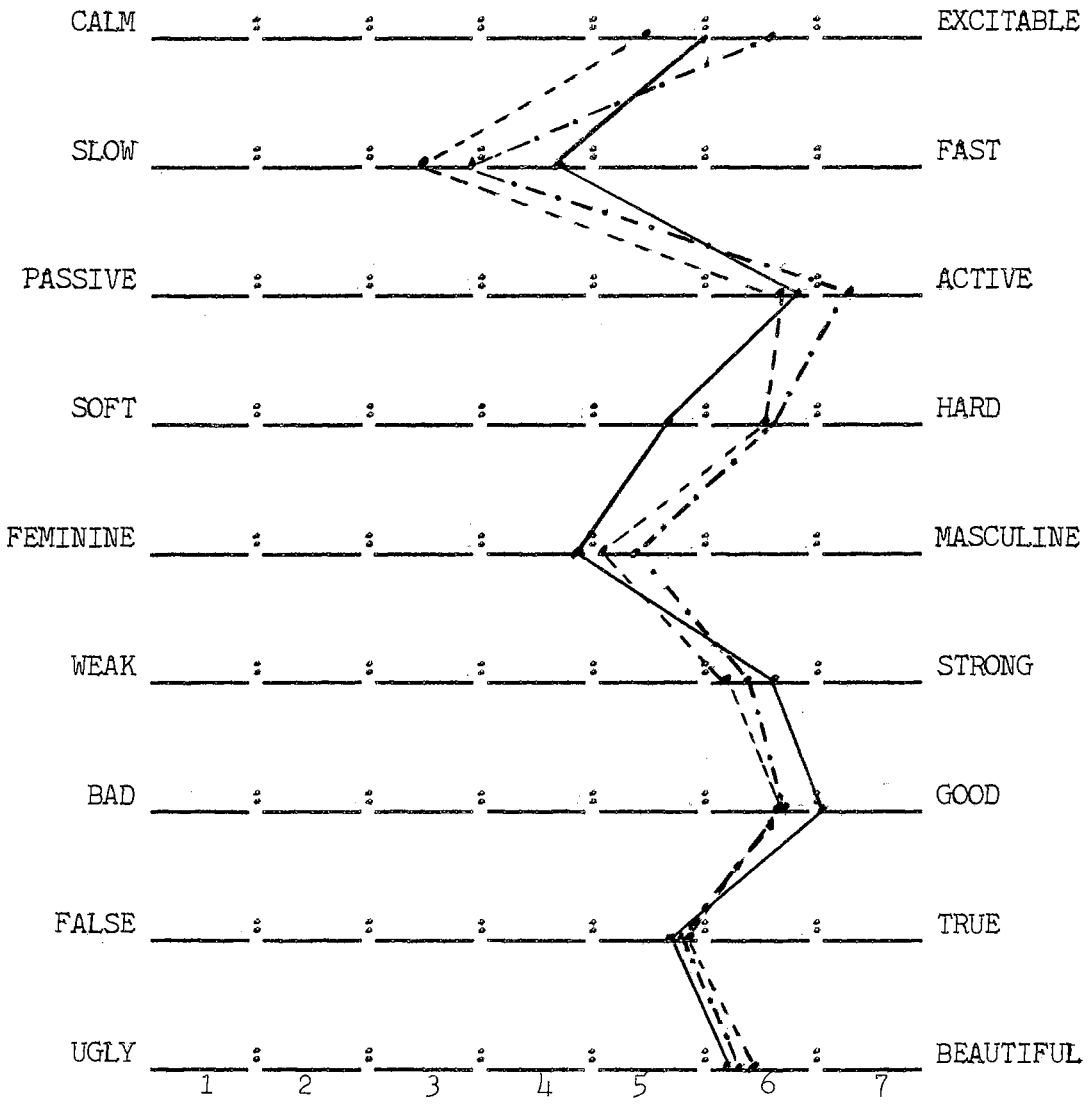


High Anxiety Ss---- Moderate Anxiety Ss-·---· Low Anxiety Ss———

APPENDIX C

SEMANTIC PROFILE

SUCCESS

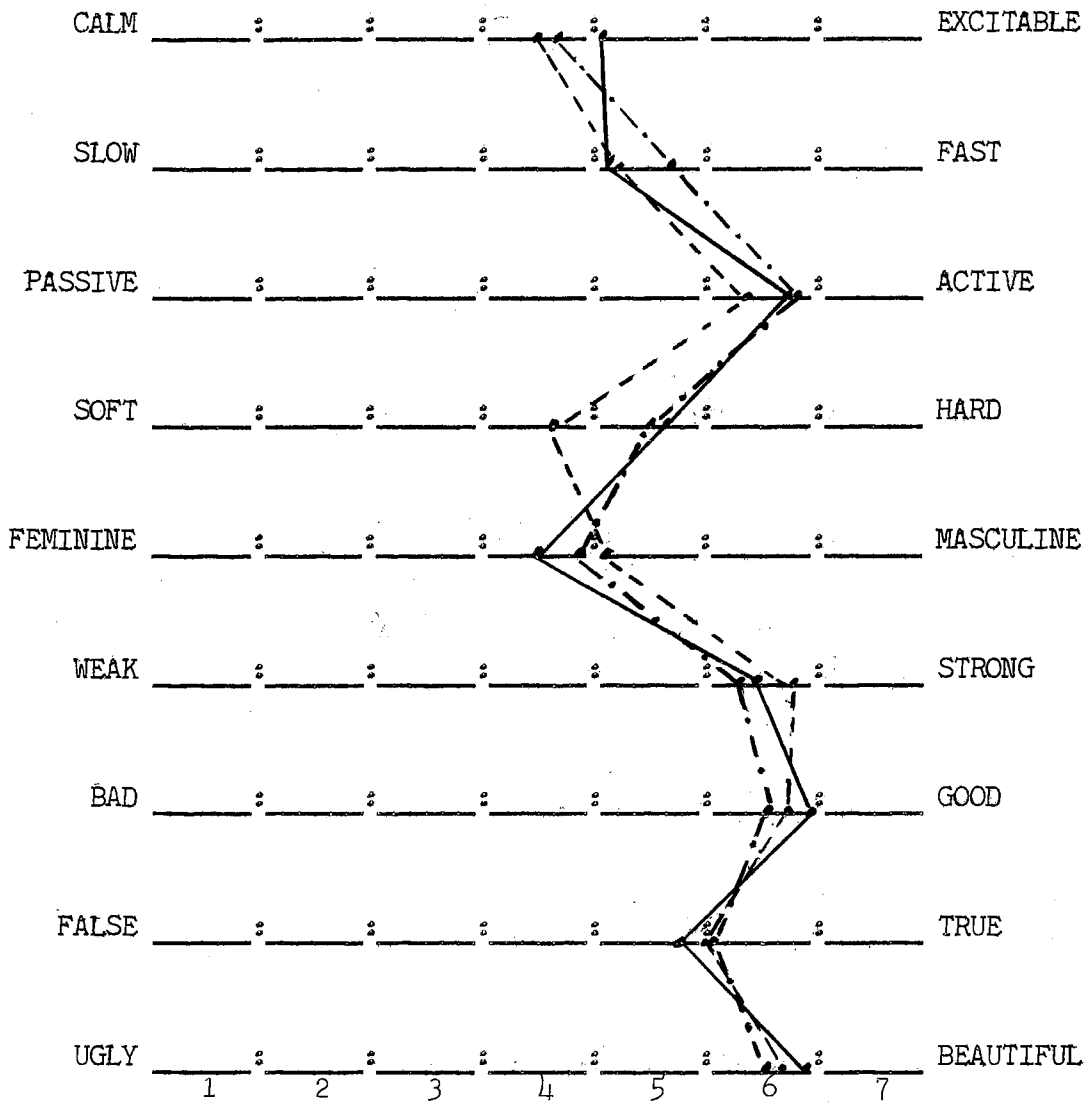


High Anxiety Ss- - - - Moderate Anxiety Ss—.—.—. Low Anxiety Ss———

APPENDIX C

SEMANTIC PROFILE

HEALTH

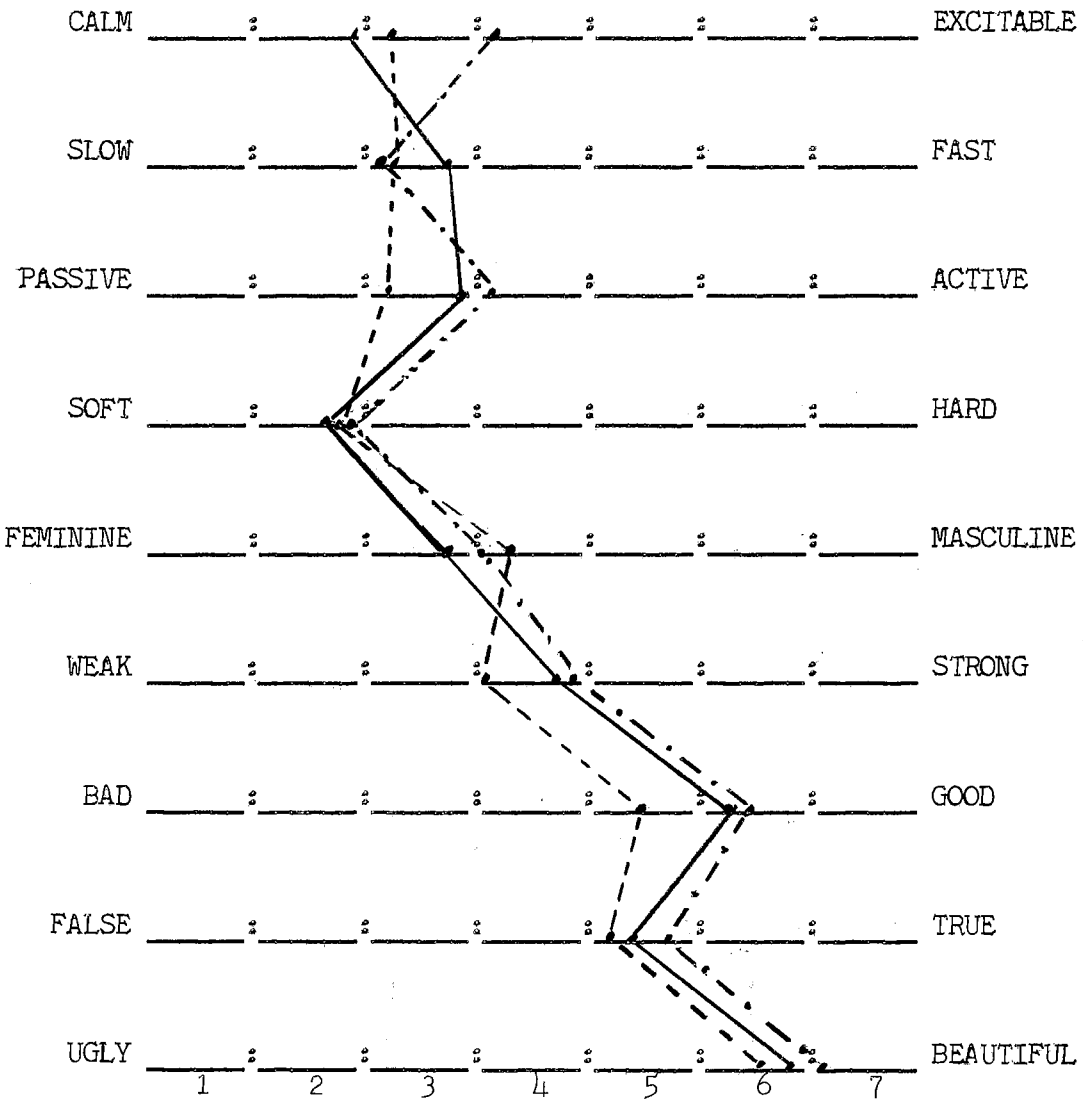


High Anxiety Ss- - - - Moderate Anxiety Ss-.-.-.- Low Anxiety Ss ____

APPENDIX C

SEMANTIC PROFILE

BLUE

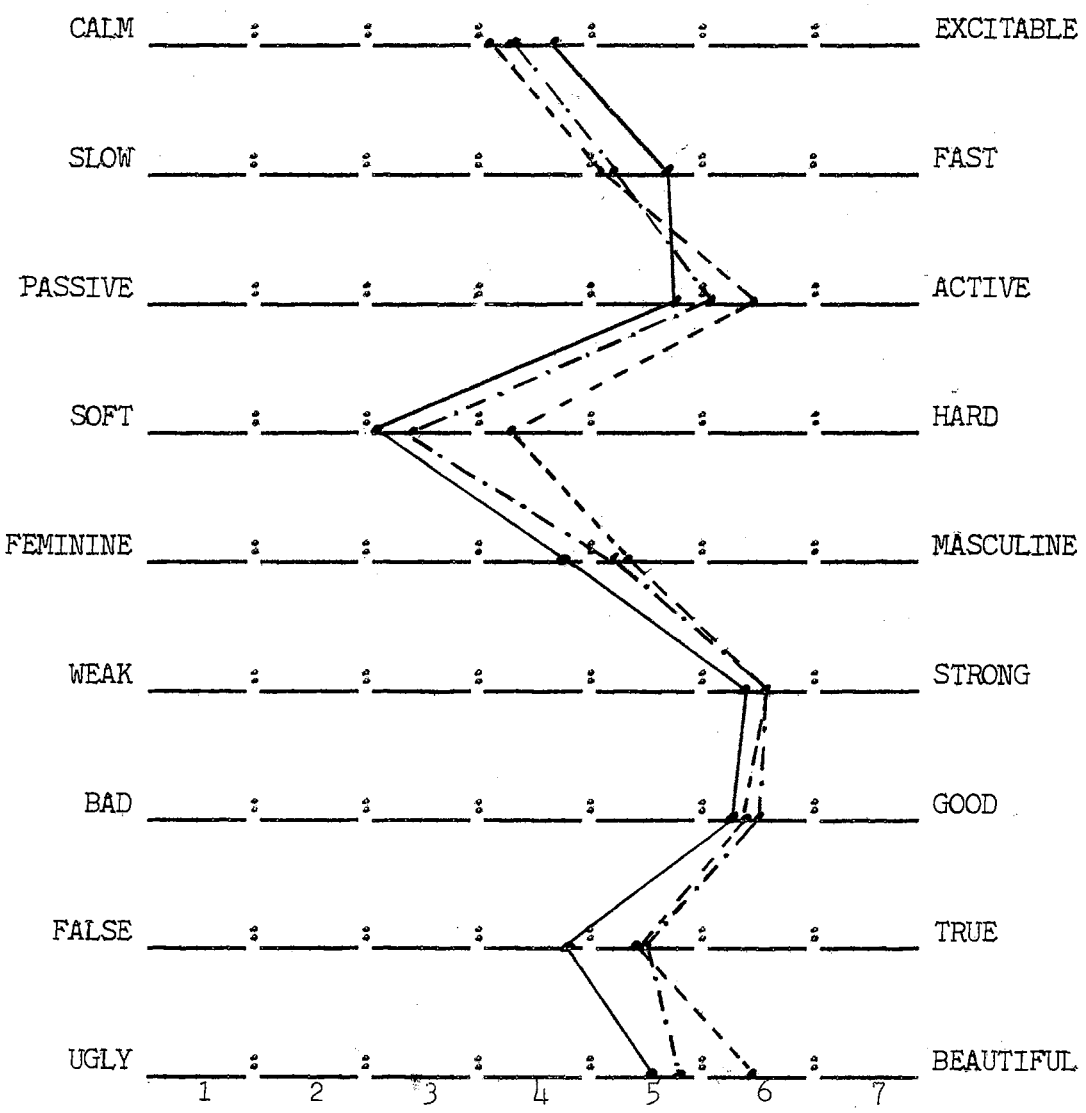


High Anxiety Ss----- Moderate Anxiety Ss—·—·— Low Anxiety Ss——

APPENDIX C

SEMANTIC PROFILE

HAND

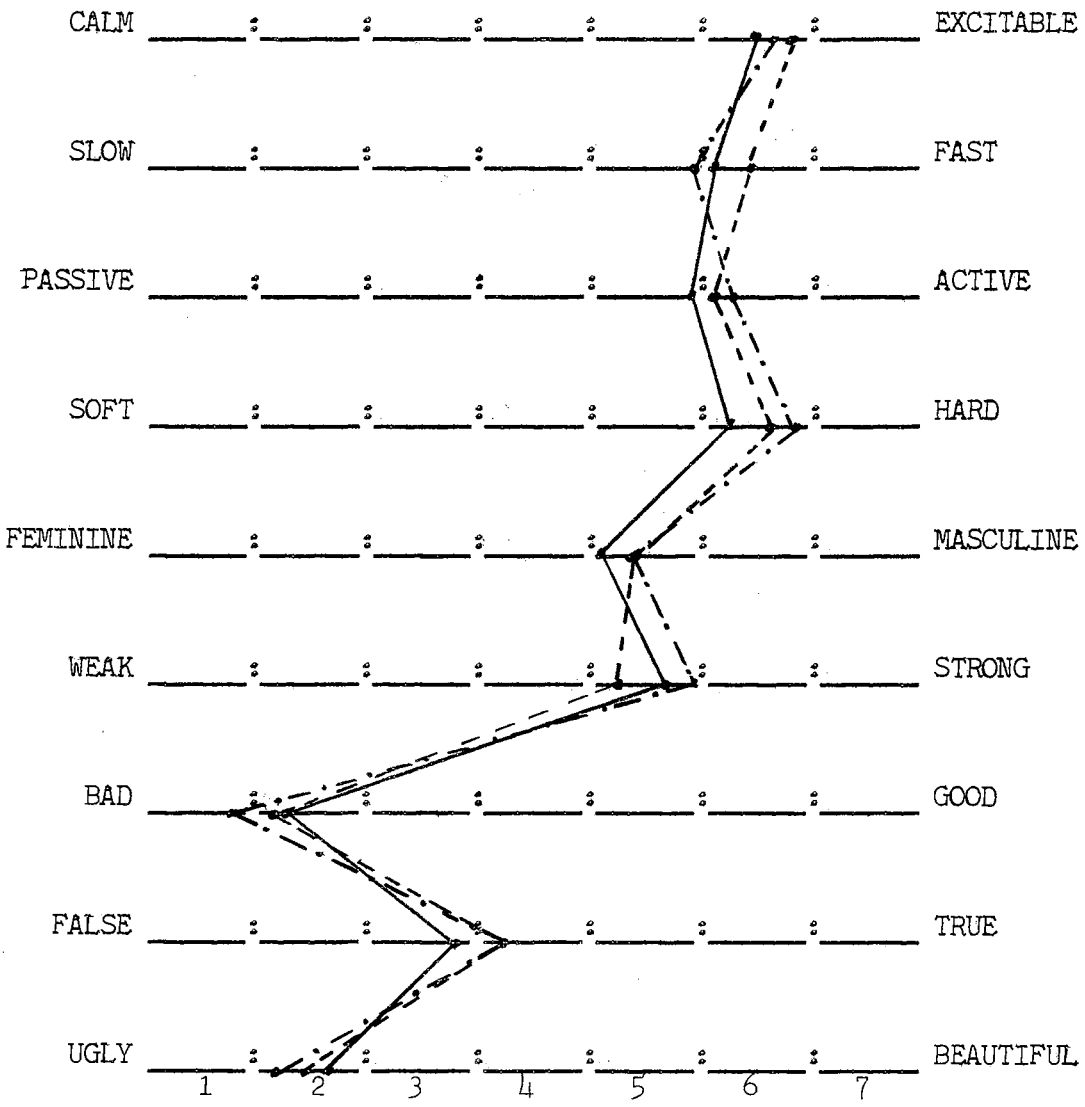


High Anxiety Ss_ _ _ _ Moderate Anxiety Ss_ . _ . Low Anxiety Ss_____

APPENDIX C

SEMANTIC PROFILE

TROUBLE

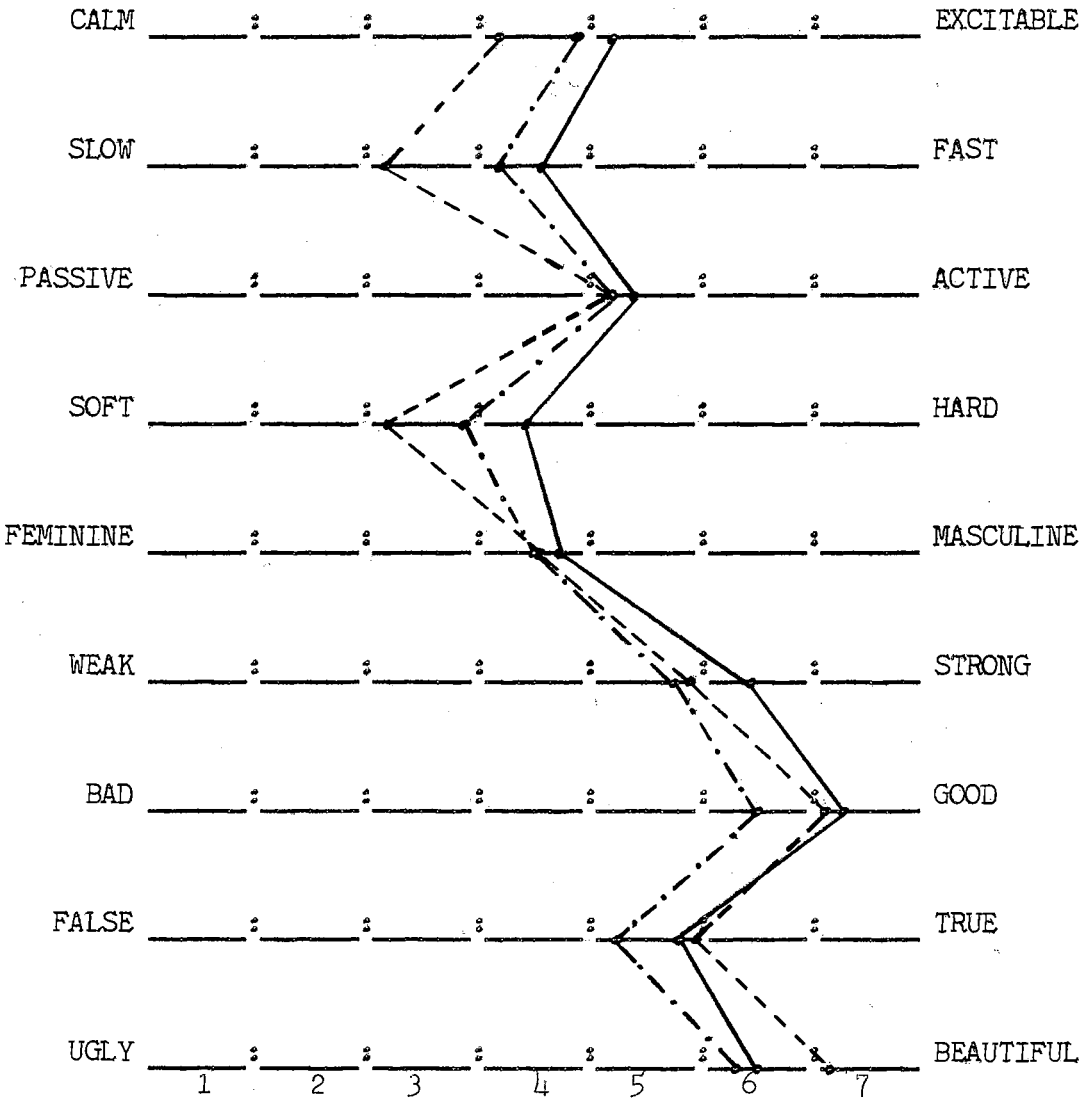


High Anxiety Ss- - - - Moderate Anxiety Ss—.—. Low Anxiety Ss———

APPENDIX C

SEMANTIC PROFILE

ART

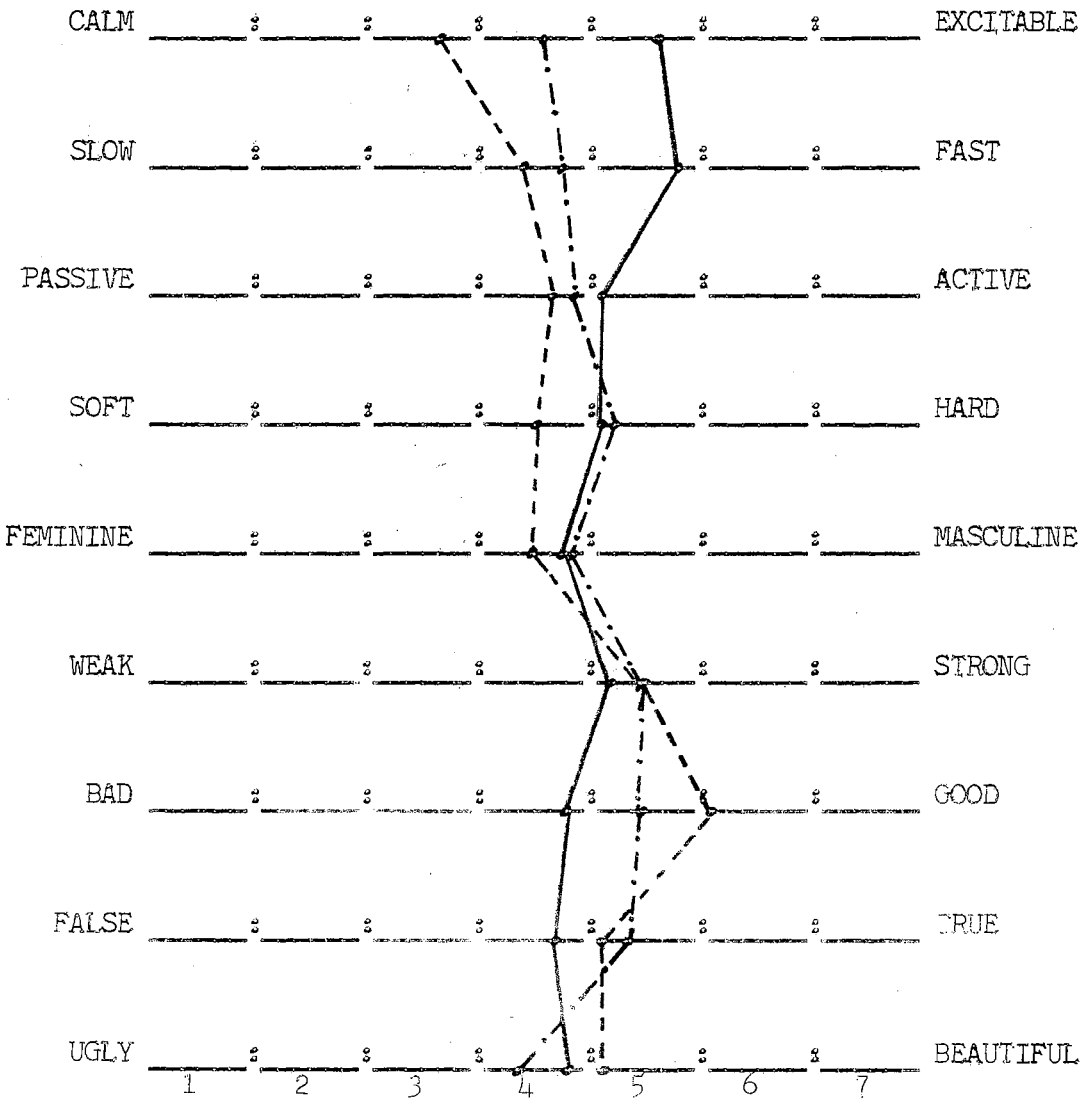


High Anxiety Ss Moderate Anxiety Ss Low Anxiety Ss

APPENDIX C

SEMANTIC PROFILE

FULL

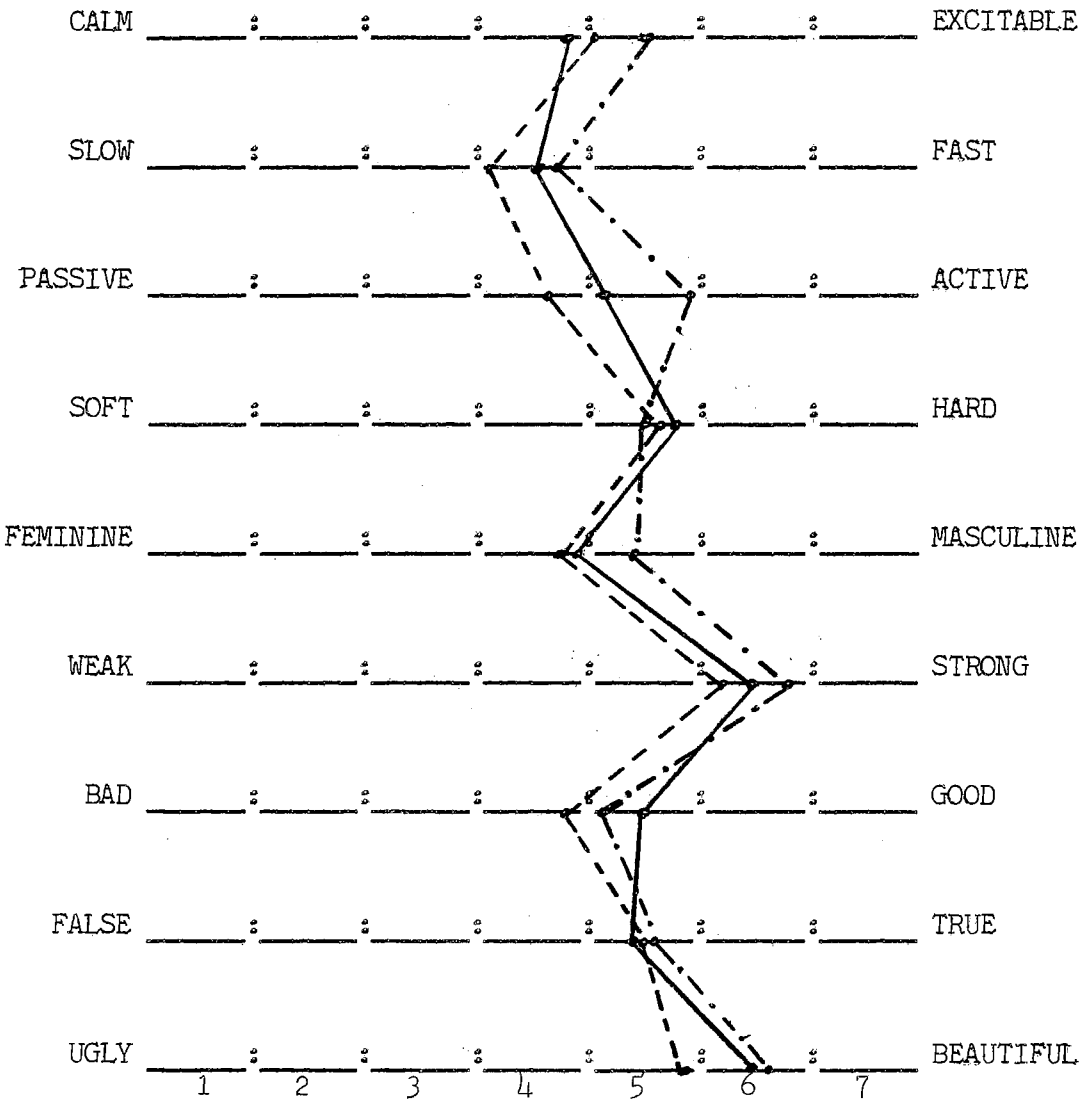


High Anxiety Ss- - - - Moderate Anxiety Ss—·—·— Low Anxiety Ss———

APPENDIX C

SEMANTIC PROFILE

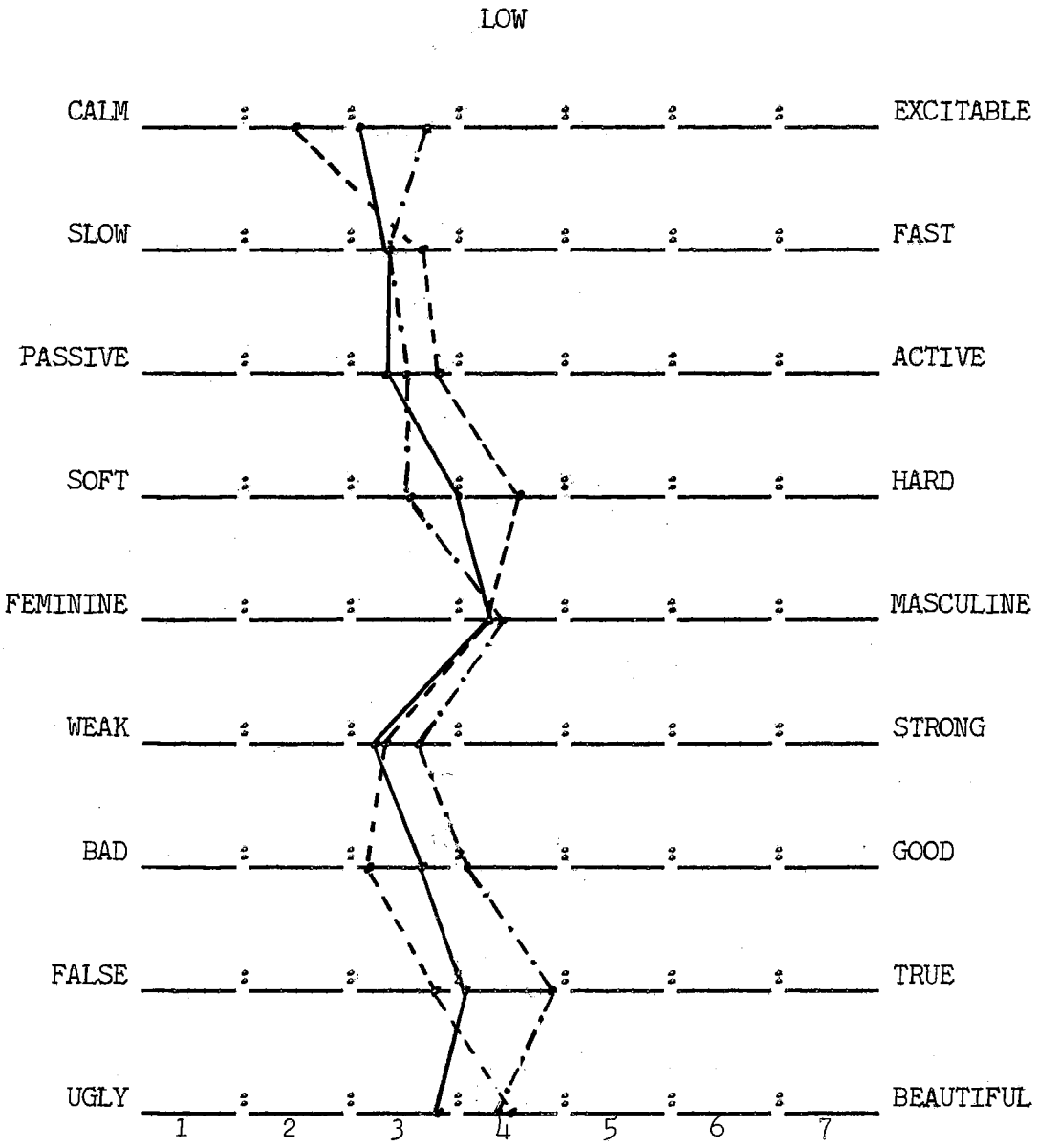
WINTER



High Anxiety Ss – – – Moderate Anxiety Ss–.–. Low Anxiety Ss———

APPENDIX C

SEMANTIC PROFILE

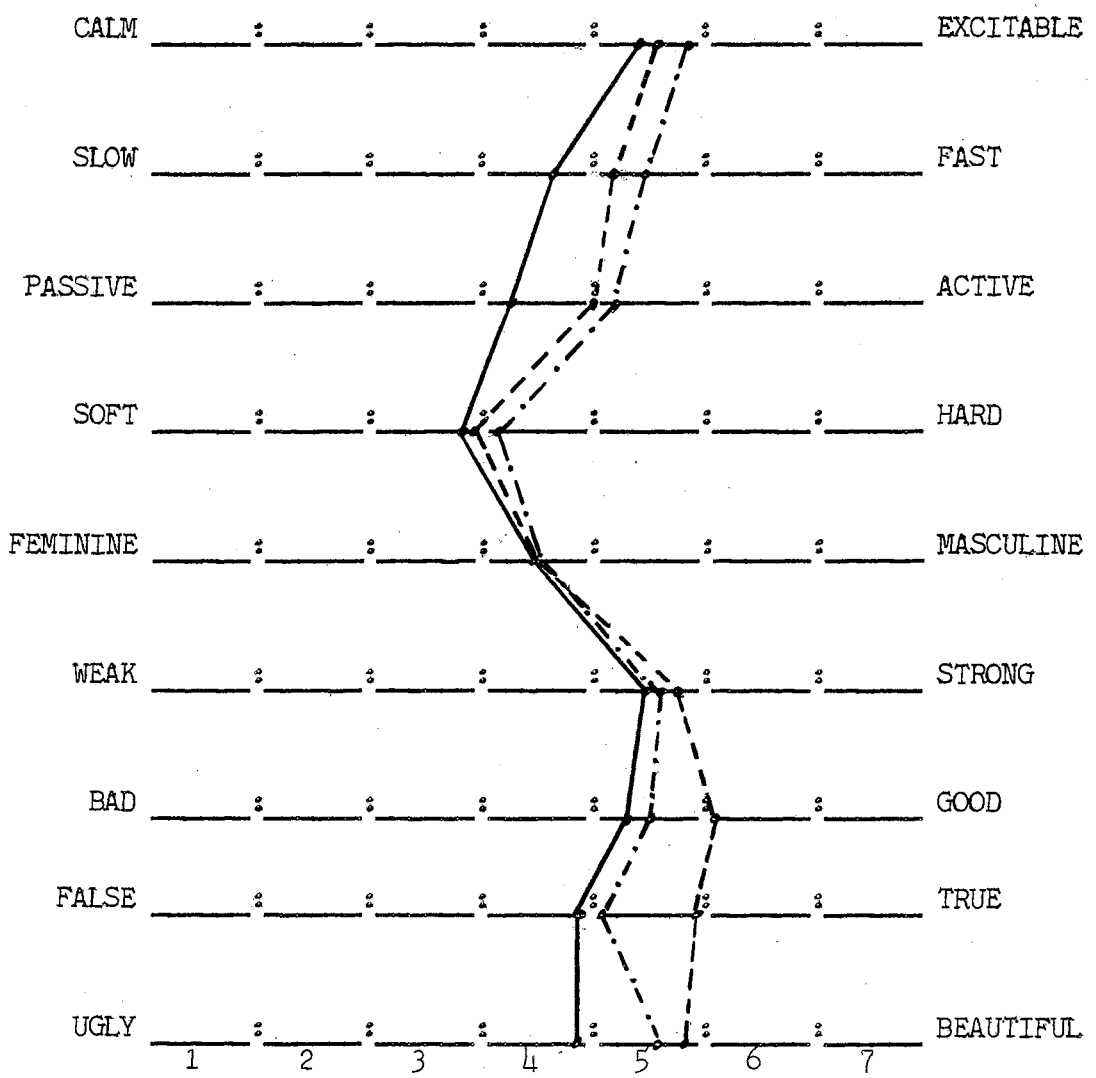


High Anxiety Ss---- Moderate Anxiety Ss-.-. Low Anxiety Ss____

APPENDIX C

SEMANTIC PROFILE

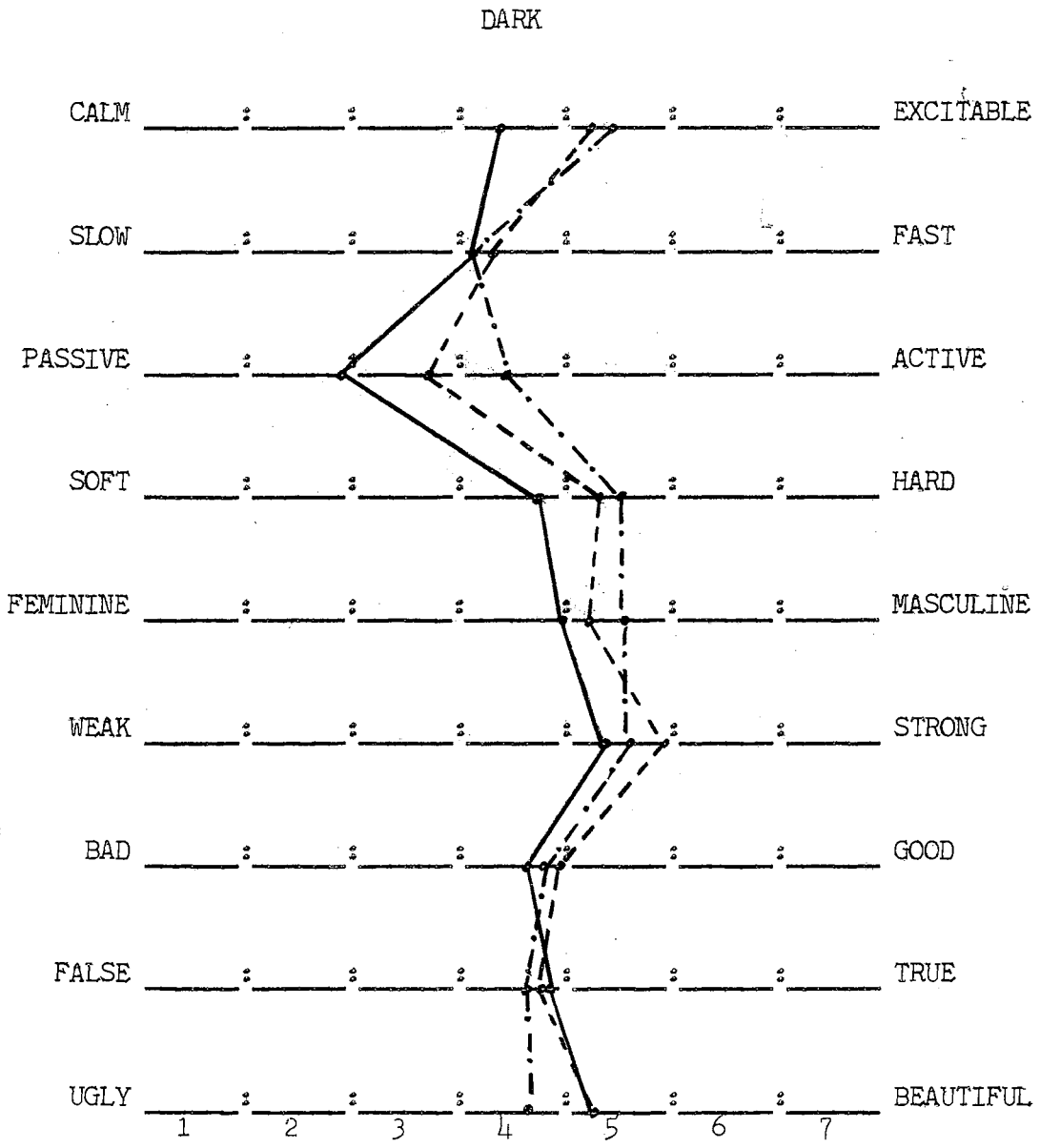
DREAM



High Anxiety Ss– – – Moderate Anxiety Ss–·–· Low Anxiety Ss——

APPENDIX C

SEMANTIC PROFILE

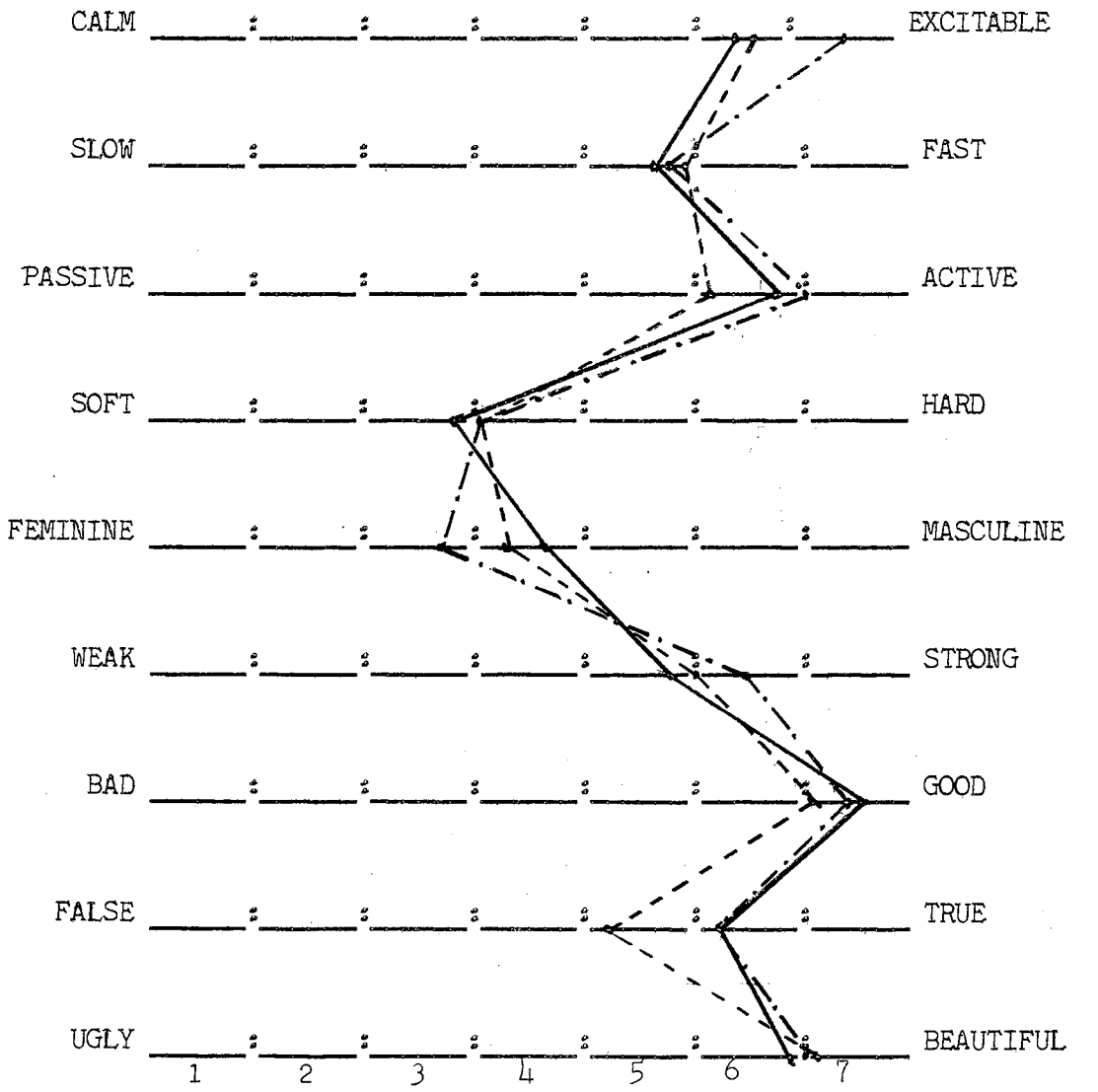


High Anxiety Ss— — — Moderate Anxiety Ss—.—. Low Anxiety Ss——

APPENDIX C

SEMANTIC PROFILE

HAPPY



High Anxiety Ss– – – Moderate Anxiety Ss—·—· Low Anxiety Ss ——

APPENDIX D

APPENDIX D

BASIC DATA

Subject No.	MAS Score	Verbal Score	Treatment Totals for *m** High *m* Words	Mod. *m* Words	Low *m* Words	Total	Treatment Totals for Polarization* High P. Words	Mod. P. Words	Low P. Words	Total
01	41	36	39	29	28	96	36.93	37.89	35.65	110.47
02	34	48	65	43	43	151	28.61	28.33	26.55	83.49
03	34	21	54	20	08	82	36.52	32.95	27.35	96.82
04	31	21	60	28	10	98	39.55	32.89	24.67	97.11
05	33	21	67	51	30	148	28.13	26.60	29.00	83.73
06	39	34	57	26	15	98	34.28	24.28	26.98	85.54
07	35	21	61	36	24	121	40.33	37.21	31.56	109.10
08	32	25	88	39	17	144	40.73	37.87	29.16	107.76
09	33	42	35	24	8	67	35.99	32.20	22.62	90.81
10	38	35	46	44	25	115	37.94	37.69	33.80	109.43
11	33	40	46	20	12	78	39.52	39.17	31.77	110.46
12	36	62	41	32	26	99	37.20	35.65	27.66	100.51
13	37	39	50	37	33	120	37.00	35.06	30.02	102.08
14	31	38	50	24	6	80	37.34	24.22	22.42	83.98
15	36	40	60	47	41	148	26.32	20.20	21.16	67.68
16	34	34	62	59	56	177	36.33	32.71	34.31	103.35
17	36	46	55	33	34	122	37.50	37.09	37.23	111.82
18	31	27	62	25	4	92	31.85	23.70	13.15	68.70
19	30	35	50	12	1	63	36.66	37.96	28.70	103.32
20	34	33	34	14	3	51	28.25	20.58	26.10	74.93

(continued)

Subject No.	MAS Score	Verbal Score	Treatment Totals for m* High m Words	Mod. m Words	Low m Words	Total	Treatment Totals for Polarization* High P. Words	Mod. P. Words	Low P. Words	Total
21	18	35	54	32	7	93	36.93	26.52	28.72	92.17
22	19	27	70	46	8	124	39.66	33.31	31.60	104.57
23	19	39	58	26	14	98	36.73	24.09	17.53	78.35
24	20	50	53	30	18	101	40.93	30.71	31.00	102.64
25	18	40	29	17	1	47	41.18	31.36	23.77	96.31
26	19	41	39	18	3	60	33.34	30.24	17.36	80.94
27	20	37	62	17	4	83	40.39	32.09	28.11	100.59
28	20	32	51	31	15	97	43.75	40.92	41.17	125.84
29	20	16	41	35	16	92	40.92	38.69	34.82	114.43
30	18	31	51	35	23	109	41.43	34.62	30.23	106.28
31	18	40	49	33	26	108	37.03	35.81	28.06	100.90
32	20	34	53	29	21	103	34.43	16.32	13.87	64.62
33	18	59	96	62	40	198	37.84	28.59	28.55	94.98
34	20	34	27	12	00	39	32.49	23.80	15.49	71.78
35	19	33	65	31	13	109	43.23	19.02	37.10	119.35
36	18	39	55	26	21	102	30.56	18.40	7.30	56.26
37	19	45	104	72	17	193	33.56	21.23	8.02	62.81
38	20	48	66	38	34	138	39.25	37.65	28.72	105.62
39	18	34	69	59	25	153	36.63	30.98	29.32	96.93
40	18	37	80	41	37	158	33.83	32.29	26.03	92.15
41	05	29	62	37	12	111	39.73	28.41	29.35	97.49
42	07	37	64	42	26	132	32.85	32.85	20.81	86.51
43	06	44	40	25	17	82	27.84	23.01	14.96	65.81
44	07	22	72	30	16	118	27.79	33.73	33.81	95.33
45	07	37	48	20	00	69	32.04	23.10	15.59	70.73

(continued)

Subject No.	MAS Score	Verbal Score	Treatment Totals for m* High m Words	Mod. m Words	Low m Words	Total	Treatment Totals for Polarization* High P. Words	Mod. P. Words	Low P. Words	Total
46	06	31	57	24	16	97	38.62	36.84	33.37	108.83
47	05	45	48	25	11	84	27.20	18.90	10.46	56.56
48	08	51	50	36	33	119	34.43	30.14	16.35	80.92
49	09	34	54	18	08	80	29.83	29.55	12.11	71.49
50	07	27	39	18	05	62	40.00	36.72	33.07	109.79
51	08	37	66	57	44	167	36.91	32.26	31.33	100.50
52	10	45	77	38	38	154	38.30	34.77	35.17	108.24
53	10	46	46	35	14	95	40.56	33.88	25.39	99.83
54	10	35	58	38	26	122	33.63	29.44	27.47	90.54
55	06	38	69	52	34	155	38.93	32.50	18.14	89.57
56	09	44	42	27	16	85	33.62	25.93	19.01	78.56
57	10	51	51	28	24	103	36.12	24.93	20.73	81.78
58	09	38	61	35	18	114	40.24	35.36	24.55	100.15
59	10	27	72	34	28	134	41.25	34.13	38.62	114.00
60	09	46	46	31	04	81	31.46	19.44	17.01	67.91

*Five words in each word group

APPENDIX D

Mean m Scores for Different Anxiety Groups

Stimulus Word	High Anxiety	Moderate Anxiety	Low Anxiety
Kitchen	11.95	13.20	12.90
Army	11.20	12.05	11.85
Money	10.10	10.95	10.35
Garment	10.25	11.15	10.15
Office	10.65	11.25	10.80
Quota	7.20	6.60	7.05
Tartan	5.30	5.60	5.75
Pallor	5.95	7.60	6.05
Entrant	5.50	5.90	6.20
Bodice	8.10	9.30	7.45
Icon	4.00	3.25	3.50
Matrix	3.90	4.55	4.65
Gamin	4.85	4.00	3.35
Ulna	5.00	3.30	4.50
Ferrule	3.45	2.30	3.50

APPENDIX D

Mean Polarization for Three Semantic Factors and Different Anxiety Groups

Stimulus Word	High Anxiety			Mod. Anxiety			Low Anxiety		
	Semantic Factor			Semantic Factor			Semantic Factor		
	Eval.	Pot.	Act.	Eval.	Pot.	Act.	Eval.	Pot.	Act.
God	4.75	4.22	3.05	5.10	4.49	4.35	4.75	3.61	3.59
Doctor	3.70	4.09	3.79	4.25	4.25	4.19	3.82	4.14	3.64
War	4.48	4.90	4.43	4.59	4.99	4.77	4.08	4.79	4.78
Happy	4.34	2.81	4.09	4.39	2.87	4.31	4.57	2.97	4.12
Success	3.72	3.43	3.98	3.79	3.55	4.49	3.72	3.15	3.88
Health	4.01	3.33	3.23	4.23	3.00	3.63	4.19	3.01	3.06
Blue	3.38	3.60	3.31	3.83	3.56	3.19	3.86	3.22	2.68
Hand	3.45	3.69	3.70	3.29	3.47	2.88	3.40	3.40	2.79
Trouble	3.84	3.42	3.88	3.98	3.46	3.80	3.70	3.02	3.50
Art	4.16	2.93	3.10	3.50	2.55	2.56	3.97	2.52	2.61
Full	2.72	2.91	3.27	2.21	2.41	2.64	1.26	2.02	2.63
Winter	3.29	3.36	2.87	3.37	3.64	3.18	2.90	3.18	2.69
Low	3.14	3.15	3.38	2.00	2.42	2.90	1.82	2.61	3.28
Dream	3.61	2.64	3.09	2.76	2.46	3.30	2.78	2.14	2.54
Dark	2.82	3.17	3.25	2.33	3.18	3.24	2.67	2.77	3.00

Maximum polarization for the three factors equals 5.19
Minimum polarization for the three factors equals zero

VITA

Robert R. Trimble

Candidate for the Degree of

Doctor of Philosophy

Thesis: THE EFFECTS OF MANIFEST ANXIETY ON TWO INDICES OF VERBAL MEANINGFULNESS: NOBLE'S m AND SEMANTIC DIFFERENTIAL POLARIZATION

Major Field: Educational Psychology

Biographical:

Personal Data: Place of birth - Webb City, Missouri
Date of birth - December 20, 1926

Education: Bachelor of Science in Education, August, 1950, Kansas State Teachers College, Pittsburg, Kansas, Major, Music Education; Master of Science in Education and Psychology, June, 1957, Kansas State Teachers College, Pittsburg, Kansas; Doctor of Philosophy Degree, Requirements completed July, 1965, Oklahoma State University, Major, Educational Psychology.

Experience: United States Army, 1945 - 1946; Vocal and Instrumental Music Teacher, Galena, Kansas, 1950 - 1952; Riverton, Kansas, 1952 - 1953; Band Director, Clarinda, Iowa, 1953 - 1955; Assistant to the Director of Field Services, Kansas State Teachers College, Pittsburg, Kansas, 1955 - 1958; Instructor in Education and Psychology, Kansas State College of Pittsburg, 1956 - 1961; Graduate Teaching Assistant, Oklahoma State University, 1961 - 1963; Instructor in Educational Psychology, Oklahoma State University 1963 - 1965; Assistant Professor of Educational Psychology, Kansas State College of Pittsburg, 1965 - .