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TEACHER EVALUATION AS A MEASURE OF PUPIL PERFORMANCE.

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*LONGITUDINAL STUDY, *STUDENT PROGRESS, ACADEMIC ACHIEVEMENT, ARITHMETIC, LANGUAGE DEVELOPMENT, READING ACHIEVEMENT, *PERFORMANCE FACTORS, ACADEMIC PERFORMANCE, *GRADE POINT AVERAGE, *ACHIEVEMENT GAINS, ACHIEVEMENT TESTS, GRADING, OVERACHIEVERS, UNDERACHIEVERS, JUNIOR HIGH SCHOOL, EDWARDSVILLE, ILLINOIS, TEXAS HUMAN TALENT PROJECT, CALIFORNIA ACHIEVEMENT TESTS, EDWARDSVILLE, ILLINOIS

SCORES FROM 16 VARIABLES WERE USED TO ASSESS DIFFERENCES AMONG 194 JUNIOR HIGH SCHOOL BOYS AND GIRLS OF 4 TEXAS COMMUNITIES WHO WERE AMONG MORE THAN 1,500 PUPILS INCLUDED IN THE 'TEXAS HUMAN TALENT PROJECT.' SUBJECTS WERE CLASSIFIED INTO 'UP,' 'DOWN,' OR 'STABLE' SAMPLES. CLASSIFICATION INTO THE 'UP' SAMPLE OF 19 BOYS AND 27 GIRLS REQUIRED AN INCREASE OF 2 OR MORE STANINES IN GRADE POINT AVERAGE FROM THE SEVENTH TO THE NINTH GRADE. CLASSIFICATION INTO THE 'DOWN' SAMPLE OF 28 BOYS AND 20 GIRLS REQUIRED A DECREASE IN GPA OF 2 OR MORE STANINES. EACH SUBJECT CLASSIFIED INTO THE 'STABLE' SAMPLE OF 50 BOYS AND 50 GIRLS OBTAINED IDENTICAL GRADE POINT AVERAGES AT THE SEVENTH AND NINTH GRADES. STANINES FOR THE GRADE POINT AVERAGES WERE OBTAINED FOR THE ENTIRE POPULATION OF 1,500 PUPILS IN THE 4 COMMUNITIES. ACHIEVEMENT TEST SCORES OBTAINED FROM THE CALIFORNIA ACHIEVEMENT TESTS IN ARITHMETIC, READING, AND LANGUAGE YIELDED RESULTS INDICATING THAT ALL THREE SAMPLES MADE SIGNIFICANT GAINS IN GRADE PLACEMENT FROM THE SEVENTH TO THE NINTH GRADE (AVERAGE GRADE PLACEMENT GAINS FOR THE 'UP,' 'DOWN,' AND 'STABLE' SAMPLES WERE 2.1, 1.9, AND 2.5, RESPECTIVELY.) THE 'UP' SAMPLE DID NOT MAKE GAINS IN PROPORTION TO THE MARKED INCREASE IN GPA FOR THAT SAMPLE, AND THE 'DOWN' SAMPLE GAINS FOR THE ACHIEVEMENT TESTS DO NOT REFLECT THE SEVERE LOSS IN GPA FOR THE SUBJECTS OF THAT SAMPLE. THE 'STABLE' SAMPLE, WITH GRADE PLACEMENT SCORES ABOVE THOSE FOR THE OTHER TWO SAMPLES AT THE SEVENTH GRADE, ENJOYED THE GREATEST GAINS IN GRADE PLACEMENT FOR THE THREE TESTS. (LP)

TEACHER EVALUATION AS A MEASURE OF PUPIL PERFORMANCE

Cooperative Research Project No. 5-8225-2-12-1

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1966

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TEACHER EVALUATION (GRADES) AS A MEASURE OF PUPIL PERFORMANCE

INTRODUCTION: THE PROBLEM

The present study has been undertaken to seek answers to a number of questions surrounding a rather drastic change in grade point averages for youngsters in junior high school. Are these marked changes in teacher evaluation (GPA) of pupil performance in academic subjects (from the seventh to the ninth grade) related to values obtained for selected variables measured prior to the change? Is the instability of GPA accompanied by or followed by a corresponding change in these same variables?

Many investigators have maintained that relationships exist between GPA and measures of attitude, personality, or achievement (Carter, 1952; Lund, 1932; McGuire, 1960) but no studies have been found reported in the literature where relationships involving change of GPA were considered.

The literature is replete with reports of characteristics of *overachievers* and *underachievers*, but the present study is concerned with the examination of characteristics at two points in time with subjects classified as *Upbound Achievers*, *Downbound Achievers*, and *Stable Achievers* (hereinafter referred to as *Up*, *Down*, or *Stable)* depending upon whether GPA increased or decreased two or more stanines[1] or remained constant from the seventh to the ninth grade. Under more conventional terminology, those subjects classified as *Up* would have been termed *Underachievers* at the seventh grade and *Overachievers* at the ninth grade. The reverse would be true for subjects classified as *Down*. Therefore the conventional terminology is not applicable to the present study.

If, as assumed by some investigators, measures of personality, motivation, anxiety, and attitude are fairly stable, then differences noted among the subsamples of the study could not indicate certain characteristics to be true of *Underachievers* or *Overachievers* since the subjects involved would represent one classification at the seventh grade and the other classification at the ninth grade. On the other hand, if certain characteristics tend to be related to level of achievement as measured by GPA, such variables would tend to change concomitantly with or subsequent to a change in GPA.

Therefore the study was designed to investigate the significance, both statistical and practical, of variables postulated from theory to increase the likelihood that changes in teacher evaluation (GPA) may occur and to investigate the statistical significance of certain variables postulated to change concomitantly with an observed change in GPA.

Related Literature

Modern concern with academic performance seems to date from Cattell and Ferrand just prior to the present century. Following their early exploits into measurement of individual differences by means of intellectual and motor response measures (Cook, 1946), about a half century followed wherein much attention was given to predictor measures of achievement and intelligence tests and previous grade point averages.

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[1] Stanines were obtained for the GPA of 1500 junior high schools of four Texas communities for the seventh and ninth school years.

Since World War II, investigators have increasingly concerned themselves with the importance of the nonintellectual variables which . . . *comprise the sociocultural matrix in which ability is formed.* (Ramsey, 1962). A number of racent studies indicate a present interest in a broad spectrum of variables thought to be associated with GPA (Fishman, 1961).

The earliest nonintellectual explorations seem to have concentrated in the area of interests (Super, 1949), but as the development of assessments of the functioning personality emerged, more and more studies have been conducted to investigate relationships between various personality variables and academic performance.

With the exception of the investigator's own dissertation (Starr, 1964), no studies have been found reported which examined relationships between intellectual variables and a noted change in GPA.

Rationale for the Study

Theoretically, an individual's behavior is explainable and modifiable in terms of observable conditions or events, although it is not possible at present to identify all the contributing variables and their interaction effects. Studies involving GPA as criterion measures in the prediction of achievement have tended to regard grades as manifest behavior which is the result of the effectiveness of ineffectiveness of variables totally within the organism. Thorndike recently suggested that the conventional terms of *overachievement* or *underachievement* really . . . *refer to the imperfectness of our predictions* (1963, p.2). Others have begun to encourage the inclusion of external variables, such as persons (peers, authority figures) and the situation or context in which the individual performs (Goethals, 1958; McGuire, 1960; Sears, 1951; Tolman, 1951).

Grades which are assigned to students upon the completion of a course in school should be regarded as evaluations made by the teacher. Such evaluations are thought here to be influenced by the values of the teacher as evaluator, the performance of the student both academically and socially (the former by class participation, daily production of assignments, and test grades, the latter by the peer status or relative popularity of the pupil), the sex role identification of the individual (boy or girl), the institutional values (school), and the values of the community.

Therafore, GPA, viewed as evaluations made by teachers, involve not only internal processes within the study being evaluated, but also involve variant external criteria. More explicitly, the individual's grade is regarded to be a function of (a) a combination of potential cognitive, perceptual, and psychomotor abilities, (b) expectations of the individual concerning his own behavior and the probable responses of other persons, (c) responses of other persons such as agemates, parents, teachers, or significant others, (d) sexrole identification of the individual (boy or girl), and (e) the context or situation (location) in which the behavior occurs.

Social class studies indicate that most teachers in our public schools are of middle class status either by origin or acquisition (Charters, 1963; McGuire and White, 1957) and that they tend to uphold the middle class ethic. Hence, the middle class ethic, assumed to have a modifying effect upon the teacher (Gordon, 1954), tends to influence the assignment of grades by the teacher. Thus, low grades are, in part, indicators of disvalued behavior and are inferred to be such for the present study.

Having assumed that teachers accept and inculcate middle class values, increased demands for self control and postponement of immediate need gratification are postulated to occur along about or during the period of early adolescence (junior high years). Therefore, the delayed development of self control would theoretically yield a continuing life style of immediate need gratification beyond the point in years where the middle class ethic requires the development of what Cohen (1955) has termed *worldly asceticism*. The continuation of such a life style extending throughout the junior high school environment could result in lowered grades without necessarily resulting in a corresponding change in achievement test results.

If adolescent peers (agemates) also tend to accept and emulate the middle class standards (Gordon, 1954), they too would tend to value or disvalue the behavior of individuals depending upon whether or not they develop a willingness to exercise self control. Since the development of impulse control is thought to take place during early adolescence, it is conceivable that students as well as teachers would place less value upon those who exhibit an impulsiveness toward immediate need gratification at the ninth grade than at the seventh, agemates expressing themselves in terms of peer stimulus sociometric data, the teachers expressing themselves in terms of grades.

The assumption is made in the study that in general, the boys and girls involved in the study were sufficiently reality oriented to respond to self report instruments. Expressed attitudes and scholastic motivation are thought to vary directly with grades, *e.g.*, as grades go up, a more favorable attitude is made manifest. Anxiety is thought to vary inversely with teacher evaluations as evidence of the individual responding to the external pressures of the situation, institution, and significant others. As his behavior is more highly valued, anxiety tends to lessen. If his behavior is disvalued, tension mounts, giving rise to an increase in reported anxiety.

Therefore, a variety of self-report and sociometric assessments were selected for their theoretical relevance to rather marked changes in teacher evaluations (GPA) from the seventh to the ninth grade. Data were collected during both years of school. The two years of lapsed time are thought to provide sufficient time for changes to occur if changes in GPA are indeed accompanied by reported changes in motivation, anxiety, or peer stimulus value.

The inclusion of the *Stable* group was considered necessary to observe what effect, if any, maturation and other variables might have upon those youngsters whose grade point production was identical for both years under consideration. For example, differences which exist or occur between the *Up* and *Down* groups at either point in time are likely to be regarded as having practical significance in the absence of information about those whose GPA production was identical for both years. If changes in variable scores also occur for the *Stable* group, information relative to the deviant groups will have to be considered in a different light.

Objectives of the study were to make further analysis of existing data from The University of Texas Human Talent Project (Cooperative Research Project Numbers 025, 742, 1138, Carson McGuire, Principal Investigator) in testing the general hypothesis, together with corollary hypotheses, that measures of personality, attitude, sociometric peer nominations, motivation, and anxiety are changeable and that the stability or instability of such measures is concomitant with stability or change of GPA. Examples of corollary hypotheses follow:

(1) Peer evaluations of a student's social acceptance and academic competence will tend to coincide with teacher evaluation (GPA). Therefore, peer stimulus values for the Upbound sample will increase, Stable values will remain constant and Downbound values will decrease from the seventh to the ninth grades.

(2) Assuming the middle class ethic to impinge upon the individual, general anxiety is inversely related to GPA for the samples involved in the present study. Those whose GPA declines from the seventh to the ninth grade will express themselves as less anxious at the seventh grade when their grades are higher, etc.

(3) Students whose grades decline from the seventh to the ninth grade will express themselves as more surgent that those whose grades rise or remain stable during the same period of time due to an impulsiveness toward immediate need gratification.

(4) Expressed attitudes toward school tend to vary with teacher evaluation. Therefore, at both grade levels, the sample with the higher grades will express more favorable attitudes toward school than the sample with lower grades.

In addition, data were analyzed to determine whether gain in factual or technical information, as measured by standardized achievement tests, was affected by the change or stability in grade point average.

PROCEDURES

Population, Sample, and Classification Procedures

Three subsamples [2] of 46, 48, and 100 boys and girls of junior high school age were identified and classified by whether their grade point averages increased or decreased two or more stanines, or whether GPA remained stable from the seventh to the ninth grade. Subjects were also classified by sex role identification (94 boys and 94 girls but not equally distributed among the three subsamples). The Stable group served partly as a control.

Dependent variables were selected from the original test battery (McGuire *et al*, 1960). With the exception of GPA, and Index of Social Status (which used an index value), and sex role identification (boy or girl), all of which were provided from biographical data and school records, the variables were paper and pencil instruments. GPA was determined by a 16 point scale used for all analyses. For the classification of subjects into the three subsamples, GPA were stanined. Scaled scores were also used for the IPAT Junior Personality variables (JPQ 11: Surgency vs Desurgency, and JPQ 8: Socialized Morale vs Dislike of Education), SSHA Motivation, CMAS Anxiety, and CTMM Language.

Grade placement values were used for the achievement tests (STEP Science, CAT Arithmetic, CAT Language, CAT Reading). Raw scores were used for the remaining variables and include addessments of peer evaluation of academic competence and social acceptance.

Description of Dependent Variables

Descriptions of the variables selected from the original test battery are grouped by thematic areas (see corollary hypotheses on page 4). The variables were selected because they yielded comparatively high loadings on derived factors in the analyses of data for the Texas Human Talent Project.

I. Peer Evaluations of Academic Competence (grades 7 and 9)[3]

1. Verbal: Name three persons about your own age, whom you may or may not know very well, who have a lot of ability in dealing with words. These are people who are outstanding speakers or writers.

2. Brains: Name three persons about your own age who are sort of "brains". They are boys or girls who get their ideas from books.

3. Math Ability: Name three people about your own age who are really good in arithmetic.

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2 Subjects were selected from the more than 1500 junior high boys and girls of four Texas communities who participated in the Texas Human Talent Project (McGuire *et al.*, 1960).

3 Scores derived from tabulation of agemate nominations for each nomination Stimulus item (McGuire *et al.*, 1960).

4. Academic Model: Name three persons about your own age who know how to study. These are the ones who succeed in school.

II. Assessments of Peer Evaluations of Social Acceptance (Grades 7 and 9)

5. Party With: Name three persons about your age you would prefer to have along if you were going to a game or party this weekend. They are the ones to be with.

6. Behavior Model: Name three people you would like to be like.

III. Assessments of Potential Cognitive Abilities

7. CTMM Language: California Test of Mental Maturity, Junior High Level, Form S, 1957; subtests to measure logical reasoning and verbal concepts.

IV. Assessments of Attitudes, Personality, Motivation, Anxiety and Cultural Pressures
(Assessment of surgency, grades 7 and 9)

8. JPQ 11: Surgency vs. Desurgency: IPAT Junior Personality Quiz, 1952, Cattell and Beloff, 1953); scale values derived from JPQ responses; twelve items such as "Would you rather spend an evening (a) with the hobby you like most, or (b) at a gay party?"; talkative, excitable, gay and likes variety in contrast to being serious, quiet, and interested in detailed, exact undertakings.

(Attitude toward school, grades 7 and 9)

9. SSHA Scholastic Motivation: Experimental form of the Brown-Holtzman Survey of Study Habits and Attitudes (Holtzman, Brown, and Farquhar, 1954); scale values derived from SSHA responses; 55 items such as "Whether I like a subject or not, I still work hard to make a good grade" and "Unless I really like a subject, I believe in doing enough to get a passing grade"; odd-even reliability .95, with Spearman-Brown correction; postulated to be a measure of academic attitude or motivational orientation towards scholastic achievement.

10. JPQ 8: Socialized Morale vs. Dislike of Education: IPAT Junior Personality Quiz, 1952, (Cattell and Beloff, 1953); scale values derived from JPQ responses in grades 7 and 9; twelve items such as "When you have to write an essay about your thoughts on some subject, do you (a) sometimes enjoy it, or (b) generally dislike having to do it?"; acceptance of school and cultural standards contrasted with dislike of learning and negative reaction to authority.

(Assessment of anxiety, grades 7 and 9)

11. CMAS Anxiety: Experimental form of the Castenada-McCandless Anxiety Scale (Castenda, McCandless, and Palermo, 1956) adapted for use with adolescents; 41 items grades 7 and 9 such as "I have trouble making up my mind", "I worry about what my parents will

say to me", and "My hands feel sweaty". Odd-even reliability .90 with Spearman-Brown correction; postulated to be a measure of underlying anxiety or a motive to avoid failure, especially in ego-involving, threatening, or stressful situations.

(Cultural pressures, grade 7)

12. CYS Family Tension: Experimental form adapted from Texas Cooperative Youth Study (Moore and Holtzman, 1958); twenty items such as "My parents never have time to help me", "Everyone in my family seems to be against me", and "My parents often object to the kind of boys and girls I go around with"; average item-test reliability .93; postulated to be a measure of tension aroused by inconsistent socialization pressures and manipulative controls, culminating in resentment.

(Family Social Status, grade 7)

13. ISS Family Status: Index of Social Status derived from values (McGuire and White, 1952) for occupation, source of income, and education of the status parent as reported on an identification form and checked with informants. Index values were determined from seventh grade data and may be converted to estimates of social class status of the family in the community as follows:

Upper Class (UC)	12-21
Upper-Middle (UM)	22-36
Lower-Middle (LM)	37-51
Upper-Lower (UL)	52-66
Lower-Lower (LL)	67-84

The ISS is postulated to be an indicator of variations in learning experiences in pressures and reinforcements from members of the family, and in expectations for the boy or girl on the part of school people and significant others (McGuire and White, 1957).

V. Measures of Achievement

14. CAT Reading (grades 7 and 9): California Achievement Tests, Junior High Level, Form W, 1957; two subtests, reading vocabulary and reading comprehension (grade placement scores, total test).

15. CAT Language (grades 7 and 9): California Achievement Tests Junior High Level, Form W, 1957; two subtests, mechanics of English and Spelling (grade placement scores, total test).

16. CAT Arithmetic (Grades 7 and 9): California Achievement Tests, Junior High Level, Form W, 1957; two subtests, arithmetic reasoning and arithmetic fundamentals (grade placement scores, total test).

Preliminary Analyses

(Index of Social Status)

Middle class ethics were assumed to prevail for the teachers who evaluated the subjects' academic progress. A similar assumption was also made for the subjects themselves. However, in the latter case, the Index of Social Status had been administered and an analysis was made to determine what differences, if any, existed among the various subsamples of the study. Linear regression models (described later) were formulated and F ratios calculated by means of a multiple regression computer program adapted for use on an IBM 7040 computer (Bottenberg and Ward, 1963).

The subsamples each yielded mean values within the range of the Lower Middle class (range 37-51) with the exception of the Down Girls with a mean value of 57 which is within the range of the Upper-Lower social class (range = 52-66). Since there were more boys than girls in the Down sample, significant differences between the Down girls and the other subsamples tended to be nullified when sex role identification was dropped from the models. F ratios of between sample differences (without sex role identification) did not indicate significant differences in social class status.

(CTMM Language)

Subsample Language IQ scores ranged from 95 for the Down Girls and 96 for Up Boys and 96 for Up Girls to 106 for the Stable Boys, suggesting that mean values of all subsamples were *average* for CTMM Language IQ. The scores of the Up Boys were significantly lower than those for Stable Boys ($p = .05$) and influenced the significant difference noted between the Up and Stable samples ($p = .05$) when sex role identification was dropped from the models.

(Achievement Tests)

One of the questions for which an answer was sought was "Will achievement test results be materially affected by the drastic change in GPA?" Accordingly, preliminary analyses were made of mean differences on the California Achievement Tests in Arithmetic, Language, and Reading at the seventh and ninth grade levels. Significant gains (p .01) were noted for each sample and subsamples (boys and girls) on all three tests. Grade placement gains ranged from 1.7 years to 2.9 years with composite sample gains as follows:

Up Sample gain	= 2.1 years
Down Sample gain	= 1.9 years
Stable Sample gain	= 2.6 years

A technique devised by the investigator for examining the change of relationship between group means at two points in time did not indicate any significant change in the relationship for any pair of samples. The Up sample was about one half year below grade level at both points in time, the Down sample was at grade level, and the Stable sample was a little above grade level. F ratios and means are reported in the appendix.

Multiple Linear Regression

An iterative linear regression technique developed by Bottenberg and Ward (1963) and adapted for use on an IBM 7040 computer was used for all the multiple linear

regression analyses reported in the study. Iteration was carried out to that point in the program where the sums of squares of regressed values (R^2) were not raised more than a specified criterion value of .00001 in the analysis.

Full and Restricted Models

The full, unrestricted model regression equation for the analysis of a particular test score took the form

$$y = a_o + a_1X^{(1)} + a_2X^{(2)} + a_3X^{(3)} + a_4X^{(4)} + a_5X^{(5)} + a_6X^{(6)} + e \qquad [1]$$

where

- y = criterion, test scores of each subject for a given variable
- a_o = regression constant or unit vector
- $a_1, a_2, a_3, \ldots a_6$ = weights associated with the $X^{(1)}, X^{(2)}, X^{(3)}, \ldots, X^{(6)}$ vectors
- $X^{(1)}$ = 1 if a boy Up sample, zero otherwise
- $X^{(2)}$ = 1 if a girl Up sample, zero otherwise
- $X^{(3)}$ = 1 if a boy Down sample, zero otherwise

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- $X^{(6)}$ = 1 if a girl Stable sample, zero otherwise
- e = the residual or error term

To determine whether or not mean differences were statistically significant between a pair of subsamples, an appropriate restricted model was constructed. Typical of such a restricted model is one where we sought to determine whether or not differences were significant between scores for boys and girls of the Up sample. Such a restricted model took the form

$$y = a_o + a_3X^{(3)} + a_4X^{(4)} + a_5X^{(5)} + a_6X^{(6)} + a_7X^{(7)} + f \qquad [2]$$

where

- y = criterion, test scores for all subjects in the seventh grade (same as in the full, unrestricted model [1] shown above
- a_o = regression constant or unit vector for this model
- a_3 = weight associated with the $X^{(3)}$ vector

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- a_7 = weight associated with the $X^{(7)}$ vector
- $X^{(3)}$ = 1 if boy, Down sample, zero otherwise (same as $X^{(3)}$ vector of the full, unrestricted model)

$X^{(6)}$ = 1 if a girl, Stable sample, zero otherwise (same as the $X^{(6)}$ vector in the full, unrestricted model)

$X^{(7)}$ = 1 if a boy or girl, Up sample, zero otherwise (constructed by combining vector $X^{(1)}$ and $X^{(2)}$ of the full, unrestricted model)

f = the residual or error term of the new restricted model

F Ratios of Significance

Examination of the two models above reveals that mathematically, the hypothesis under consideration is one of no difference--that a_1 = a2 (as given in the full, unrestricted model) = a_7 (as given in the new, restricted model). Hence, the new vector $X^{(7)}$ has as elements, the value of 1 for each boy and each girl of the Up sample. The resulting squared correlation coefficients (RSQ) obtained for both models, when utilized to calculate an F ratio, indicate whether or not differences between boys and girls of the Up sample are statistically significant. The F test equation takes the form

$$F = \frac{(\text{RSQ full model} - \text{RSQ restricted model})/df_a}{(1.0000 - \text{RSQ full model})/df_b} \quad [3]$$

where

F = F ratio compared with table values to determine significance for the degrees of freedom involved

RSQ full = squared correlation coefficient obtained for the full, unrestricted model (as in [1] above)

RSQ restricted = squared correlation coefficient obtained for the restricted model (as in [2] above)

df_a = degrees of freedom of the numerator, the number of unknown weights in the full model minus the number of unknown weights in the restricted model ($a_1 + a_2 \ldots + a_6$ = 6 unknowns full and $a_3 \ldots + a_7$ = 5 unknowns restricted model as in [1] and [2] above)

df_b = degrees of freedom of the demoninator, the number of subjects minus the number of unknown weights in the full model (194 - 6 in the present study when applied to full model [1] and restricted model [2] above).

The F ratios which were calculated by equation [3] followed the pattern of determining (a) differences between sexes within each sample, (b) differences between groups by sex (Up boys vs Down boys, Up boys vs Stable boys, etc.) and (c) differences between samples in the absence of sex identification.

Models to Analyze Changes At Two Points in Time

For certain variables postulated to change over the period of time under consideration, a new regression equation was necessary to permit the analysis of data obtained at two points in time. The full, unrestricted model for such an analysis took the form

$$y = a_c + a_1X^{(1)} + a_2X^{(2)} + a_3X^{(3)} + a_4X^{(4)} + a_5X^{(5)} + a_6X^{(6)} + a_7X^{(7)} + a_8X^{(8)} + a_9X^{(9)} + a_{10}X^{(10)} + a_{11}X^{(11)} + a_{12}X^{(12)} + e \quad [4]$$

where

y = criterion, test scores on a given variable for all subjects in the seventh grade followed by test scores for all subjects in the ninth grade

a_o = regression constant or unit vector

$a_1, a_2, a_3, \ldots a_{12}$ = weights associated with the $X^{(1)} \ldots X^{(12)}$ vectors

$X^{(1)}$ = 1 if a boy, Up sample, seventh grade, zero otherwise

$X^{(2)}$ = 1 if a girl, Up sample, seventh grade, zero otherwise

$X^{(3)}$ = 1 if a boy, Down sample, seventh grade, zero otherwise

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$X^{(7)}$ = 1 if a boy, Up sample, ninth grade, zero otherwise

$X^{(8)}$ = 1 if a girl, Up sample, ninth grade, zero otherwise

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$X^{(12)}$ = 1 if a girl, Stable sample, ninth grade, zero otherwise

e = the residual or error term

Restricted models were then constructed to be compared with the above full, unrestricted model [4] by means of an F ratio calculated from the two squared correlation coefficients. For example, to test the hypothesis that Up boys of the seventh grade were not significantly different in score attainment from their ninth grade scores on a given variable, a new vector was formed by adding vectors $X^{(1)}$ and $X^{(7)}$. The two squared correlation coefficients obtained from the full model [4] and the restricted model alluded to here, were applied to the F-ratio equation [5] and the F value was compared with table values to determine whether or not differences were statistically significant.

The same computer program was utilized for testing each variable for curvilinearity. The full, unrestricted model for each variable took the form

$$y = a_0 + a_1X^{(1)} + a_2X^{(2)} + e \qquad [5]$$

where

y = criterion vector in which the elements are the ninth grade GPA's for all subjects

a_0 = regression constant or unit vector

a_1, a_2 = weights associated with the $X^{(1)}$, $X^{(2)}$ vectors

$X^{(1)}$ = variable vector, in which the elements are the values obtained for all subjects on the variable being tested

$X^{(2)}$ = squared variable vector, in which the elements are the squared values of the corresponding elements in vector $X^{(1)}$

e = residual vector or error term

The restricted model, formed by dropping the squared variable vector $X^{(2)}$ was otherwise identical to the full, unrestricted model [5] and took the form

$$y = a_0 + a_1X^{(1)} + f \qquad [6]$$

where

y = criterion vector in which the elements are the ninth grade GPA's for all subjects

a_0 = regression constant or unit vector

$X^{(1)}$ = variable vector, in which the elements are the values obtained for all subjects on the variable being tested

f = residual vector or error term (designated f rather than e to indicate a different residual value)

The F test was calculated from equation [3] given earlier. If the squared variable vector contributes significantly to the squared correlation coefficient of the full, unrestricted model, dropping it out of the equation in the second, restricted model will result in a significant drop in value of RSQ as indicated by the F-ratio given in equation [3]. If, in the full model [5], weight a_2 has a positive value, the curve is U-shaped. If weight a_2 has a negative value, the curve is inverted.

Discriminant Function Analysis

Computer programs DISCRIM and CLASGOR were utilized for the discriminant function analysis but were applied only to the Up and Down samples. Lohnes (1961) extended the use of discriminant function analysis by reporting a technique for the

classification of subjects into groups by means of the test space. Lohnes proposed that in certain areas such as personnel and guidance where the need is for the most efficient classification scheme, the test space method which requires the computation of centaur scores for each person in all groups, provides an efficient method for converting discriminant score vectors into actual group classifications.

Since, in the present study, the data had already been gathered, discriminant function analysis seemed appropriate to determine whether or not the score profiles differed for the two variant samples and whether or not discriminant function techniques would have correctly classified the subjects into their respective groups.

RESULTS

Multiple linear regression iterative techniques permitting the use of unequal cell frequencies were chosen to determine whether or not seventh grade test data could have predicted the phenomenon of drastic change up or down for grade point averages of 46 Up and 48 Down subjects by the time subjects had completed the ninth grade. The same techniques were applied in seeking to answer the question of whether or not ninth grade test data indicated change which could be considered as concomitant with or subsequent to the change in GPA. Results of the analysis are clustered about four hypotheses:

Hypothesis 1: Peer evaluations of a student's social acceptance and academic competence will tend to coincide with teacher evaluation (GPA). Therefore, peer stimulus values for the Up sample will increase, Stable values will remain constant, and Down sample values will decrease from the seventh to the ninth grades. Additionally, scale values at any given point in time will be greater for the sample with the higher grade point average.

Four peer nomination variables selected as measures of Academic Competence were *Verbal*, *Brains*, *Math Ability*, and *Academic Model*. Two peer nominations selected as measures of Social Acceptance were *Party With* and *Behavior Model* Results of analyses are presented in Tables 1-6, respectively. Between sample differences by sex are presented but are not commented upon except in those instances where sex differences appear to have contributed substantially to the significant sample differences.

Results--Hypothesis 1: Peer Nomination Measures of Academic Competence

Peer Nomination Scale *Verbal*

Results of the statistical analysis of data for the peer nomination *Verbal* are presented in Table 1. Within sample differences (boy vs girl) were not significant at either the seventh or the ninth grade level. At the seventh grade level, the mean for the Stable sample was significantly higher than that for the Up sample ($p < .01$). At the ninth grade, it was significantly higher than either the Up sample ($p < .01$) or the Down sample ($p < .01$).

The mean for the Down sample was greater than that for the Up sample at grade 7 and decreased by the time data were gathered in the ninth grade while the mean increased for the Up sample during the same period of time. In the absence of data for the Stable sample, the direction of change would tend to support the hypothesis although differences between samples (either grade level) and the change of mean per sample (7 vs 9) did not yield significant F-ratios. Since the peer nominations on the *Verbal* scale increased significantly from the seventh to the ninth grade for the Stable sample ($p < .01$) the total results do not tend to support the hypothesis.

TABLE 1

F RATIOS AND MEANS OF WITHIN AND BETWEEN SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH AND NINTH GRADES
PEER NOMINATION SCALE: *VERBAL*

Classification		F-Ratio Grade 7	F-Ratio Grade 9	F-Ratio 7 vs 9
Within Sample Sex Differences				
Up	(Boy vs Girl)	.03	1.00	
Down	(Boy vs Girl)	.57	1.00	
Stable	(Boy vs Girl)	.22	1.67	
Between Sample Differences by Sex				
Boy	(Up vs Down)	2.65	.00	
	(Up vs Stable)	5.14*	8.40**	
	(Down vs Stable)	.29	10.08**	
Girl	(Up vs Down)	.53	.00	
	(Up vs Stable)	7.50**	4.49*	
	(Down vs Stable)	2.77	3.39	
Between Sample Differences				
	(Up vs Down)	3.13	.24	
	(Up vs Stable)	12.58**	13.09**	
	(Down vs Stable)	2.31	12.53**	
Changes Within Subsamples Seventh to Ninth Grade				
Boy Up	(7 vs 9)			.03
Girl Up	(7 vs 9)			.04
Boy Down	(7 vs 9)			.38
Girl Down	(7 vs 9)			.02
Boy Stable	(7 vs 9)			13.41**
Girl Stable	(7 vs 9)			2.88
Changes by Sample Seventh to Ninth Grade				
Up	(7 vs 9)			.07
Down	(7 vs 9)			.32
Stable	(7 vs 9)			14.55**

* Significant at the .05 level
** Significant at the .01 level

Classification	N	Mean Grade 7	Mean Grade 9
Boy Up	19	.32	1.10
Girl Up	27	.67	1.31
Boy Down	28	3.80	1.54
Girl Down	20	2.19	1.65
Boy Stable	50	4.70	14.02
Girl Stable	50	5.35	9.79
Up	46	.52	1.23
Down	48	3.12	1.60
Stable	100	5.03	11.90

Peer Nomination Scale *Brains*

Results of the statistical analysis of data for the peer nomination *brains* are presented in Table 2. Within sample differences (boy vs girl) were not significant at either grade level (7 or 9). At both grade levels the mean for the Stable sample was significantly higher than those for the Up and Down samples (p 01).

At the seventh grade level, the Down mean was greater than that for the Up sample but the difference was not significant (F= 1.98, 3.91 required for .05 significance with df = 1 and 191). From the seventh to the ninth grade the Up mean increased while the Down mean decreased (as hypotheesized) and the F-ratio dropped. If the Stable sample was not included in the study, the direction of change would have tended to support the hypothesis although the amount of change for each sample was not significant. In view of the fact that the Stable sample mean increased significantly from the seventh to the ninth grade (p 01), the results do not lend much support to the hypothesis.

Peer Nomination Scale *Math Ability*

Results of the analysis of data for the peer nomination scale *Math Ability* are presented in Table 3. Within sample differences (boy vs girl) were not significant at either the seventh or the ninth grade. At both grade levels the mean for the Stable sample was significantly higher than those for the Up or Down samples (p 01).

At the seventh grade level, the mean for the Down sample was significantly higher than that for the Up sample (p 05). By the ninth grade, the mean for the Up sample was greater than that for the Down sample, the former having increased while the latter decreased, but the difference was not significant. The mean for the Stable sample dropped very slightly from the seventh to the ninth grade with an F-ratio indicating no change.

The di ction of change for the two variant samples (Up and Down) and the stability of the mean for the Stable sample are as hypothesized but the magnitude of change was not statistically significant in any of the samples.

Peer Nomination Scale *Academic Model*

Results of the analysis of data for the peer nomination scale *Academic Model* are presented in Table 4. Within sample differences (boy vs girl) were not significant for any of the samples at either grade level. At both grade levels the mean for the Stable sample was significantly greater than the means for the Up or Down samples (p 01).

The means for all three samples increased from the seventh to the ninth grade, significantly so for the Up and Stable samples (p 01). The increase for the Up group was greater than that for the Down group. The results do not provide support for the hypothesis.

TABLE 2

F RATIOS AND MEANS OF WITHIN AND BETWEEN SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH AND NINTH GRADES
PEER NOMINATION SCALE: *BRAINS*

Classification		F-Ratio Grade 7	F-Ratio Grade 9	F-Ratio 7 vs 9
Within Sample Sex Differences				
Up	(Boy vs Girl)	.01	.01	
Down	(Boy vs Girl)	.32	.003	
Stable	(Boy vs Girl)	.13	.04	
Between Differences By Sex				
Boy	(Up vs Down)	1.42	.01	
	(Up vs Stable)	9.99**	5.23*	
	(Down vs Stable)	4.41*	6.13*	
Girl	(Up vs Down)	.42	12.20**	
	(Up vs Stable)	10.76**	6.92**	
	(Down vs Stable)	5.00*	5.85*	
Between Differences				
	(Up vs Down)	1.98	.002	
	(Up vs Stable)	21.39**	12.33**	
	(Down vs Stable)	9.23**	12.29**	
Changes Within Subsamples Seventh to Ninth Grade				
Boy Up	(7 vs 9)			.02
Girl Up	(7 vs 9)			.10
Boy Down	(7 vs 9)			.10
Girl Down	(7 vs 9)			.01
Boy Stable	(7 vs 9)			4.85*
Girl Stable	(7 vs 9)			6.91**
Changes by Sample Seventh to Ninth Grade				
Up	(7 vs 9)			.11
Down	(7 vs 9)			.09
Stable	(7 vs 9)			11.86**

* Significant at the .05 level (F = 3.90)
** Significant at the .01 level (F = 6.8)

Classification	N	Mean - 7	Mean - 9
Boy Up	19	.52	1.02
Girl Up	27	.52	1.41
Boy Down	28	2.36	1.46
Girl Down	20	1.50	1.23
Boy Stable	50	4.90	9.40
Girl Stable	50	4.54	9.94
Up	46	.52	1.24
Down	48	2.00	1.38
Stable	100	4.72	9.67

TABLE 3

F RATIOS AND MEANS OF WITHIN AND BETWEEN SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH AND NINTH GRADES
PEER NOMINATION SCALE: *MATH ABILITY*

Classification		F-Ratio Grade 7	F-Ratio Grade 9	F-Ratio 7 vs 9
Within Sample Sex Differences				
Up	(Boy vs Girl)	.10	.01	
Down	(Boy vs Girl)	1.25	.01	
Stable	(Boy vs Girl)	2.88	.40	
Between Differences by Sex				
Boy	(Up vs Down)	4.35*	.01	
	(Up vs Stable)	9.39**	4.81*	
	(Down vs Stable)	.76	6,90**	
Girl	(Up vs Down)	.44	.01	
	(Up vs Stable)	19.99**	8,12**	
	(Down vs Stable)	10.86**	7.36**	
Between Differences				
	(Up vs Down)	4.25*	.03	
	(Up vs Stable)	27.58**	12.78**	
	(Down vs Stable)	8.44**	14.81**	
Changes Within Subsamples Seventh to Ninth Grade				
Boy Up	(7 vs 9)			.23
Girl Up	(7 vs 9)			.17
Boy Down	(7 vs 9)			2.59
Girl Down	(7 vs 9)			.10
Boy Stable	(7 vs 9)			.11
Girl Stable	(7 vs 9)			.25
Changes by Sample Seventh to Ninth Grade				
Up	(7 vs 9)			.39
Down	(7 vs 9)			2.08
Stable	(7 vs 9)			.01

* Significant at the .05 level
** Significant at the .01 level

Classification	N	Mean - 7	Mean - 9
Boy Up	19	.05	1.09
Girl Up	27	.63	1.37
Boy Down	28	3.75	.91
Girl Down	20	1.80	1.09
Boy Stable	50	4.98	5.41
Girl Stable	50	6.99	6.34
Up	46	.39	1.26
Down	48	2.94	.98
Stable	100	5.99	5.88

TABLE 4

F RATIOS AND MEANS OF WITHIN AND BETWEEN SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH AND NINTH GRADES
PEER NOMINATION SCALE: ACADEMIC MODEL

Classification		F-Ratio Grade 7	F-Ratio Grade 9	F-Ratio 7 vs 9
Within Sample Sex Differences				
Up	(Boy vs Girl)	.66	.73	
Down	(Boy vs Girl)	.09	.02	
Stable	(Boy vs Girl)	.14	.98	
Between Differences By Sex				
Boy	(Up vs Down)	1.97	.01	
	(Up vs Stable)	9.77**	5.64*	
	(Down vs Stable)	3.24	.41	
Girl	(Up vs Down)	.08	6.73*	
	(Up vs Stable)	7.97**	5.91*	
	(Down vs Stable)	4.94*	8.50**	
Between Differences				
	(Up vs Down)	1.34	.25	
	(Up vs Stable)	17.32**	11.02**	
	(Down vs Stable)	8.18**	15.86**	
Changes Within Subsamples Seventh to Ninth Grade				
Boy Up	(7 vs 9)			1.82
Girl Up	(7 vs 9)			5.48*
Boy Down	(7 vs 9)			.66
Girl Down	(7 vs 9)			1.16
Boy Stable	(7 vs 9)			16.18**
Girl Stable	(7 vs 9)			24.96**
Changes by Sample Seventh to Ninth Grade				
Up	(7 vs 9)			7.14**
Down	(7 vs 9)			1.74
Stable	(7 vs 9)			41.69**

* Significant at the .05 level
** Significant at the .01 level

Classification	N	Mean 7	Mean 9
Boy Up	19	.57	2.68
Girl Up	27	1.23	4.30
Boy Down	28	1.67	2.87
Girl Down	20	1.44	3.11
Boy Stable	50	2.80	6.72
Girl Stable	50	2.99	7.83
Up	46	.95	3.63
Down	48	1.58	2.96
Stable	100	2.89	7.32

Results Hyp. 1: (Part 2) Peer Nomination Measures of Social Acceptance

Peer Nomination Scale *Party With*

Results of the analysis of data for the peer nomination scale *Party With* are presented in Table 5. Within sample differences (boy vs girl) were not significant for any of the samples at either grade level. At the seventh grade level the mean for the Stable sample was significantly greater than that for the Up sample (p 05). At the ninth grade level, the mean for the Stable sample was significantly greater than those for either the Up or Down samples (p 01).

The means for all three samples increased from the seventh to the ninth grade, significantly so for the Up sample (p 05) and the Stable sample (p 01). The results do not provide support for the hypothesis.

Peer Nomination Scale *Behavior Model*

Results of the analysis of data for the peer nomination scale *Behavior Model* are presented in Table 6. Within sample differences (boy vs girl) were not significant for any of the samples at either grade level.

At the seventh grade level, the mean for the Down sample was significantly greater than that for the Up sample (p 05). By the ninth grade, the mean for the Up sample was greater than that for the Down sample but not significantly so. The mean for the Stable sample was significantly greater than that for the Up sample at both grade levels (p 01 and p 05).

Peer stimulus values for the nomination scale *behavior model* increased for the Up and Stable samples and decreased for the Down sample but none of the changes were significant.

Hypothesis 2: Assuming the middle class ethic to impinge upon the individual, general anxiety is inversely related to GPA for the samples involved in the present study. Those whose GPA declines from the seventh to the ninth grade will express themselves as less anxious at the seventh grade when their grades are higher, etc.

Two variables were selected for hypothesis 2, *CMAS Anxiety* and *Family Tension*. Results of analysis for both variables are presented in Tables 7 and 8, respectively.

CMAS ANXIETY

The results of data analysis for *CMAS Anxiety* are presented in Table 7. At the seventh grade level no significant differences were found between boys and girls of any of the three samples although the mean score of the Up boys was greater than that for the Up girls. At the ninth grade level, the Up girls had a mean greater than that for the Up boys but not significantly greater. Also at the ninth grade level, girls of the Down and Stable samples expressed significantly more anxiety than the boys of the same samples (p 05).

TABLE 5

F RATIOS AND MEANS OF WITHIN AND BETWEEN SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH AND NINTH GRADES
PEER NOMINATION SCALE: *PARTY WITH*

Classification		F-Ratio Grade 7	F-Ratio Grade 9	F-Ratio 7 vs 9
Within Sample Sex Differences				
Up	(Boy vs Girl)	.44	1.62	
Down	(Boy vs Girl)	.003	1.02	
Stable	(Boy vs Girl)	.37	.15	
Between Differences By Sex				
Boy	(Up vs Down)	1.82	.16	
	(Up vs Stable)	4.11*	6.12*	
	(Down vs Stable)	.38	5.38*	
Girl	(Up vs Down)	.54	.01	
	(Up vs Stable)	.91	2.33	
	(Down vs Stable)	.001	1.55	
Between Differences				
	(Up vs Down)	2.00	.009	
	(Up vs Stable)	4.36*	7.35**	
	(Down vs Stable)	.21	6.97**	
Changes Within Subsamples Seventh to Ninth Grade				
Boy Up	(7 vs 9)			.68
Girl Up	(7 vs 9)			3.81*
Boy Down	(7 vs 9)			.09
Girl Down	(7 vs 9)			1.50
Boy Stable	(7 vs 9)			7.82**
Girl Stable	(7 vs 9)			13.85**
Changes by Sample Seventh to Ninth Grade				
Up	(7 vs 9)			4.12*
Down	(7 vs 9)			1.07
Stable	(7 vs 9)			21.54**

* - Significant at the .05 level
** Significant at the .01 level

Classification	N	Mean - 7	Mean - 9
Boy Up	19	1.47	2.38
Girl Up	27	2.04	3.82
Boy Down	28	2.61	2.81
Girl Down	20	2.65	3.94
Boy Stable	50	3.02	4.89
Girl Stable	50	2.67	5.20
Up	46	1.80	3.23
Down	48	2.62	3.29
Stable	100	2.85	5.06

TABLE 6

F RATIOS AND MEANS OF WITHIN AND BETWEEN SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH AND NINTH GRADES
PEER NOMINATION SCALE: *BEHAVIOR MODEL*

Classification		F-Ratio Grade 7	F-Ratio Grade 9	F-Ratio 7 vs 9
Within Sample Sex Differences				
Up	(Boy vs Girl)	.67	.21	
Down	(Boy vs Girl)	.003	.10	
Stable	(Boy vs Girl)	.32	.07	
Between Differences By Sex				
Boy	(Up vs Down)	4.27	.47	
	(Up vs Stable)	6.92**	2.94	
	(Down vs Stable)	.16	1.20	
Girl	(Up vs Down)	13.17**	.01	
	(Up vs Stable)	5.83*	2.46	
	(Down vs Stable)	.71	2.33	
Between Differences				
	(Up vs Down)	5.11*	.16	
	(Up vs Stable)	12.30**	5.27*	
	(Down vs Stable)	.81	3.43	
Changes Within Subsamples Seventh to Ninth Grade				
Boy Up	(7 vs 9)		.17	
Girl Up	(7 vs 9)		.14	
Boy Down	(7 vs 9)		.17	
Girl Down	(7 vs 9)		.43	
Boy Stable	(7 vs 9)		.37	
Girl Stable	(7 vs 9)		.22	
Changes by Sample Seventh to Ninth Grade				
Up	(7 vs 9)		.30	
Down	(7 vs 9)		.55	
Stable	(7 vs 9)		.59	

* Significant at the .05 level
** Significant at the .01 level

Classification	N	Mean - 7	Mean - 9
Boy Up	19	.16	.62
Girl Up	27	.85	1.22
Boy Down	28	1.89	1.56
Girl Down	20	1.85	1.10
Boy Stable	50	2.16	2.60
Girl Stable	50	2.48	2.81
Up	46	.57	.98
Down	48	1.87	.33
Stable	100	2.31	2.71

TABLE 7

F RATIOS AND MEANS OF WITHIN AND BETWEEN SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH AND NINTH GRADES
PEER NOMINATION SCALE: *CMAS ANXIETY*

Classification		F-Ratio Grade 7	F-Ratio Grade 9	F-Ratio 7 vs 9
Within Sample Sex Differences				
Up	(Boy vs Girl)	.24	.37	
Down	(Boy vs Girl)	1.76	4.91*	
Stable	(Boy vs Girl)	2.78	5.97*	
Between Differences By Sex				
Boy	(Up vs Down)	5.90*	.77	
	(Up vs Stable)	4.59*	2.27	
	(Down vs Stable)	.38	.38	
Girl	(Up vs Down)	.41	.48	
	(Up vs Stable)	.17	.16	
	(Down vs Stable)	.12	1.28	
Between Differences				
	(Up vs Down)	5.24*	.22	
	(Up vs Stable)	3.29	2.15	
	(Down vs Stable)	.73	.87	

Changes Within Subsamples Seventh to Ninth Grade		
Boy Up	(7 vs 9)	1.67
Girl Up	(7 vs 9)	.12
Boy Down	(7 vs 9)	.16
Girl Down	(7 vs 9)	.90
Boy Stable	(7 vs 9)	1.08
Girl Stable	(7 vs 9)	.17
Changes by Sample Seventh to Ninth Grade		
Up	(7 vs 9)	1.16
Down	(7 vs 9)	.89
Stable	(7 vs 9)	1.03

* Significant at the .05 level
** Significant at the .01 level

Classification	N	Mean - 7	Mean - 9
Boy Up	19	40.86	34.94
Girl Up	27	38.67	37.36
Boy Down	28	30.28	31.43
Girl Down	20	35.94	40.16
Boy Stable	50	32.40	29.47
Girl Stable	50	37.30	36.15
Up	46	39.59	36.39
Down	48	32.64	35.06
Stable	100	34.84	32.80

TABLE 8

F RATIOS AND MEANS OF SEX AND SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH GRADE
FAMILY TENSION

Classification		F-Ratios 7th Grade
Within Sample Differences By Sex		
Up	(Boy vs Girl)	.66
Down	(Boy vs Girl)	.99
Stable	(Boy vs Girl)	.07
Between Sample Differences By Sex		
Boy	(Up vs Down)	.01
	(Up vs Stable)	.17
	(Down vs Stable)	.11
Girl	(Up vs Down)	.003
	(Up vs Stable)	1.57
	(Down vs Stable)	1.41
Between Sample Differences		
	(Up vs Down)	.01
	(Up vs Stable)	1.61
	(Down vs Stable)	1.41

* Significant at the .05 level (F = 3.90)
** Significant at the .01 level (F = 6.88)

Sample and Subsample Means

Classification	N	Mean
Boy Up	19	9.02
Girl Up	27	10.81
Boy Down	28	9.28
Girl Down	20	10.89
Boy Stable	50	8.86
Girl Stable	50	9.16
Up	46	9.66
Down	48	9.59
Stable	100	9.01

As indicated in hypothesis 2, the Up sample expressed more anxiety than the Down sample (p 05) at the seventh grade. The Up sample mean was greater than that of the Stable sample but not significantly greater at the seventh grade

From the seventh to the ninth grade, the Up sample decreased in anxiety (NS) as did the Stable sample (NS) while the Down sample increased in expressed anxiety (NS). Although the direction of change for the variant samples (Up and Down) was as hypothesized, the magnitude of change was not significant. The hypothesis does not appear to be supported by the results.

Family Tension (seventh grade only)

The results of the data analysis for *Family Tension* (seventh grade only) are presented in Table 8.

In all three samples girls expressed slightly greater family tension than boys but the differences were not significant. Subjects of the Up sample expressed slightly more family tension than subjects of either of the other two samples but the differences were not significant and cannot be interpreted as providing support for the hypothesis. As indicated in Table 8, there were no within or between differences which approached the level of significance. The results do not provide support for the hypothesis.

Hypothesis 3: Students whose grades decline from the seventh to the ninth grade will express themselves as more surgent than those whose grades rise or remain stable during the same period of time due to an impulsiveness toward immediate need gratification.

The variable selected as a measure of surgency was JPQ 11 (Surgency vs Desurgency scale of the Junior Personality Quiz). Results of the analysis is presented in Table 9.

JPQ 11

Results of the statistical analysis of data for *JPQ 11* are presented in Table 9. At both grade levels the girls indicated greater surgency than boys, the differences resulting in significance except for the Down sample at the ninth grade.

At the seventh grade, the mean for the Up sample was significantly greater (more surgent) than that for the Down sample (p .01). By the ninth grade, the difference had lost significance. The mean for the Up sample decreased while the mean of the Down sample increased. The direction of change for the two samples was in the direction hypothesized. However, whereas the variant samples reflect a more carefree attitude in the absence of good grades, the mean for the Stable sample increased significantly from the seventh to the ninth grade (p .01) indicating that for the subjects in that sample, the status quo resulted in an expression of a less serious attitude. Therefore, the results do not support the hypothesis.

TABLE 9

F RATIOS AND MEANS OF WITHIN AND BETWEEN SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH AND NINTH GRADES
JPQ 11: SURGENCY vs DESURGENCY

Classification		F-Ratio Grade 7	F-Ratio Grade 9	F-Ratio 7 vs 9
Within Sample Sex Differences				
Up	(Boy vs Girl)	10.81**	5.44*	
Down	(Boy vs Girl)	5.80*	3.14	
Stable	(Boy vs Girl)	20.53**	52.18**	
Between Differences By Sex				
Boy	(Up vs Down)	2.59	.13	
	(Up vs Stable)	1.35	3.68	
	(Down vs Stable)	.49	3.00	
Girl	(Up vs Down)	6.29*	.12	
	(Up vs Stable)	2.23	29.08**	
	(Down vs Stable)	2.09	26.19**	
Between Differences				
	(Up vs Down)	11.26**	.12	
	(Up vs Stable)	4.69*	17.01**	
	(Down vs Stable)	3.05	21.16**	
Changes Within Subsamples Seventh to Ninth Grade				
Boy Up	(7 vs 9)			.50
Girl Up	(7 vs 9)			1.59
Boy Down	(7 vs 9)			.73
Girl Down	(7 vs 9)			.59
Boy Stable	(7 vs 9)			9.46**
Girl Stable	(7 vs 9)			47.06**
Changes by Sample Seventh to Ninth Grade				
Up	(7 vs 9)			1.67
Down	(7 vs 9)			1.13
Stable	(7 vs 9)			39.58**

* Significant at the .05 level
** Significant at the .01 level

Classification	N	Mean - 7	Mean - 9
Boy Up	19	6.05	5.57
Girl Up	27	7.85	7.15
Boy Down	28	5.18	5.83
Girl Down	20	6.50	7.00
Boy Stable	50	5.48	6.73
Girl Stable	50	7.19	10.04
Up	46	7.09	6.50
Down	48	5.72	6.31
Stable	100	6.34	8.39

Hypothesis 4: Expressed attitudes toward school tend to vary with teacher evaluation. Therefore, at both grade levels, the sample with the higher grades will express more favorable attitudes toward school than the sample with lower grades.

The two variables selected as measures of attitudes toward school were SSHA Scholastic Motivation and JPQ 8: Socialized Morale vs Dislike of Education. Results of the analysis of data for the two variables are presented in Tables 10 and 11, respectively.

SSHA Scholastic Motivation

The results of data analysis for SSHA Scholastic Motivation are presented in Table 10. At the seventh grade level, the Up girls expressed a significantly greater scholastic motivation than did the boys of the same sample (p 05). At the ninth grade level the difference was still greater (p 01). No significant differences were noted in the expressed scholastic motivation of boys vs girls in the Down and Stable samples but the obtained mean for Stable girls was significantly greater than that for the Stable boys at the ninth grade (p 05).

The Down sample indicated significantly greater scholastic motivation than the Up sample at the seventh grade (p 05) but the difference, although reversed at the ninth grade (Up now greater than Down), was not significant. The direction of change for the two samples tends to lend support to the hypothesis. The Down sample mean decreased significantly from the seventh to the ninth grade (p 05) as predicted. The Up sample mean increased during the same period of time but not significantly so.

As indicated in the hypothesis, the means for all three groups corresponded favorably with GPA at the seventh grade level. However, at the ninth grade level, the mean for the Stable sample increased rather than remain constant as predicted. The increase was not significant. The hypothesis is only modestly supported by the results.

JPQ 8: Socialized Morale vs Dislike of Education

The results of the data analysis for JPQ 8 are presented in Table 11. Sex differences were noted at both grade levels for the Up and Stable samples but not for the Down sample.

At the seventh grade level, the mean for the Down sample was significantly greater than that for the Up sample (p 05), indicating the greater socialized morale in the presence of higher GPA. At the ninth grade the difference was reversed but the Up sample mean was not significantly greater than that for the Down sample.

The mean for the Up sample did not increase as predicted from the seventh to ninth grades but the mean for the Down sample decreased significantly as predicted (p 01). The mean for the Stable sample was expected to remain constant but increased significantly (p 01), so much so that by the ninth grade, the Stable mean was significantly greater than that for the Up sample (p 01) or the Down sample (p 01).

TABLE 10

F RATIOS AND MEANS OF WITHIN AND BETWEEN SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS; SEVENTH AND NINTH GRADES
SSHA SCHOLASTIC MOTIVATION

Classification		F-Ratio Grade 7	F-Ratio Grade 9	F-Ratio 7 vs 9
Within Sample Sex Differences		4.43*	8.60**	
Up	(Boy vs Girl)	.65	.02	
Down	(Boy vs Girl)	1.44	6.08*	
Stable	(Boy vs Girl)			
Between Differences By Sex				
Boy	(Up vs Down)	12.34**	7.64**	
	(Up vs Stable)	4.76*	3.34	
	(Down vs Stable)	3.74	.40	
Girl	(Up vs Down)	.35	3.84	
	(Up vs Stable)	.70	.24	
	(Down vs Stable)	.01	6.89**	
Between Differences				
	(Up vs Down)	7.62**	.79	
	(Up vs Stable)	3.56	1.55	
	(Down vs Stable)	1.77	5.34*	
Changes Within Subsamples Seventh to Ninth Grade				
Boy Up	(7 vs 9)		.61	
Girl Up	(7 vs 9)		2.29	
Boy Down	(7 vs 9)		4.76*	
Girl Down	(7 vs 9)		1.00	
Boy Stable	(7 vs 9)		.21	
Girl Stable	(7 vs 9)		2.36	
Changes by Sample Seventh to Ninth Grade				
Up	(7 vs 9)		2.65	
Down	(7 vs 9)		5.20*	
Stable	(7 vs 9)		1.92	

* Significant at the .05 level
** Significant at the .01 level

Classification	N	Mean - 7	Mean - 9
Boy Up	19	42.69	47.05
Girl Up	27	54.08	61.04
Boy Down	28	61.49	52.45
Girl Down	20	57.20	51.80
Boy Stable	50	53.25	54.87
Girl Stable	50	57.65	62.91
Up	46	49.35	55.22
Down	48	59.71	52.20
Stable	100	55.46	58.59

TABLE 11

F RATIOS AND MEANS OF WITHIN AND BETWEEN SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH AND NINTH GRADES
JPQ 8: SOCIALIZED MORALE vs DISLIKE OF EDUCATION

Classification		F-Ratio Grade 7	F-Ratio Grade 9	F-Ratio 7 vs 9
Within Sample Sex Differences				
Up	(Boy vs Girl)	13.81**	4.64*	
Down	(Boy vs Girl)	2.13	.39	
Stable	(Boy vs Girl)	12.26**	9.20**	
Between Differences by Sex				
Boy	(Up vs Down)	10.64**	.66	
	(Up vs Stable)	4.45*	12.45**	
	(Down vs Stable)	2.89	9.05**	
Girl	(Up vs Down)	1.02	.54	
	(Up vs Stable)	.58	14.76**	
	(Down vs Stable)	.19	18.39**	
Between Differences				
	(Up vs Down)	5.17*	.24	
	(Up vs Stable)	2.15	13.31**	
	(Down vs Stable)	1.41	14.23**	
Changes Within Subsamples Seventh to Ninth Grade				
Boy Up	(7 vs 9)			.03
Girl Up	(7 vs 9)			.25
Boy Down	(7 vs 9)			.61
Girl Down	(7 vs 9)			3.97*
Boy Stable	(7 vs 9)			11.11**
Girl Stable	(7 vs 9)			14.07**
Changes by Sample Seventh to Ninth Grade				
Up	(7 vs 9)			.06
Down	(7 vs 9)			7.76**
Stable	(7 vs 9)			23.35**

* Significant at the .05 level
** Significant at the .01 level

Classification	N	Mean — 7	Mean — 9
Boy Up	19	4.69	4.83
Girl Up	27	7.26	6.88
Boy Down	28	6.94	5.61
Girl Down	20	7.95	6.21
Boy Stable	50	6.00	7.87
Girl Stable	50	7.41	9.79
Up	46	6.19	6.04
Down	48	7.35	5.85
Stable	100	6.84	8.83

Discriminant Function Analysis

Discriminant function analysis was applied to the two variant samples (Up and Down) by means of computer programs DISCRIM and CLASCOR adapted from Cooley and Lohnes (1962). Twenty-five seventh grade variables were selected from the original test battery of the Texas Human Talent Project on the basis of their high loadings on factor scores for the entire population studied in the project. Centour scores were obtained which represent the degree to which an individual resembles each of several groups in terms of several certain antecedent variables thought to be important in distinguishing among the groups.

Each student is represented by a point in the test space. The obtained individual discriminant scores are vector products of discriminant vectors and test score vectors. A moderate departure from homogeneity of dispersion will not produce differences between the test space and the discriminant space. (Cooley and Lohnes, 1962).

The obtained value for the Wilkes Lambda was .194. When applied to an F-ratio equation to determine whether or not the Up and Down sample profiles were statistically the same, an F value of 11.31 was obtained and the null hypothesis of similar profiles had to be rejected (Df A = 25, where Df A = number of variables, and Df W = 68 where Df W = N (number of variables) - 1).

Program CLASCOR was applied to the results of DISCRIM to obtain chi^2 and probability values for each subject as his profile was compared with the group profiles. Since the group sizes were unequal (nUp = 46 and nDown = 48), high probability is recommended over low chi^2. However, in the present situation, both techniques yielded the same number of correct classifications. The classification results are presented in Table 12. All of the U, subjects were correctly classified and only two misses occurred for the Down subjects.

Large contributors to group separation were STEP Listen, JPQ 8, JPQ 11, Verbal, Academic Model, Behavior Model, CAT Arithmetic CAT Reading, CAT Language, and DRT (Discrimination Reaction Time test). Subsequent analyses included these ten variables and four group classification (boys and girls for Up and Down samples). A total of 58 correct classifications were obtained for the 94 subjects (64.4 percent correct classification). The results of the ten test score classification for four groups are presented in Table 13.

Correct classifications were obtained at a rate greater than chance with six variables for four groups in a cross validation where half of the subjects from each original sample (Up and Down) were selected at random to obtain discriminant fuctions which were then applied to the test scores of the other half. Correct classifications were obtained for 18 of the 47 subjects (39 percent). The correct classifications yielded a chi^2 of 20.56 which is significantly greater than chance at the p = .02 level of significance.

Note: Wilkes Lambda = 1.000 --RSQ. For two groups, the multiple regression technique used in the present study can be used to make the same type of group classification. Out of curiosity therefore, this was verified with a resulting RSQ value of .806 which is 1.000 - Wilkes Lambda,(.194 in this case.)

TABLE 12

PREDICTION OF GROUP MEMBERSHIP FROM DISCRIMINANT FUNCTIONS
FOR 47 BOYS AND 47 GIRLS OF JUNIOR HIGH AGE
TWO GROUPS, TWENTY-FIVE TEST VARIABLES
(HIGH PROBABILITY CLASSIFICATION)

		GROUP ENTERED		
		UP	DOWN	TOTAL
GROUP PREDICTED	UP	46 Up Hits	0 Down Misses	46
	DOWN	2 Up Misses	46	48
			Total Hits 92	
	TOTAL	48	46	94

TABLE 13

PREDICTION OF GROUP MEMBERSHIP FROM DISCRIMINANT FUNCTIONS
FOR 47 BOYS AND 47 GIRLS OF JUNIOR HIGH AGE
FOUR GROUPS, TEN TEST SCORE VARIABLES

GROUP PREDICTED	GROUP ENTERED: BOY UP	GIRL UP	BOY DOWN	GIRL DOWN	
BOY UP	12 Hits	2	4	1	19
GIRL UP	2	20 Hits	0	5	27
BOY DOWN	3	1	22 Hits	2	28
GIRL DOWN	1	7	2	10 Total Hits 64	20
	18	30	28	18	94

SUMMARY AND CONCLUSIONS

Scores from sixteen variables were used to assess differences among 194 junior high school boys and girls of four Texas communities who were among more than 1500 pupils included in the Texas Human Talent Project. Subjects were classified into Up, Down, or Stable samples. Classification into the Up sample of 19 boys and 27 girls required an increase of two or more stanines in grade point average from the seventh to the ninth grade. Classification into the Down sample of 28 boys and 20 girls required a decrease in GPA of two or more staninas. Each subject classified into the Stable sample of 50 boys and 50 girls obtained identical grade point averages at the seventh and ninth grades. Statines for the grade point averages were obtained for the entire population of 1500 pupils in the four communities.

Analyses of the sample differences were made with the use of an iterative linear regression program adapted for use on an IBM 7040 computer.

Achievement test scores obtained from the California Achievement Tests in Arithmetic, Reading, and Language yielded results indicating that all three samples made significant gains in grade placement from the seventh to the ninth grade (Average grade placement gains for the Up, Down and Stable samples were 2.1, 1.9, and 2.5, respectively. The Up sample did not make gains in proportion to the marked increase in GPA for that sample, and the Down sample gains for the achievement tests do not reflect the severe loss in GPA for the subjects of that sample. The Stable sample, with grade placement scores above those for the other two samples at the seventh grade, enjoyed the greatest gains in grade placement for the three tests.

If achievement tests may be regarded as indices of gain in factual or technical information, then it appears that teacher evaluations were not based upon gain of subject matter knowledge along. Nothing in the data indicated the degree to which the subjects applied themselves in the daily production of assignments or in performing other teacher assigned tasks.

Grades should not be thought of in terms of pupil achievement alone. Grades are marks assigned by teachers as indicators of the teacher's evaluation of the pupil's performance. In this latter light, grades were postulated to involve variant external criteria as well as internal processes within the individual being evaluated.

GPA, the behavior under consideration, was regarded as a function of (a) a combination of potential cognitive, perceptual and psychomotor abilities, (b) elements of attitudes, personality and motivation, especially expectations about one's own behavior and the probable responses of others, (c) responses of other persons such as peers, parents, teachers, or significant others, (d) sex role identification (boy or girl), and (e) the context or situation in which the behavior occurs (community A, B, C, etc.).

Teachers, parents, and the general student population from which the samples were obtained were assumed to be of middle class status and to generally accept the middle class ethic. An index of social status (ISS) supported the notion that students in the study were of middle class origin. F-ratios did not approach significance in social class status for any of the samples (either within or between).

CTMM Language IQ scores yielded F-ratios of significant difference between Up boys (96) and Stable boys (106) which contributed to the significant difference in means for the Up (96) and Stable (104) samples in the absence of sex identification. The mean for the Down sample was 100 which did not differ significantly from the means of either of the other samples. The differences noted do not appear to be of practical significance since the means for all three samples fall well within the range of "average intelligence".

Within Sample Changes

The changes of GPA noted for the Up and Down samples were accompanied by changes in certain variables which indicated a tendency toward a concomitant or subsequent relationship with the change in GPA although the changes noted cannot be regarded as statistically significant. Peer nomination values thought to have relevance for academic competence and social acceptance tended to change in the hypothesized direction for the two variant groups. Subjects themselves reported changes in expressed attitudes, motivation and anxiety.

A comparison of the gains and losses for each sample is presented in Table 14. The Up sample was predicted to make gains in peer nomination scales postulated to reflect peer assessment of the individual's academic competence and social acceptance, to develop a more serious life style (lower JPQ:11 score), to become less anxious, and to develop more scholastic motivation and socialized morale (JPQ:8). All of the changes were in the predicted direction but the only significant changes noted were for being regarded as a better academic model (p 01) and more desirable to "party with" (p 05).

The Down sample, with lowered GPA in the ninth grade, was predicted to have variable scores move in a direction opposite to those for the Up sample. Eight of the ten changes were in the predicted direction, but only one change was of sufficient magnitude to produce a significant R-ratio (JPQ: 8, lowered socialized morale and greater dislike of school, p 01). Contrary to the hypothesis, the Down sample became regarded by agemates as better academic models and more desirable to "party with" although neither of the two changes were significant.

The Stable sample, predicted to have ninth grade scores indicative of the stability noted in GPA, was the sample of greatest change in the ten variables analyzed for both the seventh and ninth grades. Six of the ten changes were significant (p 01). They became more academically

TABLE 14

WITHIN SAMPLE CHANGES
UP, DOWN, AND STABLE SAMPLES: SEVENTH TO NINTH GRADE

VARIABLE	CLASSIFICATION BY SAMPLE UP Change + or -	DOWN Change + or -	STABLE Change + or -
Hyp 1 Academic Competence			
Verbal	+ NS	- NS	+ .01
Brains	+ NS	- NS	+ 01
Math Ability	+ NS	- NS	+ NS
Academic Model	+ 01	+ NS	+ 01
Hyp 1 Social Acceptance			
Party With	+ 05	+ NS	+ 01
Behavior Model	+ NS	- NS	+ NS
Hyp 2 Anxiety			
CMAS Anxiety	- NS	+ NS	- NS
Hyp 3 Surgency-Desurgency			
JPQ: 11 Surgency	- NS	+ NS	+ 01
Hyp 4 Scholastic Motivation and Attitude			
SSHA Motivation	+ NS	- NS	+ NS
JPQ:8 Socialized Morale	+ NS	- 01	+ 01

NS Not Significant
05 Significant at the 05 level
01 Significant at the 01 level
+ or - Indicates the increase or decrease in sample mean

competent and more socially acceptable in the eyes of agemates, developed a more carefree outlook on life (JPQ:11, Surgency vs Desurgency) and expressed themselves as liking school more (JPQ 8: Socialized Morale vs Dislike of School).

The interpretation of the above results is difficult. In the absence of the Stable sample (which was the least stable of the three samples except for GPA), the interpretation would likely be that the direction of change for the variant groups was as predicted but the time span was too short for the changes to approach significance. However, since the Stable sample was included and a number of changes observed which were significant, the element of time must be discarded. Perhaps the safest statement which can be made is to say that for the subjects included in the study, there was stability in change. The changes in assessments of peer nomination scales, personality and attitude scales, were accompanied by stability in GPA for the Stable sample. The change in GPA for the Up and Down samples was accompanied by relative stability in the other measures.

Changes Between Samples

A comparison of the seventh and ninth grade relationships between pairs of samples is presented in Table 15. Lines drawn to represent the direction of change for each sample are not drawn to scale and are presented only to indicate means for the Up, Down, and Stable samples for both the seventh and ninth grade levels.

At the seventh grade level, the Up sample had greater mean scores than the Down sample for CMAS Anxiety (p 05) and JPQ: 8 Surgency (p 01). The Down sample means were greater for all other variables and four of which were significantly greater, Math Ability (p 05), Behavior Model (p 05), SSHA Motivation (p 01), JPQ:8, Socialized Morale (p 05). At the ninth grade level, seven of the means for the Up sample were greater than those for the Down sample, none of which were significant. The Down sample had greater mean scores for the peer nomination scales of "Verbal", "Brains", and "Party With" but not significantly greater.

In the seventh grade, eight variables yielded mean values which were greater for the Stable sample that for the Up Sample, and six of these were significantly greater (Verbal, .01; Brains, .01; Math Ability, .05; Academic Model, .01; Party With, .05; and Behavior model, .01). The mean for the Up sample was significantly greater than that of the Stable sample for JPQ:11 Surgency (p 05). At the ninth grade level, nine of the variable means were greater for the Stable sample that for the Up sample. The Up sample still reported more anxiety but the difference was not significant. All six peer nomination scales indicated significant differences between the two samples at both grade levels, suggesting that the Stable sample was regarded by peers as more academically competent and more socially acceptable

TABLE 15

BETWEEN SAMPLE CHANGES
UP, DOWN, AND STABLE SAMPLES: SEVENTH TO NINTH GRADE

VARIABLE	7th Grade COMPARISON	SIGNIFICANCE	9th Grade COMPARISON	SIGNIFICANCE	GRAPHIC 7	GRAPHIC 9
Hyp 1.Academic Competence						
Verbal	Down-Up	NS	Down-Up	NS		
	Stable-Up	01	Stable-Up	01		
	Stable-Down	NS	Stable-Down	01		
~~Reading~~	Down-Up	NS	Down-Up	NS		
	Stable-Up	01	Stable-Up	01		
	Stable-Down	01	Stable-Down	01		
Math Ability	Down-Up	05	Up-Down	NS		
	Stable-Up	01	Stable-Up	01		
	Stable-Down	01	Stable-Down	01		
Academic Model	Down-Up	NS	Up-Down	NS		
	Stable-Up	01	Stable-Up	01		
	Stable-Down	01	Stable-Down	01		
Hyp 1.Social Acceptance						
Party With	Down-Up	NS	Down-Up	NS		
	Stable-Up	05	Stable Up	01		
	Stable-Down	NS	Stable-Down	01		
Behavior Model	Down-Up	05	Up-Down	NS		
	Stable-Up	01	Stable-Up	05		
	Stable-Down	NS	Stable-Down	NS		
Hyp 2. Anxiety						
CMAS Anxiety	Up-Down	05	Up-Down	NS		
	Up-Stable	NS	Up-Stable	NS		
	Stable-Down	NS	Down-Stable	NS		
Hyp 3. Surgency vs Dislike of School						
JPQ:11 Surgency	Up-Down	01	Up-Down	NS		
	Up-Stable	05	Stable-Up	01		
	Stable-Down	NS	Stable-Down	01		
Hyp 4. Scholastic Motivation and Attitude						
SSHA Motivation	Down-Up	01	Up-Down	NS		
	Stable-Up	NS	Stable-Up	NS		
	Down-Stable	NS	Stable-Down	05		
JPQ: 8 Socialized Morale	Down-Up	05	Up-Down	NS		
	Down-Stable	NS	Stable-Up	01		
	Stable-Up	NS	Stable-Down	01		

NS Not Significant
05 Significant at the 05 level
01 Significant at the 01 level
The variable with the greater mean score is presented first.

The Down sample indicated slightly more scholastic motivation and more socialized morale (JPQ 8) at the seventh grade than did the Stable sample but the differences were not significant. Of the eight remaining variables, means were significantly greater for the Stable sample on the peer nomination scales of "Brains" (p 01), "Math Ability" (p 01), and "Academic Model" (p 01). Differences in mean values between the two samples increased at the ninth grade level at which time means for all ten variables were greater for the Stable sample and with the exception of "Behavior Model" and CMAS Anxiety, all of the differences were significant at the .01 level.

Again, the interpretation of the results is difficult. The Stable sample, so designated for the stability of GPA for each member of the sample, had more of everything at the ninth grade except anxiety and one hundredth of a point less "Math Ability". As indicated earlier, they expressed themselves as being more carefree and liking school better. The peer nomination scales indicate an enhanced position for those whose grade point averages were stable from the seventh to the ninth grade. Agemates placed greater value upon the subjects of the Stable sample at the ninth grade than at the seventh for these variables postulated to reflect academic competence and social acceptance.

Discriminant function analysis provided a means of determining whether or not the Up and Down clusters of scores obtained from a number of variables occupy the same test space. With twenty-five variables, 92 of the 94 subjects were correctly classified. However, all that can be said for the discriminant function analysis as applied to the present study is that the results of the analysis indicate a composite difference between the Up and Down samples. Since the obtained score values were generally better for the sample whose grade point averages declined sharply from the seventh to the ninth grade and since the profile of characteristics for that sample is not unlike that for rather normal youngsters, the derived scores should not be applied toward the classification of any other sample.

TABLE A 3

F RATIOS AND MEANS OF WITHIN AND BETWEEN SAMPLE DIFFERENCES
97 BOYS AND 17 GIRLS, SEVENTH AND NINTH GRADES
CAT LANGUAGE

Classification		F-Ratio Grade 7	F-Ratio Grade 9	F-Ratio 7 vs 9
Within Sample Sex Differences				
Up	(Boy vs Girl)	4.98*	8.02**	
Down	(Boy vs Girl)	1.40	1.87	
Stable	(Boy vs Girl)	17.93**	13.11**	
Between Differences By Sex				
Boy	(Up vs Down)	3.91*	5,40*	
	(Up vs Stable)	7.83**	11.78**	
	(Down vs Stable)	.49	.98	
Girl	(Up vs Down)	44.42**	.71	
	(Up vs Stable)	15.57**	11.68**	
	(Down vs Stable)	6.46	4.58	
Between Differences				
	(Up vs Down)	2.46	2.79	
	(Up vs Stable)	17.66**	18.06**	
	(Down vs Stable)	5.86*	5.51*	
Changes Within Subsamples Seventh to Ninth Grade				
Boy Up	(7 vs 9)			11.14**
Girl Up	(7 vs 9)			18.52**
Boy Down	(7 vs 9)			34.31**
Girl Down	(7 vs 9)			21.38**
Boy Stable	(7 vs 9)			14.02**
Girl Stable	(7 vs 9)			26.58**
Changes by Sample Seventh to Ninth Grade				
Up	(7 vs 9)			29.61**
Down	(7 vs 9)			30.07**
Stable	(7 vs 9)			57.54**

* Significant at the .05 level
** Significant at the .01 level

Classification	N	Mean - 7	Mean - 9
Boy Up	19	6.18	9.83
Girl Up	[illegible]	[illegible]	9.13
Boy Down	[illegible]	[illegible]	8.87
Girl Down	[illegible]	[illegible]	9.51
Boy Stable	[illegible]	[illegible]	9.23
Girl Stable	[illegible]	[illegible]	10.35
[illegible]	[illegible]	[illegible]	8.58
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

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TABLE A-4

F RATIOS AND MEANS OF SEX AND SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH GRADE
CTMM LANGUAGE IQ

Classification		F-Ratios 7th Grade
Within Sample Differences By Sex		
Up	(Boy vs Girl)	.0004
Down	(Boy vs Girl)	2.63
Stable	(Boy vs Girl)	1.88
Between Sample Differences By Sex		
Boy	(Up vs Down)	1.85
	(Up vs Stable)	4.11*
	(Down vs Stable)	.36
Girl	(Up vs Down)	.043
	(Up vs Stable)	.366
	(Down vs Stable)	1.66
Between Sample Differences		
	(Up vs Down)	1.04
	(Up vs Stable)	5.34*
	(Down vs Stable)	1.31

* Significant at the .05 level (F = 3.90)
** Significant at the .01 level (F = 6.88)

Sample and Sample Means

Classification	N	Mean
Boy Up	19	96.37
Girl Up	27	96.26
Boy Down	28	103.75
Girl Down	20	95.05
Boy Stable	50	106.33
Girl Stable	50	101.33
Up	46	96.28
Down	48	100.15
Stable	100	103.83

TABLE A.1

F RATIOS AND MEANS OF WITHIN AND BETWEEN SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH AND NINTH GRADES
CAT ARITHMETIC

Classification		F-Ratio Grade 7	F-Ratio Grade 9	F-Ratio 7 vs 9
Within Sample Sex Differences				
Up	(Boy vs Girl)	.93	2.88	
Down	(Boy vs Girl)	.92	.037	
Stable	(Boy vs Girl)	1.58	1.05	
Between Differences By Sex				
Boy	(Up vs Down)	10.29**	5.23*	
	(Up vs Stable)	10.29**	22.56**	
	(Down vs Stable)	.14	6.47**	
Girl	(Up vs Down)	1.71	.59	
	(Up vs Stable)	11.99**	16.74**	
	(Down vs Stable)	2.79	8.01**	
Between Differences				
	(Up vs Down)	10.72**	4.00**	
	(Up vs Stable)	21.19**	37.05**	
	(Down vs Stable)	.76	14.88**	
Changes Within Subsamples Seventh to Ninth Grad				
Boy Up	(7 vs 9)			15.88**
Girl Up	(7 vs 9)			17.06**
Boy Down	(7 vs 9)			73.84**
Girl Down	(7 vs 9)			32.67**
Boy Stable	(7 vs 9)			18.83**
Girl Stable	(7 vs 9)			61.79**
Changes by Sample Seventh to Ninth Grade				
Up	(7 vs 9)			49.18**
Down	(7 vs 9)			36.05**
Stable	(7 vs 9)			46.98**

* Significant at the .05 level
** Significant at the .01 level

Classification	N	Mean - 7	Mean - 9
Boy Up	19	6.71	8.38
Girl Up	27	7.05	9.11
Boy Down	28	7.83	9.35
Girl Down	20	7.49	9.42
Boy Stable	50	7.72	10.18
Girl Stable	50	8.02	10.49
Up	46	6.90	8.81
Down	48	7.70	9.38
Stable	100	7.90	10.34

TABLE A 2

F RATIOS AND MEANS OF WITHIN AND BETWEEN SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH AND NINTH GRADE
CAT READING

Classification		F-Ratio Grade 7	F-Ratio Grade 9	F-Ratio 7 vs 9
Within Sample Sex Differences				
Up	(Boy vs Girl)	3.79	.70	
Down	(Boy vs Girl)	.09	.87	
Stable	(Boy vs Girl)	1.82	.49	
Between Differences By Sex				
Boy	(Up vs Down)	5.79*	.12	
	(Up vs Stable)	10.36**	5.87*	
	(Down vs Stable)	.41	5.39*	
Girl	(Up vs Down)	.02	.19	
	(Up vs Stable)	5.41*	5.15*	
	(Down vs Stable)	3.79	2.46	
Between Differences				
	(Up vs Down)	2.95	.12	
	(Up vs Stable)	13.56**	10.56**	
	(Down vs Stable)	3.34	8.28**	
Changes Within Subsamples Seventh to Ninth Grade				
Boy Up	(7 vs 9)			25.87**
Girl Up	(7 vs 9)			15.08**
Boy Down	(7 vs 9)			48.97**
Girl Down	(7 vs 9)			24.17**
Boy Stable	(7 vs 9)			18.69**
Girl Stable	(7 vs 9)			38.04**
Changes by Sample Seventh to Ninth Grade				
Up	(7 vs 9)			51.06**
Down	(7 vs 9)			33.62**
Stable	(7 vs 9)			91.48**

* Significant at the .05 level
** Significant at the .01 level

Classification	N	Mean - 7	Mean - 9
Boy Up	19	6.28	9.13
Girl Up	27	7.21	9.60
Boy Down	28	7.42	9.33
Girl Down	20	7.28	9.84
Boy Stable	50	7.67	10.35
Girl Stable	50	8.09	10.61
Up	46	6.82	9.41
Down	48	7.36	9.54
Stable	100	7.88	10.98

TABLE A 3

F RATIOS AND MEANS OF WITHIN AND BETWEEN SAMPLE DIFFERENCES
97 BOYS AND 17 GIRLS, SEVENTH AND NINTH GRADES
CAT LANGUAGE

Classification		F-Ratio Grade 7	F-Ratio Grade 9	F-Ratio 7 vs 9
Within Sample Sex Differences				
Up	(Boy vs Girl)	4.98*	8.02**	
Down	(Boy vs Girl)	1.40	1.87	
Stable	(Boy vs Girl)	17.93**	13.11**	
Between Differences By Sex				
Boy	(Up vs Down)	3.91*	5.40*	
	(Up vs Stable)	7.83**	11.78**	
	(Down vs Stable)	.49	.98	
Girl	(Up vs Down)	44.42**	.71	
	(Up vs Stable)	15.57**	11.68**	
	(Down vs Stable)	6.46	4.58	
Between Differences				
	(Up vs Down)	2.46	2.79	
	(Up vs Stable)	17.66**	18.06**	
	(Down vs Stable)	5.86*	5.51*	
Changes Within Subsamples Seventh to Ninth Grade				
Boy Up	(7 vs 9)			11.14**
Girl Up	(7 vs 9)			18.52**
Boy Down	(7 vs 9)			34.31**
Girl Down	(7 vs 9)			21.38**
Boy Stable	(7 vs 9)			14.02**
Girl Stable	(7 vs 9)			26.58**

* Significant at the .05 level
** Significant at the .01 level

Changes by Sample Seventh to Ninth Grade		
Up	(7 vs 9)	29.61**
Down	(7 vs 9)	30.07**
Stable	(7 vs 9)	57.54**

Classification	N	Mean - 7	Mean - 9
Boy Up	19	6.18	9.83
Girl Up	27	7.18	9.13
Boy Down	28	7.01	8.87
Girl Down	20	7.59	9.51
Boy Stable	50	7.31	9.23
Girl Stable	50	8.60	10.37
Up	46	6.77	8.58
Down	48	7.28	9.14
Stable	100	7.96	9.80

TABLE A-4

F RATIOS AND MEANS OF SEX AND SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH GRADE
CTMM LANGUAGE IQ

Classification		F-Ratios 7th Grade
Within Sample Differences By Sex		
Up	(Boy vs Girl)	.0004
Down	(Boy vs Girl)	2.63
Stable	(Boy vs Girl)	1.88
Between Sample Differences By Sex		
Boy	(Up vs Down)	1.85
	(Up vs Stable)	4.11*
	(Down vs Stable)	.36
Girl	(Up vs Down)	.043
	(Up vs Stable)	.366
	(Down vs Stable)	1.66
Between Sample Differences		
	(Up vs Down)	1.04
	(Up vs Stable)	5.34*
	(Down vs Stable)	1.31

* Significant at the .05 level (F = 3.90)
** Significant at the .01 level (F = 6.88)

Sample and Sample Means

Classification	N	Mean
Boy Up	19	96.37
Girl Up	27	96.26
Boy Down	28	103.75
Girl Down	20	95.05
Boy Stable	50	106.33
Girl Stable	50	101.33
Up	46	96.28
Down	48	100.15
Stable	100	103.83

TABLE A 5

F RATIOS AND MEANS OF SEX AND SAMPLE DIFFERENCES
97 BOYS AND 97 GIRLS, SEVENTH GRADE
INDEX OF SOCIAL STATUS

Classification		F-Ratios 7th Grade
Within Sample Differences By Sex		
Up	(Boy vs Girl)	2.72
Down	(Boy vs Girl)	6.56**
Stable	(Boy vs Girl)	.05
Between Sample Differences (By Sex)		
Boy	(Up vs Down)	.27
	(Up vs Stable)	2.39
	(Down vs Stable)	1.24
Girl	(Up vs Down)	9.74**
	(Up vs Stable)	.25
	(Down vs Stable)	4.09*
Between Sample Differences		
	(Up vs Down)	.73
	(Up vs Stable)	.34
	(Down vs Stable)	.17

* Significant at the .05 level
** Significant at the .01 level

Sample and Subsample Means

Classification	N	Mean
Boy Up	19	45.87
Girl Up	27	51.37
Boy Down	28	46.87
Girl Down	20	56.86
Boy Stable	50	50.37
Girl Stable	50	49.77
Up	46	48.67
Down	48	51.04
Stable	100	50.07