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The Assessment of Achievement Anxieties in Children. How Important is Response Set and Multidimensionality in the Test Anxiety Scale for Children?

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This is a progress report on research conducted (1) to consider the methodological issues of response set and multidimensionality, which might lead to a refinement of the Test Anxiety Scale for Children (TASC) and the Defensiveness Scale for Children and (2) to investigate social background and school achievement correlates of test anxiety and defensiveness in a more heterogeneous group than had previously been done. The scales were expanded so that 7,551 second graders were randomly assigned to one of six possible test situations. Factor analysis of the original TASC for each sex revealed four factors, three of which were replicated on a factor analysis of the expanded TASC. None of the factors were interpreted as clearly defining response set. The four factors were used as subscales in a two-way multivariate analysis to test the race and sex effect. All four subscales contributed to the race effect, while the overall sex effect was due to the white sample only. When results were compared to total TASC scores, the effects proved significant. The following conclusions and directions were made: (1) acquiescent response set is not a major source of variance in TASC, (2) multidimensionality of the scale orients researchers to focus on childrens' anxiety responses to school situations, and (3) it would be difficult to use the interdependent subscales as differentiating correlates of TASC. (JS)

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THE ASSESSMENT OF ACHIEVEMENT ANXIETIES IN CHILDREN:

HOW IMPORTANT IS RESPONSE SET AND MULTIDIMENSIONALITY IN THE TEST ANXIETY SCALE FOR CHILDREN?

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Summary

This is a progress report of a long term program of research concerning positive (achievement motivation) and negative (achievement anxiety) achievement strivings in children and those aspects of the social environment in the home and school that are related to their development and manifestations. The first stage of this program, partially reported here, was designed to deal with general methodological and normative problems in the measurement of achievement anxiety, preparatory to more detailed substantive studies to follow in the next stage. The first stage has three general purposes: (1) consideration of the methodological issues of response set and multidimensionality, which might lead to refinement of the Test Anxiety Scale for Children and the Defensiveness Scale for Children; (2) investigation of social background and school achievement correlates of test anxiety and defensiveness in a more heterogeneous sample of children than had previously been done; and (3) establishment of a pool of subjects with measured levels of test anxiety and defensiveness, from which subjects could be selected for further studies that required certain levels of these variables.

This paper is limited to data concerning the Test Anxiety Scale for Children (TASC). Factor analyses designed to investigate the importance of response set, as well as the multidimensional structure of the scale, are presented. As an illustration of the usefulness of a preliminary effort to rescore the original scale in a multidimensional fashion, race and sex differences on the total scale and the subscales are analyzed.

Expanded forms of the TASC that included original and reversed questions were devised. The results presented here are based on 7551 second grade Ss who were orally administered the scale in the classroom. Data concerning family background, school tests, and school history were obtained from school files.

Factor analyses of the original TASC were performed for each sex. Four factors appeared in both sexes, and were labeled: Test Anxiety, Somatic Signs of Anxiety, Poor Self-Evaluation, and Remote School Concern. For each of three forms of the expanded TASC, separate factor analyses were also performed for each sex. Five or six factors were interpreted. Three of the factors identified in the original TASC replicated in each of the six factor analyses based on the expanded versions of the scale, which included reversed items. In each form of the expanded scale, the largest factor was the bipolar Test Anxiety Factor, which was a content factor that included original and reversed items. Most of the other factors did not provide an adequate test of the alternative interpretations of underlying content or response set dimensions, but content interpretations were proposed because of apparent content similarities in the highly-loaded questions. None of the factors were interpreted as clearly defining a response set dimension. The content of the factors were interpreted as defining both the stimulus conditions that elicit anxiety and the types of reactions that are components of anxiety.

Subscales were developed based on the four factors found in the original TASC. Items received a weight of one if they had comparatively high factor loadings for both sexes; all other items had zero weights. The four subscales were significantly intercorrelated.

A two-way multivariate analysis of variance was performed to test the race and sex effects on the four subscales. The main effects of sex and race were significant. The sex effect, indicating higher anxiety scores for girls, was produced by the Remote School Concern, Somatic Signs of Anxiety, and Test Anxiety Subscales, listed in the order of their contribution to a significant discriminant between the sexes. The overall sex effect was due to the white sample only. All four subscales contributed to the race effect, indicating higher anxiety scores for Negroes than whites; the subscales contributed to a race discriminant in the following order: Remote School Concern, Poor Self-Evaluation, Test Anxiety, and Somatic Signs of Anxiety. These results were compared with those obtained using the total score on the TASC. The main effects of sex and race were once again significant. Thus, the general results using the total score were similar to those obtained with the multivariate test of the four subscales. Two important additional kinds of information were obtained by using the subscales. First, one component of the total scale did not contribute to the overall sex difference--the Poor Self-Evaluation Subscale. Second, even when significant sex or race effects were obtained, the several subscales were differentially useful in discriminating between the sexes or the races.

The following conclusions and directions for future research were proposed. (1) Acquiescent response set does not appear to be a major source of variance in the TASC, but the extent of individual differences in this response tendency warrants assessment. (2) The multidimensional structure of the scale orients our thinking away from looking for anxious

and non-anxious children. Instead, our interest is focused on children for whom different types of school situations elicit anxiety responses and on children who experience different types of anxiety reactions to school evaluation situations. (3) The lack of independence of the four subscales indicate that they do not accurately reflect the orthogonal multidimensional structure of the TASC, and this may be a serious problem in future efforts to differentiate the correlates of the dimensions using these subscales. Despite this problem, these measures of the factors yield certain interesting sex and race results that are not simple duplications of the results using the total score.

THE ASSESSMENT OF ACHIEVEMENT ANXIETIES IN CHILDREN: HOW IMPORTANT IS RESPONSE SET AND MULTIDIMENSIONALITY IN THE TEST ANXIETY SCALE FOR CHILDREN?[1]

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The research I am reporting today grew out of a general interest in the development and manifestations of achievement strivings, and anxieties about achievement in young children. Although there were a number of substantive questions that we wanted to pursue in this area, a priority appeared to exist concerning the measuring instruments. A method for measuring achievement motivation in young children was not firmly established, although the research that Dr. Veroff has reported at this conference changes that situation. The Test Anxiety Scale for Children (TASC), developed by Sarason and his colleagues, appeared to be a valid method for measuring school achievement anxiety and had proved to be a heuristic tool (Sarason, Davidson, Lighthall, Waite, & Ruebush, 1960). However, continued progress in research using this instrument seemed to hinge on certain unresolved methodological problems that had been considered in the early development of the Test Anxiety Scale for Children and later left in abeyance because the scale did seem to yield fruitful results.

As with any self-report device, the major methodological question was whether the self-reports elicited by the scale are accurate reflections of conscious feelings. Two specific issues seemed crucial to

answering this question for the Test Anxiety Scale for Children. The first issue concerned defensive distortion used to hide one's unpleasant or undesirable qualities. The second issue was the problem of response set, posed by the fact that the scale was scored by counting the number of "Yes" answers.

Defensive distortion can result from the suppression of reports about consciously experienced feelings, or the operation of defense mechanisms that prevent conscious recognition of one's feelings. In an attempt to control the former type of distortion, a Lie Scale concerning general anxiety reactions in and out of school was developed during the course of early work on the Test Anxiety Scale for Children (Sarason et al., 1960, Ch. 5). It consisted of questions about experiences that everyone presumably has at one time or another. Questions were worded in extreme forms to insure that their denial more likely reflected a distortion, e.g., Have you ever been afraid of getting hurt? Subjects who denied many experiences of this type were presumed to be lying, and their scores on the Test Anxiety Scale for Children were discounted as invalid. More recently, the Defensiveness Scale for Children (DSC) has been used to measure the tendency to deny the experience of unpleasant feelings in a variety of life situations (Ruebush, 1960). Like the Lie Scale items, the questions on the Defensiveness Scale for Children were assumed to concern very common feelings, but they were not phrased in such absolute terms, and they did not stress anxiety reactions, e.g., Do you feel cross and grouchy sometimes? They seemed to be more relevant to the kind of distortion that could be

viewed as a general style of defense. The Lie Scale and the Defensiveness Scale for Children are positively correlated, and each is negatively correlated with the Test Anxiety Scale for Children. Since both the Lie Scale and the Defensiveness Scale for Children are based on summing replies of "No" to a series of items, the use of either of them to "correct" for distortion on the Test Anxiety Scale for Children is confounded with the influence of response set bias due to acquiescence or negativism.

I am aware of only two studies that directly investigated the influence of acquiescence or negativism on the Test Anxiety Scale for Children or the Defensiveness Scale for Children. Sarason and his colleagues (1960, Ch. 5) developed a measure of response acquiescence based on the number of "Yes" answers to a balanced scale of good descriptions and bad descriptions of the self and others. The descriptions did not concern anxiety, and the questions concerning good and bad characteristics had different content. Correlations between the Test Anxiety Scale for Children and this measure were not significant for either boys or girls in the 5th grade. Lunneborg and Lunneborg (1963) also empl yed a measure of acquiescence with heterogeneous content that did not specifically include questions about anxiety. The scale was balanced for social desirability. This measure of acquiescence and the Defensiveness Scale for Children were significantly and positively correlated for children in grades four through six. This surprising result is difficult to interpret in a response set framework, since it seems to indicate that being acquiescent on the

Lunneborgs' measure is associated with being negativistic on the Defensiveness Scale for Children. Although both these studies failed to show the expected relationship of acquiescent or negativistic response set to the Test Anxiety Scale for Children and the Defensiveness Scale for Children, their relevance to that issue rests on the assumption of a general acquiescent style rather than a test-specific response bias. Since this assumption is disputable, the importance of response set on these scales remains an open question.

The assumption that the Test Anxiety Scale for Children measures a unidimensional class of anxiety reactions was the other major methodological issue that concerned us. Although the scale had been developed by means of item analyses, further investigation of the appropriateness of a single total score seemed necessary in view of the theoretical importance attached to the specific type of anxiety being measured. After we had begun this study, two reports on the factor structure of the scale were published (Dunn, 1964, 1965; Silverstein & Mohan, 1964). Both indicated a fairly stable multidimensional structure for the Test Anxiety Scale for Children when comparing 4th through 9th graders, and even mentally retarded children. These studies emphasized the need to investigate several questions about the implications of the multidimensional structure of the scale, e.g., which components of the scale accounted for previously found relationships with the entire scale score? Would our conceptions of the test anxious child be affected by considering the separate components of the scale? Would a rescoring of the scale in terms of its factor structure be feasible and useful?

The third general issue that interested us was a further specification of the broad social background correlates of the scale. Since the initial validation studies, most of the research with the Test Anxiety Scale for Children has been done with subjects from white, middle class backgrounds. There is some evidence that the test anxiety scores of boys are negatively associated with the socioeconomic status of their parents (Abelson, 1961; Adams & Sarason, I. G., 1963; Dunn, 1966; Feld, Owen, & Sarason, 1963; Sarason et al., 1960, Ch. 8). On the other hand, there have been repeated findings that achievement motivation is positively related to social class (Feld, 1960; Rosen, 1956, 1959; Veroff, Atkinson, Feld, & Gurin, 1960). Therefore, it seemed important to reassess the demographic correlates of scores on the Test Anxiety Scale for Children in a more heterogeneous sample than had previously usually been used.

The issues I have just discussed led us to plan our research in two stages. I am reporting today on the first stage, which was designed to deal with the general methodological and normative problems just cited. This phase was preparatory to more detailed substantive studies to follow in the next stage of our research program. There were three general purposes in the first phase: (1) consideration of the methodological issues of response set and multidimensionality, which might lead to refinement of the measuring instruments; (2) investigation of the social background and school achievement correlates of test anxiety and defensiveness in a more heterogeneous sample of children than had previously been done; and (3) establishment of a pool of subjects with

measured levels of test anxiety and defensiveness from which subjects could be selected for further studies that required certain levels of these variables.

Because of the sizable negative correlation typically found between scores on the Test Anxiety Scale for Children and the Defensiveness Scale for Children, initial collection of data from a large sample was necessary in order to provide a sufficient pool of subjects with extreme scores on both measures. With the typically found negative correlations between these two scales of around -.50, it was estimated that to obtain 100 subjects in the extreme quartiles on both measures, a total pool of 6000 subjects would be required.[2] In view of this estimate and our interest in studying children from heterogeneous backgrounds, we decided to use the entire second-grade population of the county school system in which our research laboratory is based. Second graders were chosen because we wanted to work with children as young as possible.

Our major decision concerned the manner of assessing the influence of acquiescent response set on the Test Anxiety Scale for Children (or the Defensiveness Scale for Children). We were guided by three interrelated considerations. The first was that our interest in this problem stemmed from a need to reassess the validity of these particular measuring instruments. The second was Cronbach's early definition of response set, "A response set is any tendency causing a person consistently to give different responses to test items than he would when the same content is presented in a different form [Cronbach, 1946, p. 476]."Lastly, we were not convinced that a general acquiescent response style had been demonstrated to exist. (See McGee, 1962, or Rover, 1963, for similar conclusions.)

These three considerations required a method of assessing acquiescent response set that could directly determine whether revising the form of the questions on the Test Anxiety Scale for Children would change a subject's position on the scale. A further requirement was that high scores on the measure of acquiescence would be based on contradictory responses. This requirement was especially important because we assumed that the Test Anxiety Scale for Children was not unidimensional. In studies where subjects are not required to be contradictory to get high acquiescence scores, it is difficult to eliminate the possibility that the self-descriptions are accurate. Therefore, we decided to investigate acquiescence by reversing the items on the scale itself, and giving both versions of the same item to the same subjects, although not consecutively.

Because of the assumptions that acquiescence could only be inferred from contradictory replies and that the different items were not necessarily equivalent, the assessment of response set had to be made at the item level. The factor analysis of an expanded Test Anxiety Scale for Children that included matched pairs of original and reversed items seemed to meet this condition, as well as to satisfy our interest in the factor structure of the scale. The use of reversed items to measure response set in this manner rests on two assumptions: (1) that the psychological content of the original and reversed items are polar opposites, and (2) that giving the same answer to both the original and reversed versions of an item is psychologically and logically contradictory. Accepting these assumptions, for the time being, how would response set influence the nature of the factor structure?

If response set has no influence, the matched original and reversed items should load on the same factor, with opposite signs for their factor loadings. The "ideal" factor to interpret as a refutation of the influence of response set would be one where for every original item with a high positive factor loading, there is a reversed version of the item that has an equally high negative factor loading, and vice versa. On the other hand, if response set strongly influences replies, a response set factor should occur. This factor would be one where the loadings for matched original and reversed items have congruent signs. If replies to the Test Anxiety Scale for Children are primarily due to response set, this would be a large and general factor, with all the original and reversed items having factor loadings with the same signs. Alternatively, there could be both content and response set dimensions underlying replies to the Test Anxiety Scale for Children. The proportions of variance accounted for by the two types of factors would then be of interest.

If the basic assumption of totally adequate reversal of the items is not valid, then other factor patterns may occur that would obscure the interpretation of content versus response set factors. If the reversal process changes the psychological meaning of a question, rather than only its form, the two versions of a question may load on different factors. This would leave unresolved the issue of content versus response bias determination of replies. Shifts in meaning could also occur that would result in the two versions of a question reflecting the same underlying dimension of meaning to varying degrees. This would be

revealed in factor loadings of different size on the same factor. This pattern would also be equivocal since it could be attributed either to the inadequate reversal of psychological meaning or to the influence of response bias.

These then were the major outlines of the study: (1) to develop reversed versions of the questions on the Test Anxiety Scale for Children and the Defensiveness Scale for Children; (2) to determine the multidimensional structure of each of these expanded scales in order to specify content versus response set dimensions; (3) to reassess the relationship between the two scales in terms of their multidimensional structures; (4) to develop revised versions of the scales that controlled for response bias and multidimensionality; (5) to relate scores on the original and revised versions of the scales to various social background, school history and school achievement characteristics in order to consider these relationships in a heterogeneous population, and to compare these relationships for the original and revised versions of the scales.

The data from the entire study are not yet fully analyzed, so that this is a progress report. My talk today concerns only the Test Anxiety Scale for Children. It deals with the factor analyses and an examination of the results of sex and race comparisons using a preliminary effort to rescore the original scale in a multidimensional fashion.

Methods and Procedures[3]

The Sample and Research Site

The site of the study was a rapidly growing suburban county adjacent to one of the larger and older metropolitan areas in the eastern part of the United States. The county has been shown to be typical of the residential suburbs that have developed since World War II (Goldsmith & Stockwell, 1965). Its rapid population growth reflected the suburban movement of relatively affluent families with young and school-aged children. The county school population can be viewed as a sample from the school populations of these rapidly growing suburban areas that have relatively high socioeconomic status.

Despite this overall characterization, there was considerable diversity in occupational, educational, and financial status among the county residents. In 1960, 17% of the county population (and 30% of the U.S. population) lived in rural areas. The proportion of Negroes in the county was slightly less than in the United States (9% versus 10.5% in 1960). Proportionately, the Negroes were mostly concentrated in the rural areas (they were 26% of the population in the county rural areas) and least likely to be resident in the fastest growing suburban areas of the county (3% of that population). Selected socioeconomic population characteristics of the county are compared with those for the total United States in Table 1. Higher proportions of white collar workers (especially professional, clerical, and kindred workers) were found among the employed males in the county (49%) than in the United States (36%). Unlike the nation as a whole, skilled blue collar workers in the county were the largest single occupational category of the

11 major Bureau of the Census categories (26% in the county and 20% in the United States). The median level of educational attainment also was higher (12.1 years) than the average for the United States (10.3 years). Even so, 25% of the county adult population had no high school education (as compared with 39% for the United States). Family income level in the county clearly surpassed that of the United States. About 26% of the county families earned at least $10,000 in 1959 (as compared with 15% for the United States) and only 20% of them earned less than $5,000 in 1959 (as compared with 41% of the U.S. families).

Table 1 about here

The total sample was defined to include all children enrolled in the second-grade classes of the county public school system on the day that the testing was done at their particular school. This included 8875 subjects enrolled in 111 schools. Not all children in the total sample were administered the classroom procedures: 7.9% were absent, and 2.6% had parents who refused permission for participation. Subjects who omitted answers to more than one question on either the expanded Test Anxiety Scale for Children or the expanded Defensiveness Scale for Children were also excluded from the sample used in this paper (4.3%).

We checked whether there was a bias in the final sample, which included about 85% of the original subjects. The subjects excluded for any reason tended to be lower in IQ and reading readiness scores, and those whose parents refused permission for participation tended to come from families with lower socioeconomic status. Thus, the subjects

used in the present paper included a slight overrepresentation of the upper status and high ability second graders. The mean first grade IQ of the final sample was about 101, with a standard deviation of 14.6. A fuller description of the characteristics of the final sample is available in Table 2.

Table 2 about here

Instruments

Expanded forms of the Test Anxiety Scale for Children and the Defensiveness Scale for Children were developed, which included original and reversed questions. It was difficult to write questions where alternate responses of "Yes" and "No" to original and reversed versions would indicate consistent feelings. Logically, this could be handled by "reversing" one feeling state by its negative, e.g., worry and not worry, fearful and not fearful. However, we could not ask second-grade children to answer "Yes" or "No" to questions such as, "Are you not afraid of tests in school?" Instead, we tried to write reversed items so that if a subject said "Yes" to the original question, it would be logically and psychologically inconsistent to say "Yes" to its reversed version, for example, "Are you afraid of tests in school?" versus "Do you like tests in school?" "Do you worry about being promoted?" versus "Do you feel sure that you will be promoted?" The difficulty with this approach was that replying "No" to both questions was not necessarily inconsistent. This difficulty mainly stemmed from the lack of contradiction between feeling neither worried nor optimistic, fearful nor confident, etc.

Our second rule for writing reversals was to avoid extreme statements. The original questions were not worded in the extreme; they asked whether the child felt afraid or sometimes worried. We reversed these items by asking if the child felt sure of himself or usually felt pleased. It would have been more logically correct to oppose sometimes being afraid with always feeling confident, but the psychological implications of reporting always feeling a certain way did not seem to be appropriately opposite to the original questions.

Several possible reversals were developed for most questions in consultation with teachers and elementary school principals, and were then pretested in order to choose those most meaningful to the children. The final set of items is listed in Table 3.

Table 3 about here

We were able to reverse all but one item (Item 27). However, we were not satisfied with two sets of reversals. The problematic questions were those that concerned dreams and waking fantasies about school while at home. A child who was anxious about school might have both anxiety-provoking dreams about school and pleasant dreams about school, the latter being more clearly wish-fulfillment dreams. The key element might be whether the child remembered having dreams about school. Similarly, it seemed possible that an anxious child could have both pleasant and unpleasant fantasies; or that the presence or absence of such thoughts about school might be the critical dimension underlying these questions. The original items that concerned anxiety dreams or unpleasant fantasies and thoughts about school while at home

were revised to describe pleasant dreams or fantasies about school, but these were not considered adequate reversals. Two affectively neutral questions were also added to all forms of the expanded scale; they simply asked about the occurrence of these thoughts or dreams:

31. When you are at home, do you think about your school work?

32. Do you sometimes dream at night about school?

Because of time limitations in administering the tests, three parallel forms of the expanded Test Anxiety Scale for Children were developed. Each form included all 30 items from the Sarason scale (Sarason et al., 1960, Appendix B), the 2 neutral items about dreams and thoughts about school, and 10 reversed questions. The reversed questions were randomly assigned to one of the three forms. The original questions from the Test Anxiety Scale for Children appeared in the same sequential order in all test forms; this order was the one used in previous studies. The new questions appeared at the same point in all forms; this sequential location was determined randomly, with the exception that no original item was immediatly preceded or followed by its revised version. The Defensiveness Scale for Children (Sarason, Hill, & Zimbardo, 1964, Appendix A) was revised in a similar fashion to yield two test forms.

Classroom Data Collection

Six test conditions resulted from all possible combinations of the three expanded forms of the Test Anxiety Scale for Children and the two expanded forms of the Defensiveness Scale for Children. Each second-grade class was assigned at random to one of the six test conditions.

All classroom data collection was done during a 2-month period in the middle of the school year. The procedures were designed to test the children under normal classroom conditions. Testing was done in the regular classrooms, and women examiners were used since all the teachers were women. At the time of the study, the remnants of a dual school system remained in evidence in the county; 89% of the Negro second-graders were enrolled in 15 all-Negro schools and had Negro teachers. Therefore, a Negro examiner was used in those schools. Because of staff limitations, a single Negro examiner did all the testing. This confounded race and examiner effects for most of the Negro subjects. In the remaining schools, 11 examiners were used, with the assignments made solely on the basis of convenience of scheduling.

The examiners were introduced to the children in a standard, neutral manner by the teacher, who then left the room. The children each received three-page answer sheets. The middle page was blank; on the first and last pages were listed question numbers and alongside, the words, "Yes" and "No." The examiner emphasized that she was the only one who would see the answers, that there were no right or wrong answers, and that different children thought and felt differently about the questions. The subjects were told that their task was to listen to each question and then to circle either "Yes" or "No." The expanded Test Anxiety Scale for Children was administered first. Questions were repeated if the children so requested. Then, as a transition, the examiner led the children in a two- or three-minute series of stretching and bending exercises. The expanded Defensiveness Scale for Children was then administered. The testing sessions were scheduled for

1 hour and 15 minutes. In most instances, this was ample time to complete the procedures.

School Record Data Collection Procedures

Information on family background, school tests, and school history was obtained from the cumulative folders maintained by the schools for each pupil. These transcribed data were then coded and punched on IBM cards.

The coding and punching procedures included checks for inter-coder reliability. All checks indicated inter-coder agreement above 97%. There was no duplicate transcription of school-record data by the different clerks to provide reliability estimates. Any unreliability in the transcription procedures or in the information in the school records contributed unknown amounts of error to the data.

Data Analysis

Since several separate data analyses will be reported, I will describe the statistical procedures separately.[4] There are only two general points I would like to make. First, all probability values reported are for two-tailed tests. Second, most of the analyses are based on very large numbers of subjects and the null hypothesis is relatively easy to reject. Therefore, stringent significance levels were used, and the size of the relationships or extent of differences should be considered along with the probability values.

Results

Symmetry of Reversals

Before describing the factor analyses, I will present an attempt to assess the adequacy of the question reversals. We followed the lead

of Samelson (1964), who proposed a means of evaluating the equivalence of the extremity of item reversals using a scaling theory model (Coombs, 1951). This approach applies to any method of assessing a subject's position on some continuum by means of his agreement or disagreement with a stimulus question. Each item is assumed to be placed somewhere on an underlying attitude continuum. Each subject also has a position on the same continuum. The response of an individual subject is a function of both his position and the position of the item. In order for a pair of items to be considered adequate reversals, both items must scale at the same point on the underlying continuum--the reversal must be symmetrical. The scale position of an item is estimated by its level of acceptance or rejection in a sample, that is, by its marginal values. The assumption of symmetrical reversals therefore requires that the proportion of subjects accepting an original item equals the proportion of subjects rejecting its reversed version. Figure 1, adapted from Samelson, illustrates the implications of this theoretical position for the phenotypic responses of three subjects who differ in their true position on an anxiety continuum.

Figure 1 about here

Consider items 25 and 25R in Figure 1, which are very close to being perfectly symmetrical. All three subjects could give phenotypically consistent replies to this pair of questions. Inconsistent replies ("Yes" to both, or "No" to both) could be considered a function of response set, unreliability in the subject's own position, or unreliability in the subject's judgment of the item's position.

Now consider what happens when there is not perfect agreement between the percentage of replies of "Yes" to the original item and "No" to the reversed item. For items 2 and 2R in Figure 1, rejection of the reversed item indicates more extreme anxiety than does acceptance of the original item. Subject A would again appear consistently anxious and Subject C consistently unanxious, but Subject B would appear to be inconsistently acquiescent by replying "Yes" to both items. For items 10 and 10R, where the original version is more extreme than the reversed version, Subject B would reply "No" to both questions, and appear inconsistently negativistic.

It does not seem parsimonious to conclude that Subjects A and C are consistently replying without either acquiescent or negativistic response set and that Subject B is alternately consistent, acquiescent, and negativistic. Samelson concludes that in order to use double agreement or disagreement as an indication of response set, it is first necessary to establish that reversals are symmetrical. If the reversals are not symmetrical, a more appropriate estimate of the extent of "true" response set may be obtained by comparing observed values of double agreement to "minimum" values that are determined by use of the marginals.

The adequacy of the symmetry of reversed test anxiety items was measured by this model. The data relevant to this are in Table 4. The percentage of subjects who replied "Yes" to an original item (Column 1) was compared with the percentage of subjects who replied "No" to the reversed form of that item (Column 2). The signed difference between these percentages was used as an index of extent and direction of

asymmetry (Column 3). If the item had been symmetrically reversed, this difference would have been zero. The asymmetry index, in Column 3, shows considerable variation in the symmetry of the reversals. The predominant bias was toward less extreme scale placements for the reversed items; for 18 of the 30 pairs of original and reversed items, the asymmetry index was negative: that is, the original item was less likely to be endorsed than the reversed item was to be rejected.

Table 4 about here

There was no precise way to estimate the degree of asymmetry that could be tolerated. But it seemed necessary to question the adequacy of reversals for those pairs of items where the asymmetry index was more than 20%. This was true of six pairs of items; they are the top and bottom three pairs in Table 4. A majority of the item pairs (18 of them) showed discrepancies of less than 10%. We judged these to be relatively symmetrical reversals.

Estimates of Response Set in Individual Item Pairs

The asymmetry index also provides lower and upper bounds for the observed percentage of subjects replying "Yes" to both the original and reversed items, if the obtained marginals for any pair of items are assumed to be fixed. The assumption of fixed marginals is equivalent to assuming that the questions have stable scale values. This assumption is reasonable for these data. For the original items, the overall mean difference in the percentage of "Yes" replies to each question for the three random samples ($N \geq 2400$ each) that received the three forms of the expanded Test Anxiety Scale for Children was 2.7%.

Thus, these values were quite stable. The same type of comparison was not possible for the reversed items since they appeared on only one form of the expanded Test Anxiety Scale for Children. However, an indirect indication of the stability of the scale values for both the reversed and original items was available since the asymmetry index was separately computed for the total samples of boys and girls. The correlation of .94 between the indexes for the two sexes on the 30 items can be taken to indicate that the reversals and originals had similar scale values in the two sexes.

Granting then, the assumption of fixed marginals, what is the relationship between the asymmetry index and the lower bound for the observed percentage of double agreement (replying "Yes" to both the original and reversed versions of an item)? This relationship is illustrated in Figure 2 for the same three sets of items previously discussed. The minimum possible value of double agreement equals the value of the asymmetry index if the index has a positive sign, and the minimum value equals zero if the asymmetry index is negative. For item 2, the marginal value of the "Yes" response was 49%, and for item 2R, 76%. The occurrence of these values indicate that a minimum of 25% of the subjects must have replied "Yes" to both questions; this is equal to the asymmetry index. For items 10 and 10R, however, where the asymmetry index is negative, the minimum value for the double agreement cell was zero. If these minimum values for double agreement coincided with the observed values, it would support the hypothesis that the subjects were replying to the two items in terms of their content, and that the items were located at different positions on the underlying content dimension.

Figure 2 about here

Let us now return to Table 4, in order to compare the minimum and observed values of double agreement. Column 4 lists the percentage of subjects who replied "Yes" to both the original and reversed items in each pair; the mean was close to 18%. The discrepancies between these observed values of double agreement and the minimum values are listed in Column 5; the mean excess above the minimum was 13.86% for all items. These data imply that for any pair of matched items, approximately 14% of the subjects were inconsistently acquiescent.

There is also a maximum figure for double agreement that is determined by the marginals, as can be seen by returning to Figure 2.[5] The maximum amount of double agreement possible is equal to the total percentage of subjects who said "Yes" to either the reversed or original item, whichever value is smaller. For items 2 and 2R (in Figure 2) this value was 49%, and for items 10 and 10R it was 28%. If these maximum values coincided with the observed values, they would support the hypothesis that the subjects were replying to the two items in a manner determined by acquiescent or negativistic response set. This comparison is given in Column 6 of Table 4. The maximum double agreement was never reached. The mean discrepancy below the maximum was 14.28%, which was close to the mean discrepancy above the minimum.

Thus, the average observed percentage of double agreement could be described as falling midway between the theoretically expected minimum and maximum value. This indicated that neither the hypothesis of content or of response style determinants was clearly supported by

the data, when all items were considered. Certain item pairs did tend to have observed values of double agreement that were much closer to their minimum than to their maximum, which would support a content interpretation based on different scale values (e.g., items 4, 6, 3, 13). But other item pairs had values of double agreement that were much closer to their maximum values, which would support a response set interpretation (e.g., items 30, 18, 23, 5). We will see shortly, in the report of the factor analyses, that these variations seemed to be related to the underlying dimension of anxiety that the items reflected.

Factor Structure of the Original Test Anxiety Scale for Children

The first factor analyses I will report concern the original Test Anxiety Scale for Children. I am starting here in order to provide a framework in which to view the factor analyses of the three forms of the expanded scale, which will be presented subsequently.

The 32 questions that were common to all three forms of the expanded scale were used in these analyses. These questions were the 30 items of the Sarason scale and the 2 affectively neutral items concerning dreams or thoughts about school while at home. Since these data have been reported elsewhere (Feld & Lewis, 1967), the results will be only briefly noted here.

For each sex ($N \geq 3600$), principal component factor analyses were computed from product-moment correlation matrices. The squared multiple correlation of each variable with all other variables was used as the estimate of communality. The first four principal components were rotated by use of Kaiser's normalized varimax solution for orthogonal rotation; independent rotations were performed for each sex.

Each rotation yielded four interpretable factors. By inspection, the same factor labels were assigned for both sexes. Relationships between the two factor matrices were then estimated by use of the coefficient of factor similarity (Barlow & Burt, 1954). This index is analagous to a correlation in that it varies between minus one and plus one. It is an estimate of the proportionality in the two sets of factor loadings.

In each instance the factors identified with common labels yielded indices of factor similarity of .98 or .99. In contrast, the similarity coefficients for the remaining pairs of nonmatched factors were between .36 and .74. We concluded that the four pairs of commonly-labeled factors for boys and girls were quite similar.

The Test Anxiety Factor accounted for the greatest common variance, about 40% for both sexes. The items with the highest loadings included nearly all the items that mentioned the word, test. For example:

25. When the teacher says that she is going to give the class a test, do you become afraid that you will do poor work?

20. Do you worry a lot <u>before</u> you take a test?

The Remote School Concern Factor was the smallest one for both sexes (boys = 18%, girls = 14%). The highest loadings included all the items describing dreams and most of the items dealing with thoughts about school while at home. The term, <u>concern</u>, rather than anxiety, was chosen for its title because of the high loadings of the two affectively neutral items. For example:

8. When you are in bed at night, do you sometimes worry about how you are going to do in class the next day?

31. When you are at home, do you think about your school work?

32. Do you sometimes dream at night about school?

18. Do you sometimes dream at night that the teacher is angry because you do not know your work?

The Comparative Poor Self-Evaluation Factor accounted for about 20% of the common variance for each sex. Items with high loadings concerned expectations of failure, especially in comparisons with other children. For example:

10. When the teacher is teaching you about reading, do you feel that other children in the class understand her better than you?

7. Do you sometimes dream at night that other boys and girls in your class can do things you cannot do?

The Somatic Signs of Anxiety Factor accounted for more common variance for girls than boys (26% versus 20%). All five items with somatic referents had the highest loadings on this factor, followed by items about expectations of poor work. For example:

24. When you are taking a test, does the hand you write with shake a little?

9. When the teacher says that she is going to find out how much you have learned, do you get a funny feeling in your stomach?

These factor structures were compared with those reported by Dunn (1965) for each sex at two older age levels--4th and 5th graders, and 7th and 9th graders. Dunn also interpreted four factors at each age level, and factors with labels similar to the ones we used were always found. The coefficients of factor similarity that we calculated indicated marked stability across age and sex groupings. The Test

Anxiety Factor was the largest one in each sample, and the most stable factor across all comparisons.

We were then interested in the effect that the inclusion of reversed questions in the item pool would have on the stable factor structure of the original Test Anxiety Scale for Children.

Factor Structure of the Expanded Test Anxiety Scale for Children

For each of the three forms of the expanded scale, separate factor analyses were performed for each sex ($N \geq 1200$ each); all 42 items were used, which included 10 different reversed items for each form. Comparable procedures were used to those just reported. Depending on the sample, five or six factors exhausted the originally estimated common variance. Because we were interested in comparing the factor structures for the three forms of the expanded Test Anxiety Scale for Children, both five and six factors were rotated for all groups. The rotation solutions retained for interpretation were the ones yielding the highest coefficients of factor similarity across sex within a given form of the expanded Test Anxiety Scale for Children. Brief descriptions of each factor are provided in Table 5, along with the percentage of common variance accounted for by each factor, and the factor similarity coefficient for the two sexes on the same form.[6]

Table 5 about here

From now on I will refer to the factor analyses using only the 32 questions asked of all subjects as the total factor analyses. Three of the factors that had been identified in the total factor analyses

also appeared in each of the six factor analyses based on the larger item pools and the three random subsets of the subjects. These factors were Test Anxiety, Poor Self-Evaluation, and Somatic Signs of Anxiety. Only one form of the expanded scale had a factor similar to Remote School Concern, which was the smallest factor in each of the total factor analyses.

Interestingly enough, the additional factors appearing in the expanded scales were not always primarily defined by the reversed items. (Only Factor C in Form 1, Factor H in Form 2, and Factors K and L in Form 3 were of that type.) For all three forms of the expanded Test Anxiety Scale for Children, at least one factor was interpreted that was primarily defined by items that had been in the total factor analyses. (These were Factors F and FF in Forms 1 and 2 and Factor J in Forms 2 and 3.)

I will now briefly describe the patterns of factor loadings in terms of their support for a response set or content interpretation. The Test Anxiety Factor (Factors A in Table 5) always exhibited a pattern of factor loadings that supported a content rather than a response set interpretation of the underlying dimension. It was always a bipolar factor, with original questions concerning test anxiety at the positive pole and reversed questions concerning test confidence at the negative pole. The matched original and reversed versions of the questions that defined the factor tended to have loadings of similar magnitude.[7]

None of the other factors that replicated in all three forms of the expanded scales showed such a clear pattern of bipolarity.

The Somatic Signs of Anxiety Factor (Factors D and DD in Table 5) usually did not clearly support or refute the response set hypothesis. This ambiguity was probably related in part to the relatively small number of relevant items on the original scale (five). This meant that very few reversed items of this type appeared on any one form, and in fact, Form 1 did not have any reversed items with somatic content. Thus, the somatic factor could not show a clear bipolar pattern on Form 1. On the other two forms, two or three of the highest-loading items on the positive pole of the somatic factor had been reversed, and the loadings for the reversed items were generally negative, but of very low magnitude. On Form 2, two of the items concerning somatic signs of anxiety had reversals, but only one of these pairs had high defining loadings in both its original and reversed version. For the other pair, the reversed version, but not the original member, had a defining loading for boys, and the opposite pattern occurred for this pair for the girls. This pattern of oppositely-signed loadings on Form 2 was viewed as minimal support for a content interpretation of the factors. On Form 3 of the expanded scale, three of the items about somatic reactions to school were reversed. The original versions of these items had defining loadings on the Somatic Signs of Anxiety Factors; although all the reversed versions of these questions had negative factor loadings, they were of very small magnitude. A number of other matched original items besides those with somatic content had defining loadings, but none of their reversals did. The factors were essentially unipolar for both sexes and only original items had defining loadings. Two interpretations

of this ambiguous pattern on Form 3 seemed plausible. The matched original and reversed items could be reflecting different dimensions, that is, the reversal process may have changed the meaning of the questions. Alternatively, response set could be operating to a sufficient extent to depress the appearance of a bipolar factor, but not sufficiently to produce a unipolar factor that included both versions of any item. The Somatic Signs of Anxiety Factors were, in general, not considered to offer clear support for either a content or response set interpretation.

A factor comparable to Comparative Poor Self-Evaluation also occurred in all three forms (Factors E and EE in Table 5). All these factors seemed to define a dimension of expectations of failure, with comparative self-other judgments most strongly reflecting this dimension. None of these factors had a clear bipolar pattern. An unusual pattern was found on Form 1, where three of the questions concerning self-other comparisons of adequacy of school performance were reversed. The matched original and reversed items of this type defined two factors, Comparative Poor Self-Evaluation (Factor E), and Comparative Positive Self-Evaluation (Factor C). This was taken to imply that these "reversals" were not polar opposites, but instead, were psychologically distinct from the original items; expectation of failure was an orthogonal dimension to expectation of success.

On the other two forms of the expanded scale, the patterns of factor loadings for the Poor Self-Evaluation Factor were usually equivocal in their support for the alternative hypotheses of response bias or content interpretation; the patterns were usually similar to

those just described for the somatic factors. On Form 2, the Poor Self-Evaluation Factor was unipolar, with only original items having defining loadings. None of the original items with the highest loadings had reversed versions available on this form of the expanded Test Anxiety Scale for Children, so the opportunity for a bipolar pattern was limited. However, five of the original items with lower defining loadings for the boys and three of these items for the girls had matched reversals on this form of the expanded scale; none of the reversals of those items had defining loadings, although all but one of them had negative factor loadings. Similar ambiguity occurred for the comparable factor for the boys on Form 3 (Factor E) because only one of the items with a defining factor loading was a member of the 10 reversed pairs on that form. This was a reversed item with a negative factor loading; its matched original version had a zero-order loading. For the girls who received Form 3, the pattern of factor loadings was somewhat different. One pair of matched items had positive loadings in <u>both</u> versions, which would be consistent with a response set interpretation. For three pairs of items, either the original form had a defining positive loading or the reversed form a defining <u>negative</u> loading, but the matched alternative versions had zero-order loadings. None of these items had very high loadings. We are therefore left with doubt about a content interpretation because of the positive loadings of both versions of one pair, but not enough clear evidence for an overall response set interpretation of this factor. In general, the Poor Self-Evaluation Factors raised more questions about a simple content interpretation than did the Test Anxiety or Somatic Signs of Anxiety Factors.

A factor comparable to Remote School Concern was identified only in Form 1 of the expanded scale (Factor B). It confirmed our suggestion that the report or lack of report of dreams about school rather than the anxiety content of the dreams was the key element in these questions. All four questions concerning anxiety-laden dreams about school had reversed versions on Form 1. Both versions of these questions had positive factor loadings and most of them were of defining magnitude. The two neutral items concerning dreams or thoughts about school while at home also had high positive loadings on this factor. Since we had recognized in advance that the reversals of the dream questions were not contradictory, we did not view this pattern as supporting a response set interpretation.

None of the other factors that appeared only in the separate factor analyses by forms showed a pattern of factor loadings that was consistent with a response set interpretation (Factors F through L in Table 5); there were no instances where matched original and reversed items had defining factor loadings with the same sign. Most of the patterns were equivocal; the factors were bipolar with original items at the positive pole and reversed items at the negative pole, but generally, only one matched pair of original and reversed items had high loadings with opposite signs. One of these factors did show fairly strong support for a content interpretation. The Public Evaluation Anxiety versus Public Evaluation Confidence Factor for the Form 2 Girls (Factor J) had three matched pairs of original and reversed items with appropriate bipolar defining loadings.

In summary, the six factor analyses each provided one large factor that clearly warranted a content interpretation. No factors were interpreted as clearly defining a response set dimension. Most of the factors did not provide an adequate test of these alternatives, but content interpretations were proposed because of apparent content similarities in the highly-loaded questions.

Factor Subscores

The stability of the factor structure of the Test Anxiety Scale for Children seemed to increase the likelihood that a multidimensional rescoring of the scale might prove useful. I would like to report briefly now on a preliminary revised scoring system.

Subscales were developed based on the four factors from the total factor analyses. Items received a weight of one if they had comparatively high factor loadings for both sexes; all other items had zero weights. The same weights were used for both sexes in order to facilitate sex comparisons. In most instances, the items chosen had factor loadings of at least .30, but in some cases items with a slightly lower loading in one sex were included. Weights were assigned on the basis of the loadings on each factor, without regard for loadings on any other factor. This resulted in some items being weighted on two subscales and other items not being included in any subscale. This simple scoring device was chosen because it might easily be applied to other data. A system of this type has been shown to yield fairly comparable results to that estimated by a least-squared regression of the actual factor scores onto the observable data (Horn, 1965). The items included

in each subscale are listed in Table 6, along with the means and standard deviations for the total sample.

Table 6 about here

The four subscale scores were positively intercorrelated (.32 to .65), as is typical when a simplified scoring technique is used to estimate factor scores. In part, these correlations represent item overlap, but this would not entirely account for the positive relationships. These correlations indicate that the subscales do not accurately reflect the orthogonal factors from which they were derived.

Sex and Race Differences

As one means of determining the usefulness of these subscales, we investigated sex and race differences. The entire sample of white subjects was compared with those Negro subjects attending all-Negro schools.[8] The raw scores on each subscale were converted to standard scores with a mean of 50 and a standard deviation of 10. This procedure enabled us to eliminate mean differences in the four subscales that would result from the differing numbers of items in each index. It also equated the variances and therefore made the data more appropriate for analysis of variance techniques. Table 7 lists the means and standard deviations for each race and sex group.

Table 7 about here

A 2 X 2 generalized analysis of variance factorial design was used, with the four subscales as the criteria variables.[9] This multivariate procedure tests the equality of the mean vectors (of the four criteria)

for the race and sex groups. When the results of this test indicate a significant effect, it is appropriate to consider whether the effect is uniform across the four subscales, by means of a 2 X 2 univariate analysis of variance for each subscale. The results of these analyses are presented in Table 8, and the effects can be seen in Figure 3, where the standard score means on the four subscales are plotted for each of the race and sex groups.

Table 8 and Figure 3 about here

The multivariate test for the main effect of sex was significant, indicating that the sexes differed in some way on the four subscales. (In this section all significant effects were beyond .001.) The univariate F tests for each subscale indicated that the sex effect was not uniform. The Poor Self-Evaluation Subscale did not show a significant main effect for sex. On the other three subscales, girls had significantly higher scores than boys. The relative importance of the subscales in contributing to the overall multivariate sex effect can be seen in the last column of Table 8. The standardized discriminant function coefficients provide the weights that would best discriminate between the two sex groups, in a least squares sense, using a linear combination of scores on the four anxiety subscores. The Remote School Concern Subscale would be relatively most important in discriminating the sexes, and the Somatic Signs of Anxiety Subscale the next most important. Despite the significant univariate F associated with sex for the Test Anxiety Subscale, the low discriminant coefficient suggests that this subscale does not provide much independent contribution to the discrimination between the sexes. An explanation is probably found in the

sizable positive within-group correlations between the Test Anxiety Subscale and both the Remote School Concern Subscale (.587) and the Somatic Signs of Anxiety Subscale (.646). Thus, the differences between the sexes in scores on Test Anxiety can be accounted for by Remote School Concern and Somatic Signs of Anxiety.

Although there were no significant interactive effects, inspection of the four sets of profiles in Figure 3 suggested that the significant main sex effects were primarily due to the white sample. To test this, one-way analyses of variance were computed for the simple main effect of sex, for each race group. These data are in the lower half of Table 8. The results for the white subjects duplicated those for the total sample, but there were no significant sex differences for the Negro sample. Thus, the overall main effect for sex was primarily due to the white sample.

The multivariate test of the main effect of race was also significant. Race had a more uniform effect than sex; Negro children had significantly higher anxiety scores than white children on all four subscales. The Remote School Concern Subscale was again most discriminating, but in contrast to the lack of a sex effect on Poor Self-Evaluation, that subscale was the next most important one in discriminating between the two race groups. Although Figure 3 indicates that the race effect appeared to be larger for males than females on each of the four subscales, the simple main effect of race was significant for each sex. Thus, both the males and females contributed significantly to the overall main effect for race.

The relatively greater importance of the race effect, as compared to the sex effect, also is apparent in Figure 3. The multivariate analysis of variance provided an estimate of the relative strength of the two main

effects, in the related canonical correlation between each of the main effects and the four subscales. This correlation was .113 for the sex effect and .209 for the race effect. Thus, the trend of a stronger race than sex effect, apparent in Figure 3, was confirmed by the multivariate analysis.

The results derived from the subscale analysis were compared with those obtained using the total score on the Test Anxiety Scale for Children (the 30-item Sarason scale). The data for the total scores are presented in Table 9.[10] The main effects of both sex and race were significant, but the interaction was not; girls and Negroes had higher total scores. The simple effects were also tested. White females had significantly higher total scores than white males ($t = 6.182$, $df = 6527$, $p < .001$), but the sex difference for Negroes, while in the same direction, was not significant ($t = 0.711$, $df = 824$). The simple race effect was significant for both sexes; Negro boys and girls had higher total anxiety scores than white boys and girls (for boys, $t = 12.027$, $df = 3766$, $p < .001$; for girls, $t = 9.791$, $df = 3587$, $p < .001$).

Table 9 about here

Thus, the general results using the total score were similar to those obtained with the multivariate test of the four subscales. Two important additional kinds of information were obtained by using the subscales. First, one component of the total scale did not contribute to the overall sex difference--the Poor Self-Evaluation Subscale. Second, even when significant sex or race effects were obtained, the several subscales were differentially useful in discriminating between the sexes or the races.

Discussion and Conclusions

I would now like to review the results presented in the previous section in terms of our progress toward answering three questions about the Test Anxiety Scale for Children.

1. How important an influence is acquiescent response bias?
2. How does the nature of the multidimensional structure revise our conception of what the scale measures?
3. How useful is the simplified system for rescoring the scale in terms of its multidimensional structure?

Two kinds of estimates of the importance of response bias were presented. In the first analysis, each pair of original and reversed items was assumed to reflect the same underlying dimension of anxiety. We then considered whether the two forms of the items differed in their scale placement on the anxiety continuum, in order to determine the extent to which the observed percentage of double agreement for each item pair exceeded a theoretical minimum value or was less than a theoretical maximum value. It was assumed that values close to the

theoretical minimum would support a content interpretation of replies, while values close to the maximum would support a response set interpretation. The average observed percentage of double agreement fell midway between these two theoretical extremes. Thus, neither of the alternative hypotheses was clearly supported by the data when all items were considered. Certain item pairs clearly supported a content interpretation: the observed percentage of double agreement was much closer to the theoretical minimum than to the theoretical maximum. Other pairs elicited appreciable response bias: the observed percentage of double agreement was much closer to the theoretical maximum than to the minimum.

The factor analyses based on the expanded scales were used to assess simultaneously the validity of the assumption that the reversals reflected the same dimensions as the original questions, and the influence of acquiescent or negativistic response set. The general assumption that the reversed and original questions always reflected the same dimensions could not be uniformly confirmed or rejected, as will be discussed shortly. The influence of response set could be partially determined. The analyses led us to conclude that it is reasonable to eliminate the extreme argument that scores on the Test Anxiety Scale for Children are nothing but a reflection of acquiescent or negativistic response set. Furthermore, response bias is not the primary determinant of replies to the scale. The possibility of some minimal response set influence, however, cannot be excluded.

We had two main reasons for arriving at these conclusions about the influence of response set on the Test Anxiety Scale for Children.

First, the largest single factor in each of the six factor analyses was clearly a content factor, the Test Anxiety versus Test Confidence Factor. Second, none of the factors in the six factor analyses clearly required a response set interpretation. For only one of the three forms of the expanded scale did a factor ever appear that could possibly be judged to be a response set factor: both original and reversed versions of several pairs of items had positive loadings for Factor B on Form 1. Nevertheless, this relatively small factor, called Remote School Interest, was given a content rather than a response set interpretation because the questions concerned dreams and other fantasies about school. We had assumed in advance of the data analysis that questions about these experiences would probably not be adequately reversed in the sense that replying "Yes" to the original and reversed versions of the same question were not necessarily contradictory. Consistent differences in the reporting and non-reporting of dreams have been found even under laboratory conditions (Goodenough, Shapiro, Holden, & Steinschriber, 1959). On the other two forms, none of the factors showed a pattern of several matched original and reversed items defining the same pole, although there was one factor where a single matched pair of original and reversed items loaded on the positive pole (Factor EE for the girls on Form 3) along with many original items. The negative pole was defined by a single reversed item. This pattern did not seem to warrant the interpretation of a response set factor. At the same time, most of the factors could not definitely be interpreted as content factors because they did not show a clear pattern of bipolar loadings for several matched original and reversed items. Because of the similarity in the

manifest content of the items, and the lack of any direct evidence for response set, we did interpret these factors in terms of their content, although some minimal response set influence could not be discounted.

An important question to ask about this pattern of results is, why should one factor have a pattern of loadings that so clearly conforms to the ideal type for a content interpretation of its underlying dimension, while the other factors, which also appear to reflect content, do not? We offer two conjectures. The first, already mentioned, is that the random division of the reversals into three sets resulted in the several types of content being represented on the three forms with differential frequency. In order to find bipolar factors in the factor analyses of each of the three forms of the expanded Test Anxiety Scale for Children, several reversed items representing each type of content would be required on each form. This condition was not always met since only 10 reversed items (as compared with 30 original items) appeared on any one form of the expanded scale. According to this argument, the Test Anxiety versus Test Confidence Factor was always bipolar because several reversed items concerning tests appeared on each of the three forms. This frequency argument is only partially satisfactory, however, since sufficient numbers of matched reversed and original items were available for other factors, at least on certain forms of the expanded scale. For example, on Form 1, the three highest-loading items on the Comparative Poor Self-Evaluation Factor did have reversed versions appearing on that form, but they defined another factor rather than the opposite pole. Therefore, we think that the limitation on the frequency of occurrence of different

types of matched original and reversed items was not the major reason for the absence of bipolarity. Instead, the type of content the factors reflect seems to be a more important influence on the occurrence of bipolarity.

Factors that are defined by the stimulus conditions for anxiety are bipolar because the reversal technique does not change the occurrence of the stimulus in the questions. The Test Anxiety Factor was always bipolar because it defined a class of stimuli, tests; all the questions that mentioned the word, test, in their original version also did so in their reversed version. What changed in the reversed questions was the description of the type of reaction to that stimulus; these changes may not critically affect the loading of items on a stimulus factor so long as it is clearly possible for the subject to judge the reaction to the stimulus (e.g., tests) as being unpleasant, as compared with pleasant. On the other hand, the specific choices made for the reversals of the affective or cognitive reactions may be the critical determinant of the loadings of the reversed items on response factors. Somatic anxiety reactions were reversed by substituting the reaction of feeling relaxed and comfortable; self-derogation was changed to self-aggrandizement; worrying was changed to feeling confident or relaxed; expectations of success substituted for expectations of failure, and so forth. The factors that did not replicate as bipolar factors were defined by these various aspects of the anxiety response, and we are suggesting that they were not always bipolar because of the methodological difficulty of finding appropriate reversals.

Furthermore, the assumption that there are polar opposites to these experiential states can be questioned. Tomkins (1962, 1963) for example, does not view the negative affects as simply the polar opposites of the positive affects. Instead, positive and negative affects are described as independent motivational aspects of the personality system. Several empirical studies of mood states in adults support this conclusion. Green and Nowlis (1957) factor analyzed self-ratings of college men on 100 adjectives describing mood states and expected to find bipolar factors. Instead, they found unipolar factors that separated positive feelings from negative feelings, for example, elation from sadness, and surgency from fatigue. Bradburn and Caplovitz (1965) obtained reports on several positive and negative feeling states occurring within the last week. They concluded that the items describing positive affects formed a separate cluster from those describing negative affects. In our data the occurrence of separate factors for positive and negative self-evaluations and the lack of clear bipolar factors concerning somatic signs of anxiety, or worries, may also reflect the independence of positive and negative feeling states.

These considerations of the possible reasons for lack of bipolarity of certain factors raised several problems about the appropriate future directions for research. If bipolarity did not occur in the factor analyses because of inadequate reversals, one appropriate next step would be to develop other reversed questions. If bipolarity did not occur because the feeling states described by the original questions do not have polar opposites, then this reversal technique is an inappropriate way to separate the variance determined by content

from that determined by response set, and further scale revisions may not be appropriate. The proper direction to take in assessing individual differences in acquiescence is also in doubt. Although we concluded that response bias is not a primary determinant of scale scores, the possibility remains that certain individuals do show a consistent response set, and it would be interesting to isolate those persons. This may be difficult to do, since an overall index of acquiescence may not be appropriate if it is not contradictory to answer "Yes" to both items in certain reversed pairs.

In concluding my remarks about the relatively minor role of acquiescence on the Test Anxiety Scale for Children, I would like to note that these results are in agreement with the findings of two studies in which the Manifest Anxiety Scale (Taylor, 1953) items were reversed (Adams & Kirby, 1963; Chapman & Campbell, 1959). Both investigations revealed high positive correlations between the true-keyed and false-keyed versions of that anxiety scale, thereby indicating the lack of acquiescent bias. Perhaps the evidence concerning acquiescence on attitude scales, where the subjects may not have strong opinions, led to an overconcern about the importance of this phenomena on other questionnaire devices. Anxiety scales do not seem to be seriously impaired by an acquiescent response set.

The second question under discussion concerns how the nature of the multidimensional structure of the Test Anxiety Scale for Children revises our conception of what it measures. As we have indicated, we view the dimensions revealed in the factor analyses as defining both the stimulus and response components of anxiety (Endler, Hunt, & Rosenstein, 1962).

Since the development of the original scale was premised on the importance of limiting the stimulus for anxiety to academic evaluation situations, it is noteworthy that formal test situations define a separate factor from other school evaluation situations. Two other classes of school evaluation situations occurred with some frequency on the original scale--public evaluation or recitation situations, and direct mention of the teacher. In three of the factor analyses of the expanded scales, the stimulus of public evaluation did define one of the factors. Thus, this situation might also be a distinctive anxiety cue for some children. The explicit stimulus of the teacher never defined a factor. However, it might be argued that the teacher was an implicit part of the stimulus condition in all the questions and that this was the reason this stimulus condition could not be distinguished.

The other factors differentiated among the various types of experiences that could be broadly classed as anxiety reactions. Factors concerning somatic reactions and self-derogatory feelings were found in all forms of the expanded scale. In some forms the experiences of dreams and fantasies about school, or worrying about school also defined factors. It seems to us that a fuller specification and measurement of the several aspects of the achievement anxiety experience would be an important area for future research. If we are to understand the ways in which school performance can be affected by "anxiety," we need to distinguish among children who have different types of unpleasant reactions. The child who perceives that he is having unpleasant physiological reactions should react differently to a learning task than the child who expects failure. These two response patterns might also

elicit different reactions from a teacher. If a child who believes that his hand is shaking overtly manifests this symptom, his anxiety might be more easily recognized by a teacher than the anxiety of a child who privately expects failure.

Two different conceptions of what is being measured by the Test Anxiety Scale for Children have been prominent in work with this scale. I would like to comment briefly on the implications of the multidimensional structure of the scale for these conceptualizations.

The original developers of the scale (Sarason et al., 1960) viewed it as reflecting anxiety that had its roots in the parent-child relationship and that was manifested during evaluation by a significant adult figure, the teacher. Recently, Sarason (1966) has questioned whether the child who describes himself as highly anxious on the Test Anxiety Scale for Children frequently manifests overt signs of a severe anxiety reaction. He has suggested instead, that the child is reporting the private experience of thoughts and feelings which may be a form of defense against the experience of severe anxiety. The responses differentiated by the factors provide a way to begin to specify the types of reactions that so-called anxious children may experience in lieu of a severe anxiety attack. Viewing oneself as less competent than one's peers may be a defense against a severe anxiety attack. It would be interesting to compare the developmental histories and achievement performance of persons with this response pattern with that of persons who ruminate or dream about school, or those who react with physiological symptoms.

Atkinson and Feather (1966, Ch. 20), on the other hand, have used the

Test Anxiety Scale for Children as an indirect measure of the motive to avoid failure. According to their formulation, in schools or other settings where achievement-oriented situations cannot be avoided, anxiety is experienced in proportion to the strength of a person's tendency to avoid failure. The motive to avoid failure is defined as the capacity to experience pain in failure situations. The multidimensional structure of the scale raises the question of whether the kinds of "pain" experienced in potential failure situations have different implications for inferences about the strength of the tendency to avoid failure. It would be interesting to see whether predictions based on this theory of achievement motivation would more clearly be supported by subscales measuring one or another of the components of the scale. For example, the Test Anxiety Factor seems to come closest to the formulation of anxiety as an indicator of the tendency to avoid failure: it defines anxiety experienced in response to a constrained situation where achievement evaluation, and possibly failure, will occur. In contrast, it seems difficult to conceive of the Remote School Concern Factor as indicative of a failure-avoidant tendency, since it involves rumination and fantasy about possible school failure when at home.

We have only just begun to consider the usefulness of the simple rescoring of the Test Anxiety Scale for Children in terms of its factor structure. If our speculations about the interpretation of these factors are appropriate, factor scores should differentiate several types of children corresponding to the several anxiety response patterns and stimulus conditions for anxiety. We considered this proposition by

testing sex and race differences on the four subscales used as indices of the factors. This attempt rested on the assumption that these subscales were good representations of the factors. The fairly strong correlations among these four subscales suggested that they were not good indices of the orthogonal dimensions underlying the factors, but even so, the race and sex effects were not uniform across the four subscales.

Girls are often found to have higher scores on the Test Anxiety Scale for Children than boys, and the difference seems to increase with increased time at school or increased age (Bloom, 1963; Cox & Leaper, 1959; Dunn, 1966; Hill & Sarason, 1966; Sarnoff, Lighthall, Waite, Davidson, & Sarason, 1958). For our second-grade subjects, we found this significant overall sex difference only for the white sample. The subscale analysis indicated that the strongest sex differences occurred on the two factors that seemed to be most clearly describing emotional types of responses, Remote School Concern and Somatic Signs of Anxiety. There are some other indications in the literature of similar sex differences concerning somatic reactions. For example, adult women report a greater frequency of psychophysiological or hypochondriacal symptomatology (Leighton, 1956; Welsh & Dahlstrom, 1956). There do not seem to be any previously observed sex differences in frequency of reporting night dreams or daydreams (Singer, 1966). However, the girls' higher scores on both these subscales can be viewed as consistent with some of the exciting recent work on neonatal differences in responsiveness to auditory, tactile, or oral stimulation. Silverman (1966) recently reviewed some of this

work on neonatal response patterns, where there have been suggestions that female infants are more sensitive to external stimulation than male infants (e.g., Lewis, Meyers, Kagan, & Grossberg, 1963; Bell & Darling, 1965). He proposes that there are two unique cognitive styles or experience types, for males and for females, and that these have a constitutional basis. The feminine style is typified by intuitive perceptions of feeling situations, openness to images from the unconscious, and openness to the external environment. The masculine style involves discrimination and analysis, observing and inquiring. Thus, he speculates that the characteristics usually ascribed to appropriate sex role behavior may be rooted in constitutional differences. Whatever their origin, it seems to us that the feminine style--sensitivity to external stimuli, responsiveness, and fantasy--characterizes the factors represented by the three subscales on which the sexes differed (Test Anxiety, Somatic Signs of Anxiety, and Remote School Concerns).

In contrast to the aforementioned subscales, the Poor Self-Evaluation Subscale did not differentiate the white boys and girls. More clearly than any of the other factors, it defined an analytic type of cognitive response, in which one's own competence was compared to that of other people. It is also possible that the Poor Self-Evaluation Factor reflects realistic self-appraisal. Since young girls generally perform better in school than boys, it would be unrealistic for girls to compare themselves more unfavorably to other children, even if they have stronger emotional responses to school evaluation. There is some evidence that the Poor Self-Evaluation Subscale does show stronger relationships to past performance in school than do the other subscales. We have attempted,

through multiple correlation techniques, to predict each of the four subscores. For the white boys, the first-grade IQ scores and the first-grade reading readiness scores, as well as prior retention in grade, independently entered into the prediction of Poor Self-Evaluation. For the other subscales, either the IQ or reading readiness scores entered into the prediction, but not both, and retention was never a significant predictor.[11]

Race differences were obtained for the total score on the Test Anxiety Scale for Children as well as for all subscales, with the Negro children having higher scores. The strength of the race effect was not uniform across the subscales. The Remote School Concern and Poor Self-Evaluation Subscales, in that order, contributed the most toward discriminating the race groups. Differences on the latter scale seem readily interpreted as consistent with other research showing stronger expectations of failure and self-derogation in Negro than in white children (see Katz' 1964 summary). For example, Epps (1966) recently reported that Negro elementary school children are higher in fear of failure than white children in the same school system; Phillips (1966) found that non-Anglo (Mexican and Negro) children were higher than Anglo children on a measure of school anxiety that included most of the items from the Test Anxiety Scale for Children. We can offer no reason why dreams and fantasies about school should be especially high among Negro children, but we do see this as an important question raised by the subscale analysis. Although we have not as yet fully explored this issue, I would like to mention, in closing, that other data suggest

that the race results are not fully explainable in terms of social class differences. In a multiple correlation analysis, we attempted to predict the four subscores for the entire sample. Race and sex, as well as a variety of background variables and school achievement measures, were used as predictor variables. For all four subscores, race made a significant independent contribution to the multiple correlations over and above contributions from ability measures and the measures of social status of the parent.

To sum up this discussion, let me briefly indicate our tentative answers to the three questions posed earlier:

1. Acquiescent response set does not appear to be a major source of variance in the Test Anxiety Scale for Children, but the extent of individual differences in this response tendency warrants assessment.

2. The multidimensional structure of the scale orients our thinking away from looking for anxious and non-anxious children. Instead, our interest is focused on children for whom different types of school situations elicit anxiety responses and on children who experience different types of anxiety reactions to school evaluation situations.

3. The lack of independence of the four subscales indicate that they do not accurately reflect the orthogonal multidimensional structure of the Test Anxiety Scale for Children, and this may be a serious problem in future efforts to differentiate the correlates of the dimensions using these subscales. Despite this problem, these measures of the factors yield certain interesting results that are not simple duplications of the results using the total score.

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Footnotes

[1]The help of our dedicated project clerks, Mrs. Niel Solomon and Mrs. Jesse Stern, and our research assistants, Galen Alessi, Alvin Danenberg, Robert Edmunson, Jean Kavanaugh, Youngja Kim, Abbas Mirrashidi, and Stephen Shevitz, is gratefully acknowledged. We are indebted to many of our colleagues at the Mental Health Study Center for their help throughout this project. We especially wish to express appreciation to our colleagues who assisted us in the data collection: Mary Lou Bauer, Eleanor Fay, Anita Green, Sandra Hansen, Julie Kisielewski, Janet Moran, Gretchen Schafft, Julianna Schamp, Esther Solomon, and Elizabeth Unger. The comments of Dee N. Lloyd and Edna R. Small on an earlier draft of this paper are gratefully acknowledged. Finally, we also wish to thank the school officials, children, and parents who so generously participated in this project.

[2]We are indebted to Donald N. Morrison, then of the Biometrics Branch of the National Institute of Mental Health, for providing this estimate.

[3]More complete descriptions of the methodology are available from the authors upon request for Working Paper #3 from Mental Health Study Center, Project 27.

[4]The Honeywell 800 and IBM 360 computers at the Computation and Data Processing Branch of the National Institutes of Health were utilized. The assistance of Gayle Hueston and Meyer Gordon is gratefully acknowledged.

[5]This consideration of minimum and maximum values is another aspect of the problem involved in using measures of association based on cross-classification of dichotomous variables with unequal marginals;

measures based on such tables yield attenuated estimates because both diagonal cells cannot simultaneously attain zero values.

[6]Tables with the complete pattern of factor loadings and more detailed descriptions of the factors are available from the authors upon request for Working Paper #4 from Mental Health Study Center Project 27.

[7]As rough rules of thumb, we considered items with loadings of $\pm$ .20 as contributing to the definition of a factor, and factor loadings of $\pm$ .30 or more as high loadings. The highest loading on any factor was usually between .50 and .60. These absolutely low levels of factor loadings are partially a result of using the lower-bound estimate for communality (the multiple squared correlation of each variable with all other variables), rather than factoring the total variance by placing unities in the diagonal of the correlation matrix.

[8]There were two main reasons for deleting the few Negro subjects attending predominantly white schools from the present analyses (N = 105). First, the children attending racially mixed schools came from families with higher educational and occupational status than the remaining Negro children (N = 826). Second, they were a highly selective group, in that their attendance at a racially mixed school was the result of a parental request for change in their school attendance zone. While the school anxiety of these children is an important topic for investigation, it is beyond the scope of the present paper.

[9]The scores for each subscale were skewed, with an excess of low scores. This violates the normality assumption for the analysis of variance, but the F test has been shown to be relatively robust in this regard (Winer, 1962).

Analagous to the homogeneity of variance assumption in a univariate test, the multivariate test includes an assumption of the homogeneity of the variance-covariance matrices. The present data did not meet this assumption when tested with the multivariate analogue of Bartlett's test of homogeneity of variances (Greenhouse & Geisser, 1959); specifically, the covariance of Remote School Concern and Poor Self-Evaluation was smaller in both Negro samples than in the white samples. Since the test of the equality of the mean vectors, with which we were primarily concerned, is relatively insensitive to moderate departures from the assumption of homogeneity of dispersions (Cooley & Lohnes, 1962), no further transformations of the data were attempted that might have equalized the dispersions. The general effect of failure to meet this assumption is to inflate the F values, and cases of borderline significance should therefore be discounted.

[10]Raw scores are presented in Table 9 in order to facilitate comparisons with normative data from other studies. We have not found any total score means reported for Negro children. The following studies describe their subjects as middle class, and presumably white. Sarnoff et al. (1958) reported means for high and low "Liars." For the low Liars, the means for both boys and girls at Grades 1 and 2 were much lower than ours; they were between 6.3 and 8.7. Hill and Sarason (1966) reported Grade 1 means of 7.5 for boys and 7.7 for girls, and Grade 3 means of 8.7 for boys and 10.6 for girls; only the third-grade girls in their study had as high scores as our sample.

[11]We also view the results of Silverstein and Mohan's (1964) factor analysis of the Test Anxiety Scale for Children for mentally retarded

children as consistenc with this view of the realistic element in the Poor Self-Evaluation Factor. The largest factor in their study was not Test Anxiety; it was a factor they labeled Generalized School Anxiety, but which we proposed (Feld, 1966) could more appropriately be labeled Negative School Self-Image. That factor was very similar to the Poor Self-Evaluation Factor; all the questions about negative self-other comparisons had very high loadings.

The Assessment of Achievement Anxieties in Children: How important is response set and multidimensionality in the Test Anxiety Scale for Children?

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and Self-Esteem in Children

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Table 1

Percentage distributions of selected demographic characteristics of County and United States populations in 1960

Occupational distribution of employed males [a]		
	County	U.S.
Professional, technical, kindred workers	19.98	10.80
Farmers and farm managers	1.24	5.76
Managers, officials, proprietors (not farm)	10.80	11.16
Clerical, kindred workers	11.45	7.27
Sales workers	6.92	7.18
Craftsmen, foremen, kindred workers	26.17	20.46
Operatives, kindred workers	11.99	20.83
Private household workers	0.04	0.15
Service workers (not private household)	6.36	6.26
Farm laborers and foremen	0.94	2.90
Laborers (not farm and mine)	4.10	7.23

Educational attainment of persons 24 years and over [b]		
	County	U.S.
No School	0.72	2.29
Elementary Sch.		
1-4 years	2.99	6.06
5-7 years	10.70	13.83
8 years	10.43	17.54
High School:		
1-3 years	20.89	19.22
4 years	31.52	23.59
College:		
1-3 years	11.10	8.79
4 years	11.64	7.67

Family income in dollars in 1959 [c]		
	County	U.S.
< 1,000	1.76	5.57
1,000 - 1,999	2.05	7.48
2,000 - 2,999	3.50	8.34
3,000 - 3,999	5.09	9.49
4,000 - 4,999	8.32	10.99
5,000 - 5,999	11.10	12.33
6,000 - 6,999	12.75	10.70
7,000 - 7,999	11.51	8.58
8,000 - 8,999	9.94	6.63
9,000 - 9,999	8.31	4.85
10,000 and >	26.66	15.05

[a] Base N for U.S. = 41,480,039, for County = 83,307 persons.

[b] Base N for U.S. = 99,438,084, for County = 179,698 persons.

[c] Base N for U.S. = 45,128,393, for County = 87,453 families.

Source: U. S. Bureau of the Census, (1961a and 1961b, Tables 83, 84, 86).

Table 2

Demographic Characteristics of the Final Sample

(By Sex)

Variable		Male (3867)[a]	Female (3684)[a]	Total (7551)[a]
Age[b]	M	88.105*	87.201	87.664
	SD	5.662	4.943	5.343
	N	3861	3674	7535
IQ (Grade 1)	M	100.215	100.965	100.587
	SD	14.815	14.320	14.576
	N	3043	2984	6027
RR (Grade 1)	M	0.960*	1.099	1.028
	SD	0.573	0.564	0.573
	N	3006	2943	5949
# Retentions	M	0.158*	0.086	0.123
	SD	0.375	0.285	0.336
	N	3497	3335	6832
School Stability[c]	M	2.338	2.382	2.360
	SD	0.928	0.911	0.920
	N	3819	3644	7463
# Siblings	M	2.483	2.485	2.484
	SD	1.661	1.638	1.650
	N	3780	3600	7380
Mother Absence[d]	M	1.035	1.029	1.032
	SD	0.184	0.168	0.176
	N	3681	3505	7186
Father Absence[d]	M	1.090	1.090	1.090
	SD	0.286	0.287	0.286
	N	3681	3505	7186
Education of Mother (yrs.)	M	12.142	12.174	12.157
	SD	1.961	2.038	1.999
	N	3698	3519	7217
Education of Father (yrs.)	M	12.505	12.487	12.496
	SD	2.604	2.587	2.595
	N	3649	3477	7126
Mother not Working[d]	M	1.770	1.752	1.761
	SD	0.421	0.432	0.426
	N	3690	3506	7196
SES of Father's Occupation[e]	M	65.439	64.919	65.185
	SD	22.687	22.548	22.619
	N	3818	3652	7470

(Table continued)

Table 2 (continued)

Demographic Characteristics of the Final Sample

(By Sex)

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[a]Maximum N in each group. Variations in Ns for individual variables due to missing data in school records.

[b]Age in months (9/1/63) upon entry to grade 2 during year research data were collected.

[c]Trichotomy: 1 = transfer; 2 = transfer due to new school construction; 3 = no transfer (stable).

[d]Dichotomous variable: 1 = named item not present; 2 = named item present.

[e]These are the socioeconomic status scores for detailed occupations developed by the U.S. Bureau of the Census (1963). They indicate the position of the average person in a given occupation, based on the education and income distribution for that occupation. The score range is 00-99.

*Sex difference in final sample yielded t test with $p < .001$.

Table 3

Original and Reversed Questions on the Expanded Test Anxiety Scale for Children

	Item Content
1	Do you worry when the teacher says that she is going to ask you questions to find out how much you know?
1R	Do you feel relaxed when...?
2	Do you worry about being promoted, that is passing from the 2nd to the 3rd grade at the end of the year?
2R	Do you feel sure that you will be promoted, that is pass from...?
3	When the teacher asks you to get up in front of the class and read aloud, are you afraid that you are going to make some bad mistakes?
3R	When...aloud, do you feel sure that you are going to get all the words right?
4	When the teacher says that she is going to call upon some boys and girls to answer arithmetic problems out loud, do you hope that she will call upon someone else and not on you?
4R	When...do you hope that she will call upon you?
5	Do you sometimes dream at night that you are in school and cannot answer the teacher's questions?
5R	Do you dream at night a lot of times that you are in school and can give the right answers to...?
6	When the teacher says that she is going to find out how much you have learned, does your heart begin to beat faster?
6R	When...learned, do you feel relaxed and comfortable?
7	When the teacher is teaching you about arithmetic, do you feel that other children in the class understand her better than you?
7R	When...feel that you understand her better than other children in the class?
8	When you are in bed at night, do you sometimes worry about how you are going to do in class the next day?
8R	When...do you usually feel pleased about how good you are going to do...?
9	When the teacher asks you to write on the blackboard in front of the class, does the hand you write with, sometimes shake a little?
9R	When...class, do you write without your hand shaking?
10	When the teacher is teaching you about reading, do you feel that other children in the class understand her better than you?
10R	When...you feel that you understand her better than other children in the class?
11	Do you think you worry more about school than other children?
11R	Do you think you worry less...?

(Table continued on next page)

Table 3 (continued)

Original and Reversed Questions on the Expanded Test Anxiety Scale for Children

Item Content
12 When you are at home and you are thinking about your arithmetic work for the next day, do you become afraid that you will get the answers wrong when the teacher calls upon you?
12R When...do you feel sure that you will get the answers right...?
13 If you are sick and miss school, do you worry that you will be far behind the other children when you return to school?
13R If...do you think that it will be easy to catch up with the other children...?
14 Do you sometimes dream at night that other boys and girls in your class can do things you cannot do?
14R Do you dream at night a lot of times that you can do things that other boys and girls in your class cannot do?
15 When you are home and you are thinking about your reading group for the next day, do you worry that you will do poor work?
15R When...do you feel that you will do good work?
16 When the teacher says that she is going to find out how much you have learned, do you get a funny feeling in your stomach?
16R When...do you feel relaxed and comfortable?
17 If you did very poorly when the teacher called on you, would you probably feel like crying even though you would try not to cry?
17R If...probably feel that it really didn't matter very much?
18 Do you sometimes dream at night that the teacher is angry because you do not know your work?
18R Do you dream at night a lot of times that the teacher is pleased because you know your work?
19 Are you afraid of tests in school?
19R Do you like tests in school?
20 Do you worry a lot <u>before</u> you take a test?
20R Do you feel relaxed...?
21 Do you worry a lot <u>while</u> you are taking a test?
21R Do you feel relaxed...?
22 <u>After</u> you have taken a test do you worry about how well you did on the test?
22R <u>After</u>...do you soon forget about the test and think about other things?
23 Do you sometimes dream at night that you did poor work on a test you had in school that day?
23R Do you dream at night a lot of times that you did good work ...?

(Table continued on next page)

Table 3 (continued)

Original and Reversed Questions on the Expanded Test Anxiety Scale for Children

	Item Content
24	When you are taking a test, does the hand you write with shake a little?
24R	When...do you write without your hand shaking?
25	When the teacher says that she is going to give the class a test, do you become afraid that you will do poor work?
25R	When...do you usually feel that you will do good work?
26	When you are taking a hard test, do you forget some things that you knew very well before you started taking the test?
26R	When...do you remember most things you knew very well before...?
27	Do you wish a lot of times that you didn't worry so much about tests?
28	When the teacher says that she is going to give the class a test, do you get a nervous or funny feeling?
28R	When...do you feel relaxed and comfortable?
29	While you are taking a test do you usually think you are doing poor work?
29R	While...you are doing good work?
30	While you are on your way to school, do you sometimes worry that the teacher may give the class a test?
30R	While...do you wish a lot of times that the teacher will give a test so you can show her how much you know?
31	When you are at home, do you think about your school work?
32	Do you sometimes dream at night about school?

Notes.--An ellipsis indicates that the same words appeared in the reversed as in the original question.

Question 27, from the original TASC, did not have a reversed version for this study. Questions 31 and 32 were added for this study, but they were not designed to be reversals of any single original question.

Questions 5, 14, 18 and 23 concerning dreams, and questions 8, 12, 13, 15 and 30 concerning waking fantasies about school while at home, were not considered to be adequately reversed; replies of "Yes" to both versions of these questions did not appear to be necessarily psychologically inconsistent.

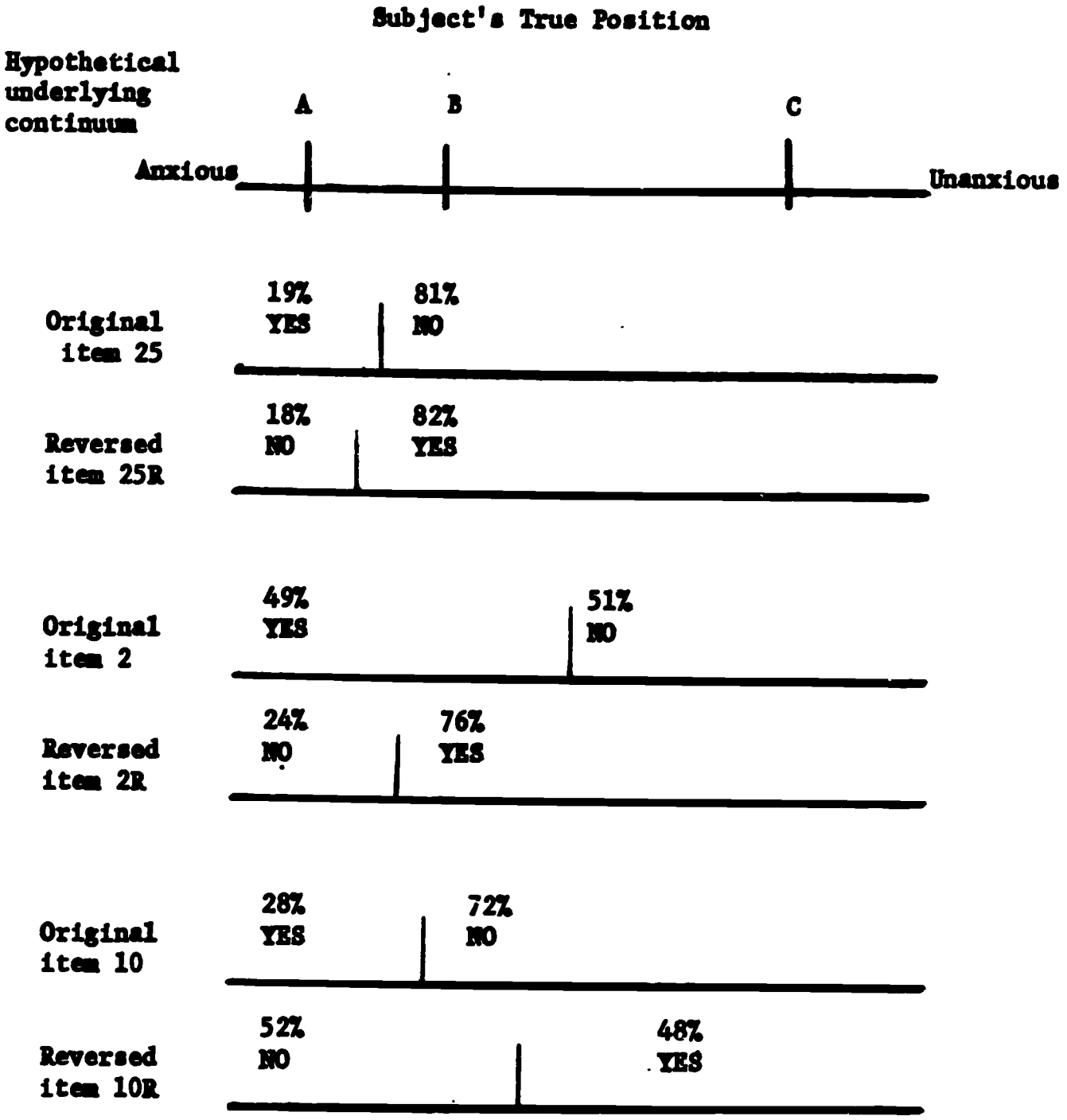
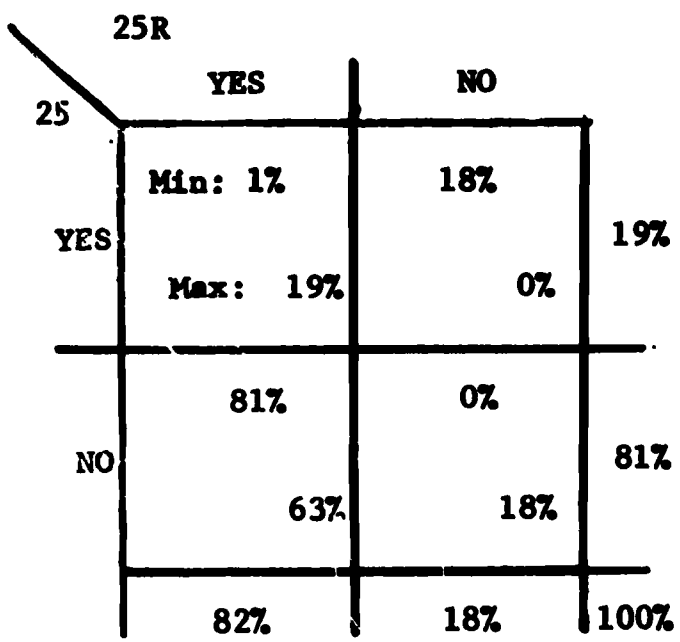
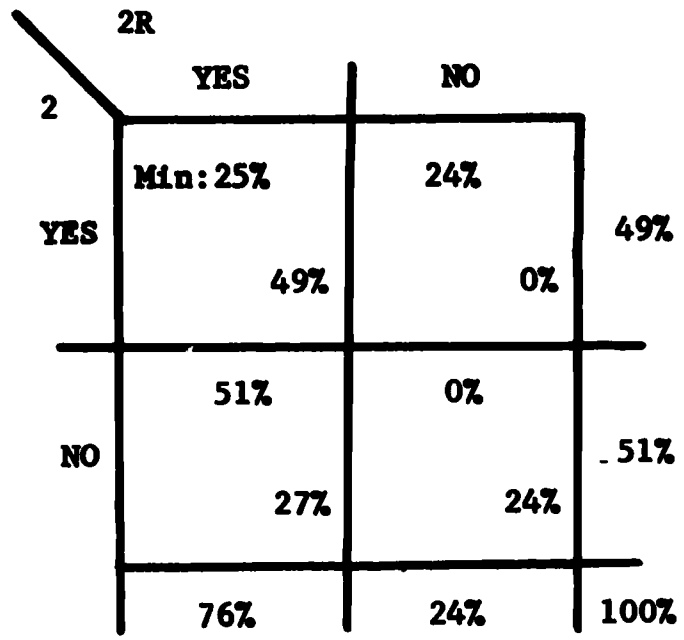
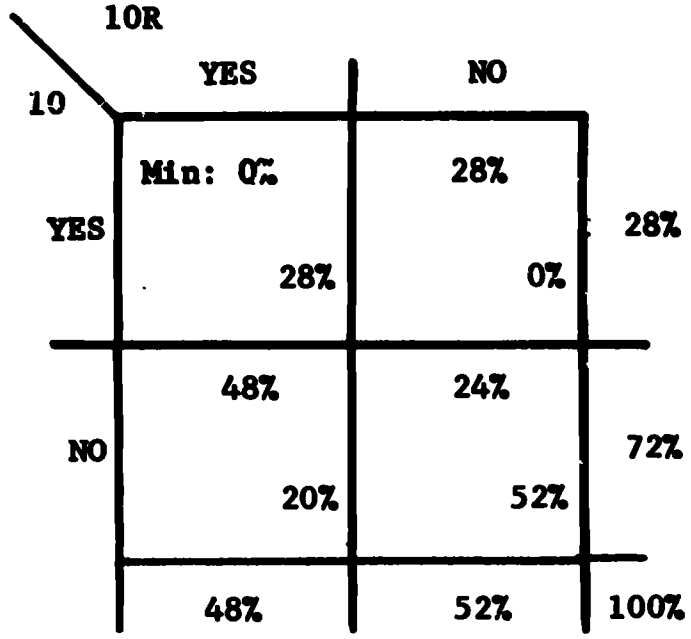


Figure 1. Hypothetical anxiety continuum placement of three subjects (A, B, and C) and three sets of original and reversed items differing in their reversal symmetry.







Asymmetry index = +1

Observed YES-YES = 11.6%

Asymmetry index = +25

Observed YES-YES = 37.1%

Asymmetry index = -24

Observed YES-YES = 15.8%

Figure 2. The effects on minimum and maximum values of double agreement and disagreement for three pairs of items that differ in their reversal symmetry. Marginal values are observed agreement and disagreement percentages. Cell entries are minimum and maximum values, assuming fixed marginals.

Table 4

Symmetry of Reversals and Double Agreement Patterns on the Expanded TASC

Item # (Form)	1 % Yes Orig	2 % No Rev	3 % Yes -% No	4 % Yes, Yes Observed	5 % Yes, Yes > Min	6 % Yes, Yes < Max
2(3)	49.4	24.4	+25.0	37.1	+12.1	-12.3
8(2)	48.4	25.6	+22.8	35.9	+13.1	-12.5
4(2)	34.2	13.2	+21.0	25.8	+4.8	-8.4
6(2)	50.4	38.1	+12.3	27.7	+15.4	-22.7
26(3)	41.8	31.7	+10.1	24.4	+14.3	-17.4
30(2)	27.9	19.1	+8.8	21.8	+13.0	-6.1
22(3)	59.4	52.1	+7.3	27.5	+20.2	-20.4
16(3)	43.7	39.0	+4.7	23.4	+18.7	-20.3
29(1)	18.3	15.4	+2.9	12.5	+9.6	-5.8
24(2)	39.0	37.7	+1.3	15.6	+14.3	-23.4
25(3)	20.2	18.3	+1.9	11.7	+9.8	-8.5
25(1)	17.9	17.2	+0.7	11.5	+10.8	-6.4
15(2)	14.6	15.0	-0.4	9.4	+9.4	-5.2
19(2)	12.3	15.0	-2.7	6.3	+6.3	-6.0
9(3)	42.6	45.6	-3.0	21.7	+21.7	-20.9
28(3)	32.5	37.5	-5.0	14.6	+14.6	-17.9
14(1)	32.8	39.4	-6.6	20.3	+20.3	-12.5
18(1)	24.7	31.4	-6.7	18.0	+18.0	-6.7
3(3)	35.0	42.3	-7.3	12.3	+12.3	-22.7
20(1)	26.2	34.0	-7.8	13.2	+13.2	-13.0
13(2)	48.8	57.5	-8.7	14.3	+14.3	-28.2
12(2)	26.6	35.6	-9.0	12.7	+12.7	-13.9
23(1)	23.9	33.9	-10.0	15.6	+15.6	-8.3
21(2)	24.0	35.2	-11.2	11.2	+11.2	-12.8
5(1)	26.4	41.9	-15.5	17.1	+17.1	-9.3
1(1)	26.8	44.6	-17.8	12.3	+12.3	-14.5
7(1)	35.1	54.4	-19.3	14.9	+14.9	-20.2
10(1)	27.8	51.6	-23.8	13.7	+13.7	-14.1
11(3)	36.7	60.9	-24.2	15.8	+15.8	-20.9
17(3)	30.2	59.3	-29.1	13.0	+13.0	-17.2
Means						
All	(30)		-2.97	17.71	+13.86	-14.28
+Asymmetry	(12)		+9.90	22.90	+13.00	-13.68
-Asymmetry	(18)		+11.56	14.24	+14.24	-14.68

Notes.-- Cols. 1, 2, and 4 are reports of observed values.
Col. 3 = (Col. 1 - Col. 2).
Col. 5 = (Col. 4 - Col. 3) if Col. 3 is +; Col. 5 = Col. 4 if Col. 3 is -.
Col. 6 = (Col. 4 - Col. 1), except for items 22 and 13, where Col. 6 = Col. 4 - (1 - Col. 2).

Table 5
Comparisons of Factor Structures From Three Forms of the Expanded TASC

Form 1		Form 2		Form 3	
Boys 6 Factors	Girls 6 Factors	Boys 5 Factors	Girls 6 Factors	Boys 5 Factors	Girls 5 Factors
A: Test Anxiety vs. Test Confidence 24.3% (S=.98)	25.6%	A: Test Anxiety vs. Test Confidence 31.7% (S=.96)	21.8%	A: Test Anxiety vs. Test Confidence 27.1% (S=.92)	31.5%
B: Remote School Interest 15.6% (S=.94)	14.9%				
C: Comparative Positive Self-Eval. 10.1% (S=.94)	11.4%				
D: Somatic Signs of Anxiety 19.5% (S=.94)	17.1%	D: Somatic Signs of Anxiety vs. Somatic Relaxation 16.9% (S=.94)	15.7%	DD: Somatic Signs of Anxiety and Worry or Dreams about School Failure 25.9% (S=.91)	D: Somatic Signs of Anxiety (and fear of tests, worry or dreams about failure) 22.3%
E: Comparative Poor Self-Evaluation (and general expectations of failure) 14.6% (S=.94)	11.4%	E: Comparative Poor Self-Evalustion (and general expectations of failure) 16.6% (S=.92)	15.0%	E: Comparative Poor Self-Eval. (and genl. expec. failure) vs. Limited Confidence 14.5% (S=.92)	EE: Pervasive Expectations of Failure (including comparative) vs. Limited Confidence 21.7%
F: Pervasive Worries (especially about public evaluation) vs. Feels Relaxed 15.6% (S=.92)	19.1%	F: Pervasive Worry about Failure vs. Limited School Confidence 22.4% (S=.92)	FF: Away from School Worries and Dreams about Failure vs. Limited School Confidence 18.3%		

(Table continues)

Table 5 (continued)
Comparisons of Factor Structures From Three Forms of the Expanded TASC

Form 1		Form 2		Form 3	
Boys 6 Factors	Girls 6 Factors	Boys 5 Factors	Girls 6 Factors	Boys 5 Factors	Girls 5 Factors
		H: Limited School Anxiety vs. General School Confidence and Interest 11.9% (S=.88) 10.9%			
			J: Public Evaluation Anxiety vs. Public Eval. Confidence 17.9%	J: Public Evaluation Anxiety while at School vs. Public Eval. Confidence 20.7% (S=.87) 16.5%	
				K: Limited Worry vs. Performance Confidence 11.3%	
					L: Expectations of Reading and Arith. Failure vs. Away from School Worries 7.6%

Notes.--Letter designations were used to connote similarity in factors, with a double letter signifying that the factor was similar to, but not identical to other factors with the same letter designation. The percentages reported are for common variance accounted for by each factor. The index, S, is the coefficient of factor similarity across sex (Barlow & Burt, 1954).

Table 6

Descriptive Information on Four Factorially Derived Subscales of the TASC

Test Anxiety	Remote School Concern	Poor Self-Evaluation	Somatic Signs of Anxiety
25.[a] T says give test, afraid poor work?	8.[a] In bed, worry how do in class next day?	10.[a] T teach read, feel others understand better?	24.[a] Test, hand shake?
20.[a] Worry before test?	32.[a] Sometimes dream about school?	7.[a] T teach arith, feel others understand better?	9.[a] T asks write blackboard, hand shake?
19.[a] Afraid tests in school?	31.[a] Home, think about school work?	14.[a] Dream others can do things you cannot?	16.[a] T finds how much learned, funny feeling stomach?
29.[a] While test, think doing poor?	18.[a] Dream T angry not know work?	4.[a] T asks arith out loud, hope call someone else?	28. T, says give test, nervous, funny feeling?
23. Dream poor work test had that day?	23. Dream poor work test had that day?	15. Home, thinking read group, worry poor work?	6.[a] T finds how much learned, heart beat faster?
28. T, says give test, nervous, funny feeling?	22.[a] After test worry?	12. Home, think arith, afraid answer T wrong?	17.[a] Did poor, T called on you, feel like crying?
21. Worry while test?	30. Way to school, worry T may give test?		21. Worry while test?
15. Home, thinking read group, worry poor work?			
12. Home, think arith, afraid answer T wrong?			
30. Way to school, worry T may give test?			
M = 2.253 SD = 2.427 Range = 0-10	M = 3.241 SD = 1.715 Range = 0-7	M = 1.717 SD = 1.515 Range = 0-6	M = 2.633 SD = 1.933 Range = 0-7

Note.--For the Sarason TASC (30 items), M = 10.173, SD = 5.889, Range = 0-30.

[a]Item appears on only one index.

Table 7

Means and Standard Deviations of Four Factorially Derived TASC Scores

(By Sex and Race)

Sex x Race	N		TASC Scores			
			Test Anxiety	Remote School Concern	Poor Self-Eval.	Somatic Signs Anxiety
Boys--white	3357	M	48.949	48.255	49.333	48.886
		SD	9.604	9.915	9.681	9.634
Boys--Negro	411	M	53.505	55.301	53.742	51.734
		SD	9.816	9.386	10.474	9.886
Girls--white	3172	M	50.241	50.405	49.799	50.581
		SD	10.298	9.791	9.978	10.277
Girls--Negro	415	M	53.392	55.686	53.263	52.757
		SD	9.338	8.446	10.785	9.728

Table 8
Multivariate and Univariate Analyses of Variance
for Four Factorially Derived TASC Scores
(By Sex and Race)

Source	F	df	p<	Stand. Discrim. Func. Coeff.	Canon. Correl.
Sex (A)	23.926[a]	4/7348	.001		.113
Test Anxiety	24.069	1/7351	.001	-0.314	
Remote School Concern	73.494	1/7351	.001	0.847	
Poor Self-Evaluation	2.421	1/7351	.119	-0.135	
Somatic Signs Anxiety	48.802	1/7351	.001	0.612	
Race (B)	83.515[a]	4/7348	.001		.209
Test Anxiety	110.860	1/7351	.001	-0.188	
Remote School Concern	292.507	1/7351	.001	0.934	
Poor Self-Evaluation	115.381	1/7351	.001	0.426	
Somatic Signs Anxiety	46.833	1/7351	.001	-0.043	
Sex X Race (AB)	1.677[a]	4/7348	.152		.030
Test Anxiety	3.686	1/7351	.054	0.360	
Remote School Concern	5.996	1/7351	.014	0.800	
Poor Self-Evaluation	1.664	1/7351	.195	0.141	
Somatic Signs Anxiety	0.838	1/7351	.363	-0.262	
White Subjects					
Sex (A)	23.955[a]	4/6524	.001		.120
Test Anxiety	27.502	1/6527	.001	-0.258	
Remote School Concern	77.573	1/6527	.001	0.861	
Poor Self-Evaluation	3.672	1/6527	.055	-0.134	
Somatic Signs Anxiety	47.298	1/6527	.001	0.556	
Negro Subjects					
Sex (A)	1.192[a]	4/821	.313		.076
Test Anxiety	0.029	1/824	.865	0.858	
Remote School Concern	0.384	1/824	.536	-0.379	
Poor Self-Evaluation	0.419	1/824	.518	0.196	
Somatic Signs Anxiety	2.247	1/824	.134	-1.121	
Male Subjects					
Race (B)	52.835[a]	4/3763	.001		.231
Test Anxiety	81.982	1/3766	.001	-.055	
Remote School Concern	186.973	1/3766	.001	.886	
Poor Self-Evaluation	74.545	1/3766	.001	.386	
Somatic Signs Anxiety	31.802	1/3766	.001	-.071	
Female Subjects					
Race (B)	32.365[a]	4/3582	.001		.187
Test Anxiety	35.073	1/3585	.001	-.343	
Remote School Concern	110.006	1/3585	.001	.983	
Poor Self-Evaluation	43.369	1/3585	.001	.478	
Somatic Signs Anxiety	16.647	1/3585	.001	-.010	

[a]Multivariate analysis of variance evaluated with Wilk's lambda criterion and Rao's approximate F test, with an exact correction for unequal cell size (Clyde, Cramer, & Sherin, 1966).

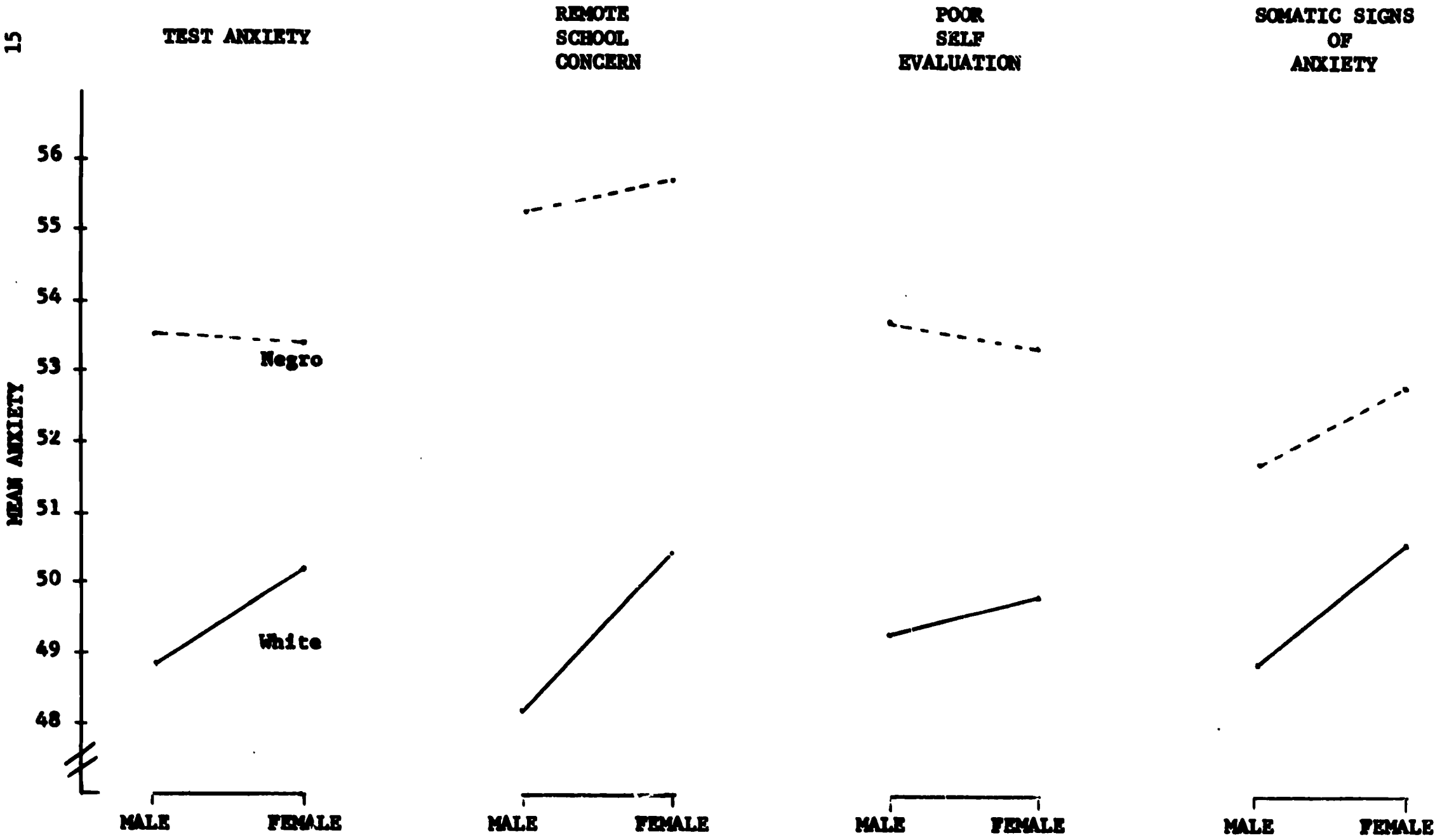


Figure 3.-- The effects of sex and race on four factorially derived TASC subscores.

Table 9

Means, Standard Deviations, and Analyses of Variance Summary for the Total TASC Scores

(By Sex and Race)

Sex and Race	N		Total TASC Scores	
			Raw Score	Standard Score
Boys--white	3357	M	9.382	48.681
		SD	5.706	9.678
Boys--Negro	411	M	12.747	54.388
		SD	5.301	8.991
Girls--white	3172	M	10.280	50.206
		SD	6.033	10.233
Girls--Negro	415	M	12.978	54.780
		SD	5.209	8.834

Summary of Analysis of Variance

Source	F	df	p <
Sex (A)	37.038	1/7351	.001
Race (B)	199.970	1/7351	.001
Sex x Race	2.426	1/7351	.118