

THE PREDICTION OF HIGH SCHOOL ACADEMIC SUCCESS FROM STANDARDIZED  
TESTS OF READING, LISTENING AND INTELLIGENCE

by 45

DAVID ALLISON MICKEY

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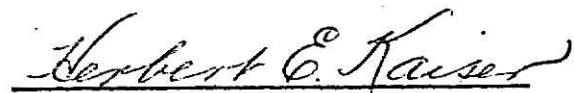
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Major Professor

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## INTRODUCTION

The need for the discovery of talent among students and providing appropriate educational opportunities, for the maximum development of such talent, is of great concern to educators today. The method commonly used to discover this talent is measurement by standardized testing programs.

The measurement problems in the secondary schools are many and varied. One of the most difficult problems facing the high school counselor is concerned with selecting tests that will provide him with the maximum amount of valid and reliable information about his students at the minimum amount of cost, time for administration, and complexity of interpretation. Also, the selected tests must be amenable to effective utilization by teachers and other school personnel who have had little or no special training in the field of measurement.<sup>1</sup>

Once these tests have been selected the high school counselor uses the tests for four basic purposes: to supplement teacher grades and other achievement data in counseling students with regard to the academic decisions which must be made during high school; to provide an independent estimate of the student's ability to pursue formal educational programs beyond high school; to identify those students who are achieving far above or far below the levels of which they appear capable; and to formulate and corroborate predictions of vocational success

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<sup>1</sup> Pairlee J. Stinson and Mildred M. Morrison, "Sex Differences Among High School Seniors," Journal of Educational Research, 53:103-104, November, 1959.

and adjustment. How well the tests fulfill the applications stated above depends on an unknown complex of subtle factors which make each school system somewhat unique. While a few generalizations may be made, the evidence most clearly indicates that the efficiency of any test varies widely from one high school to another. No amount of experimentation with a test appears sufficient to permit any exact estimate of its effectiveness in a given school system. Thus, any counselor who hopes to derive maximum value from each testing dollar must be prepared to carry on at least a moderate program of local research.<sup>1</sup> It was in this frame of reference that this study was undertaken.

#### STATEMENT OF THE PROBLEM

The purpose of this study was to evaluate the effectiveness of certain standardized tests in predicting academic success in the Manhattan, Kansas, High School, since curricular, administrative, and instructional decisions are often based on information of this kind. The need for such a study was reported by Long.

Very few research studies on the prediction of academic success have been conducted on the secondary school level. An objective method of predicting success would greatly aid high school guidance workers in the academic counseling of their students. The increased diversity of our school population brought about by cultural changes, the ever increasing numbers of young people in our public schools, and the emphasis on discovering talented students and providing

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<sup>1</sup>James F. Adams, Counseling and Guidance (New York: The Macmillan Company, 1967), p. 253.

appropriate educational opportunities for these students are some reasons why prediction of academic success is needed during the high school years.<sup>1</sup>

#### DEFINITION OF TERMS USED

Academic Success. As traditionally used, the term "academic success" refers to some method of expressing a student's scholastic standing. Usually this is a grade for a course, an average for a group of courses, an average for a group of courses in a subject area or an average for all courses (grade-point average). The grade-point average is usually taken as the measure of academic success. Another measure of academic success, sometimes used instead of grades is the standardized achievement test.<sup>2</sup> For this study both cumulative grade-point average and an achievement test (American College Testing Program Examination) were used as the criteria of academic success.

Grade-Point Average. Cumulative grade-point average as used at Manhattan, Kansas, High School was first expressed nominally (A, B, C), and then converted to a numerical value (A=4, B=3, C=2, D=1, F=0), so that grade-point average for all courses could be computed. The grade-point average was then taken as the measure of academic performance. Physical education and music grades were not included in the grade-point

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<sup>1</sup>J. Robert Long, "Academic Forecasting in the Technical-Vocational High School Subjects," Personnel and Guidance Journal, 37:666, May, 1959.

<sup>2</sup>David E. Lavin, The Prediction of Academic Performance (New York: Russell Sage Foundation, 1965), p. 18.



averages.

Once determined, the grade-point average is a seemingly continuous variable with units correct to three significant digits to the right of the decimal point (2.358). In this form it is manipulative in predictive and comparative studies. In addition, grade-point average is a vital statistic referred to in making decisions about placement and selection.<sup>1</sup>

In Manhattan High School the grade-point average was computed for each student after the completion of each semester of work. The grade-point average, used as a measure of academic success for this study, was for the culmination of eight semesters of successful work.

#### OBJECTIVES

The objectives of this investigation were:

1. To predict academic success at Manhattan High School.
2. To evaluate the standardized aptitude and achievement tests currently being used at Manhattan High School as they correlate with high school academic success. Of particular interest was the Brown-Carlson Listening Comprehension Test as it related to academic success.
3. To develop from these tests a localized multiple regression formula to predict cumulative grade-point average.
4. To develop from these tests a localized multiple regression

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<sup>1</sup>Norman M. Chansky, "A Note on the Grade-Point Average in Research," Educational and Psychological Measurement, 24:95, Spring, 1964.

formula to predict the cumulative American College Testing Program Examination standard score.

In developing the major objectives of the study the following subsidiary goals were included:

1. To provide a single useful tool for prediction of academic success that could be used by administrators, counselors, and teachers.
2. To provide a single useful tool by which estimates of the student's ability to pursue formal educational programs beyond high school could be made.
3. To provide a single useful tool which would identify those students who are achieving far above or far below the levels of which they appear capable.

#### LIMITATIONS

The results of this study are limited to Manhattan, Kansas, High School as only Manhattan High School students were included in the sample. It is therefore uncertain whether the results would be applicable to other schools.

It is a limitation of this study, to predict academic success, that no measure of socioeconomic status is included in the variables considered. Socioeconomic status is a basic correlate of academic performance.<sup>1</sup>

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<sup>1</sup>Lavin, op. cit., p. 43.

The sample was limited to only the graduates of Manhattan High School, 1965-67, who had scores for all four standardized tests used as variables in the study. A further sample limitation was that American College Testing Program Examination scores were available for only sixty-one percent of this sample population. No attempt was made to predict failure in high school.

#### REVIEW OF LITERATURE

Prediction in the broadest sense of the word is the primary goal of scientific investigation whether in astronomy, chemistry, psychology, medicine, or education. The social sciences, such as education and psychology, are concerned with prediction about the human organism itself, particularly in relation to its learning capacity, potential growth, success, and adjustment. By increasing man's ability to foretell human behavior under prescribed conditions, science makes it possible for man to make decisions about future courses of action which have a greater probability of fulfilling his goals or purposes.<sup>1</sup>

When one desires to predict a certain type of behavior, it would be very convenient to be able to locate an appropriate test, administer it, and make decisions accordingly. The situation is not that simple, however. Usually the behavior to be predicted is too complex to forecast adequately with a single predictor. Furthermore, different schools

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<sup>1</sup>Goldine C. Gleser, "Prediction," Encyclopedia of Educational Research (New York: The Macmillan Company, 1960), pp. 1038-39.

may demand quite different types of performance in courses which have similar labels making this approach undesirable. The only valid basis for prediction is experimental verification of the relationship between potential predictors and actual performance of a group of subjects who are representative of the population for which it is desired to make prediction.<sup>1</sup>

The history of academic prediction has run an ever-changing course over the past fifty years.<sup>2</sup> Studies have ranged from those involving simple reactions to those involving numerous factors and complicated statistical techniques. Most of the criteria used in the past have involved correlations between grades and some other index. The major aim of most of these studies was to discover those factors that will enable prediction of academic performance or success (usually measured by GPA). This search for predictive factors has focused primarily upon various characteristics of the student, such as his aptitudes, his personality traits, and the like. Relationships between such predictors and performance criteria are not always strong. Researchers usually view this as an indication of: (1) failure to isolate enough of the right variables, and/or (2) measurement error in the predictors.<sup>3</sup> One must also consider that the possibility of low correlations might be due to uncontrolled sources of variation in grades themselves.

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<sup>1</sup>Ibid., p. 1039.

<sup>2</sup>Benjamin S. Bloom and Frank R. Peters, Academic Prediction Scales (New York: Free Press of Glencoe, Inc., 1961), p. 8.

<sup>3</sup>Lavin, op. cit., p. 19.

These sources of variations fall into two categories. First, not all students take the same courses, and some types of majors may be more difficult than others. Second, teachers use different criteria in assigning grades.<sup>1</sup> This problem has been discussed by various researchers, notably Baker and Doyle,<sup>2</sup> Kelley,<sup>3</sup> Chansky,<sup>4</sup> and Fishman.<sup>5</sup> Fishman suggests the use of uniform tests (such as standard achievement tests) as one means of overcoming the error associated with the use of grades as an index of academic success. He points out that it would help to eliminate uncontrolled subjective criteria that may enter into the teachers' grading practices. For this reason it would seem advisable to use uniform test scores as supplementary criteria of performance or success. However, their use as the sole criterion of performance is questionable because it would lead away from a consideration of the teacher as a theoretically significant factor.

Though one may question the reliability of the grade point average as a measure of academic success, no other criterion is as easily accessible or as widely used. Until research develops more objective

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<sup>1</sup> Ibid.

<sup>2</sup> Robert L. Baker and Roy P. Doyle, "Teacher Knowledge of Pupil Data and Marking Practices at the Elementary School Level," Personnel and Guidance Journal, 37:644-647, May, 1959.

<sup>3</sup> Eldon G. Kelley, "A Study of Consistent Discrepancies Between Instructor Grades and Term-End Examination Grades," Journal of Educational Psychology, 49:328-334, June, 1958.

<sup>4</sup> Chansky, op. cit., p. 96.

<sup>5</sup> Joshua A. Fishman, "Unsolved Criterion Problems in the Selection of College Students," Harvard Educational Review, 28:345, May, 1958.

criteria, grade-point average will still be used by schools, colleges, employers, and others in attempting to assess individual potential and achievement.

By limiting the study to Manhattan High School the study is, in part, controlling for this subjective error (teacher variance), assuming the teachers within one school system would give student grades more consistently than teachers in several school systems. "The reference group for a student's grades in school is the group of students and teachers in that school, whereas, the reference group for a student's grades as an index for some other criteria, such as his college potential, consists of the students and teachers from a large number of high schools."<sup>1</sup>

Literature On the Relationship Between Reading, Listening and Intelligence Tests and Their Use as Predictors of Academic Success

The diagnostic or predictive value of a psychological test depends upon the degree to which it serves as an indicator of a relatively broad and significant area of behavior.<sup>2</sup> If reading skills, listening skills and intelligence are of a common nature, a test of one should make it possible to predict the others, or the testing of all should produce results in high agreement. If a student was trained in one, any improvement he might make should be reflected in the others. The literature

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<sup>1</sup>Bloom and Peters, op. cit., p. 115.

<sup>2</sup>Anne Anastasi, Psychological Testing (New York: The Macmillan Company, 1961), p. 22.

does not support this concept of commonality.<sup>1</sup>

There is considerable variance in the relationships of listening, reading and intelligence tests as reported by various investigators. Cleland and Toussaint, using the Gates Reading Survey and Sequential Tests of Educational Progress-Listening, found a positive correlation between the two of .6679. By combining STEP-Listening and SRA Primary Mental Abilities Test, an intelligence test, to predict reading achievement, they found a multiple  $r$  of .7564. They also cited correlations between the Gates Reading Survey and the Stanford-Binet Intelligence Test of .61, between the STEP-Listening and Stanford-Binet Intelligence Test of .63.<sup>2</sup>

Rose set out to study the relationships between the subtest skills and total test skills that are measured by standardized reading tests and the Brown-Carlson Listening Comprehension Test and the influence of intelligence upon those skills. He found the simple coefficients of correlation between the reading and listening subtests range from .32 to .60. The multiple coefficient for total test scores ranged from .54 to .67. A combination of the three reading tests and the listening test gave a multiple coefficient of .63 for boys and .65 for girls. He concluded that listening and reading comprehension as measured by standardized tests are not composed of closely related skills,

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<sup>1</sup>Paul W. Keller, "Major Findings in Listening in the Past Ten Years," Journal of Communication, 10:32, March, 1960.

<sup>2</sup>Donald L. Cleland and Isabella H. Toussaint, "The Interrelationships of Reading, Listening, Arithmetic Computation and Intelligence," Reading Teacher, 15:230, January, 1962.

intelligence is a significant factor which seems to be inherent in the tests, and the relationship between reading and listening drops significantly when intelligence is ruled out.<sup>1</sup>

Listening comprehension scores were compared with various reading measures showing relationships of from .417 to .66 for high school students as reported in the Brown-Carlson Listening Comprehension Test Manual of Directions. The publishers concluded, "The magnitude of the correlations between listening comprehension and reading comprehension suggests that the two skills are in no way identical and that measures of both may be valuable in diagnosing learning difficulties."<sup>2</sup>

Other studies by Stromer,<sup>3</sup> and Biggs,<sup>4</sup> show that listening comprehension tests and reading comprehension tests are measuring two skills. Stromer stated, "Listening training did not produce significant changes in reading comprehension."<sup>5</sup>

#### Relationships between listening comprehension and intelligence

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<sup>1</sup>Ervin Rose, "A Comparative Study of the Brown-Carlson Listening Comprehension Test and Three Tests of Reading Comprehension," Doctor's Thesis, New York, New York University, Abstract: Dissertation Abstracts, 19:2007, 1958.

<sup>2</sup>James I. Brown and G. Robert Carlson, Brown-Carlson Listening Comprehension Test Manual of Directions (New York: World Book Company, 1955), p. 18.

<sup>3</sup>Walter F. Stromer, "An Investigation Into Some of the Relationships Between Reading, Listening, and Intelligence," Speech Monographs, 21:159-160, August, 1954.

<sup>4</sup>Berniece P. Biggs, "Construction, Validation, and Evaluation of Diagnostic Test of Listening Effectiveness," Speech Monographs, 23: 9-13, March, 1956.

<sup>5</sup>Stromer, op. cit., p. 160.



were reported by Kramer, who found moderate correlations of .54 between Brown-Carlson Listening Comprehension Test and Wechsler-Bellevue Intelligence scale and .55 between American College Examination Intelligence Test and Brown-Carlson Listening Test.<sup>1</sup> Farrow found a marked lower correlation of .151 between objective listening attention scores and intelligence.<sup>2</sup> Correlations between the Listening Comprehension Test and several mental ability measures were recorded in the Brown-Carlson Test Manual. These ranged in the case of high school students from .67-78. The authors of the manual also pointed out, "When allowance is made for the fact that neither Brown-Carlson Listening Test nor intelligence scores are perfectly reliable, it is clear that there is considerable overlapping between the two measures. Since both involve language comprehension and interpretation of verbal symbols, this is to be expected."<sup>3</sup>

In several other studies correlations were cited between reading, listening and intelligence. Condon concluded that listening is positively related to reading, intellectual ability, grade-point average in English and grade-point average in all school subjects. She cited

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<sup>1</sup>Edward J. J. Kramer, "The Relationships of the Wechsler-Bellevue and American College Examination With Brown-Carlson Listening Comprehension Test," Doctor's Thesis, Tallahassee, Florida, State University, Abstract: Dissertation Abstracts, 15:2599, 1955.

<sup>2</sup>Vern Leslie Farrow, "An Experimental Study of Listening Attention at the Fourth, Fifth and Sixth Grades," Doctor's Thesis, Eugene, University of Oregon, Abstract: Dissertation Abstracts, 24:3146, 1964.

<sup>3</sup>Brown and Carlson, op. cit., p. 17.

positive correlations from .51 to .86.<sup>1</sup> In a study in which he controlled for sex and reading ability, Haberland, found relationships between the Brown-Carlson Listening Comprehension Test and the Otis Self Administering Test of Mental Ability from .38 for men with average or below average reading ability to .73 for women of average or above average reading ability.<sup>2</sup>

In summation, the literature shows that reading and listening comprehension are similar skills, but are not identical. As both are basic to the learning process, both should be included in any attempt to predict academic success. It appears that listening comprehension is a little more closely related to intelligence than to reading measures. But, there is considerable variance in the scores on each of the two types of tests not accounted for by the elements which are common to both. It is reasonable then to compare the results of a listening comprehension test with the results of an intelligence test for diagnostic purposes. As pointed out by Eckelberry, "The listening comprehension test is most valuable when used in combination with a reading test and, if possible, also with an intelligence test."<sup>3</sup>

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<sup>1</sup>Edwyna Forsyth Condon, "An Analysis of the Differences Between Good and Poor Listeners in Grades Nine, Eleven and Thirteen," Doctor's Thesis, Lawrence: University of Kansas, Abstract: Dissertation Abstracts, 26:3106, 1965.

<sup>2</sup>John A. Haberland, "A Comparison of Listening Tests With Standardized Tests," Journal of Educational Research, 52:301, April, 1959.

<sup>3</sup>R. H. Eckelberry, "Brown-Carlson Listening Comprehension Test," Educational Research Bulletin, 34:84, March, 1955.

Literature on Sex Differences in Academic Performance and Standardized Test Results

The studies that assessed the relation between sex and academic performance showed that females have higher academic performance than males.<sup>1,2,3</sup> The literature on sex differences in regards to performance on certain standardized tests and predicting academic success showed mixed results.

Seashore, using the Differential Aptitude Tests concluded "academic grades of women in high school and college are better predicted from aptitude tests than are academic grades of men."<sup>4</sup> He found, of 520 comparisons between Differential Aptitude Test scores and high school or college grade-point averages, sixty-one percent of the cases showed higher validity coefficients for girls than boys, thirty-six percent of the cases showed higher validity coefficients for boys than girls, and three percent had no difference.<sup>5</sup> Similar findings were reported by Jacobs. Using five of the sub-tests from the Differential Aptitude Test Battery and three other tests as variables to predict high school academic success, he found, "a general consistency of higher relationships

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<sup>1</sup>Arwood S. Northby, "Sex Differences in High School Scholarship," School and Society, 86:63, January, 1958.

<sup>2</sup>Donald P. Hoyt, "Size of High School and College Grades," Personnel and Guidance Journal, 37:573, April, 1959.

<sup>3</sup>H. G. Seashore, "Women Are More Predictable Than Men," Journal of Counseling Psychology, 9:262, Fall, 1962.

<sup>4</sup>Ibid., p. 270.

<sup>5</sup>Ibid., p. 262.

(boys .310 to .657; girls .437 to .716) existing between the predictor test variables and criterion variable for girls than for boys."<sup>1</sup> In a more recent study, Boney found boys' grade-point average less predictable than that of girls.<sup>2</sup> Quite different results were reported in a study by Stinson and Morrison. They found a selected battery of tests, including some of the sub-tests of the Differential Aptitude Test, seemed to predict academic success or behavior for boys much better than for girls. Correlations from .30 to .68 for boys and .30 to .49 for girls were cited between the predictor variables and criterion.

Early studies of listening comprehension indicated that boys were better listeners than girls.<sup>3,4</sup> These studies were further supported in more recent years by Murphy,<sup>5</sup> who found consistently higher relationships for boys between listening comprehension, as measured by the Brown-Carlsen Listening Comprehension Test, and high school grades in four major academic areas. The results of this investigation were:

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<sup>1</sup>James N. Jacobs, "Aptitude and Achievement Measures in Predicting High School Academic Success," Personnel and Guidance Journal, 37: 335, January, 1959.

<sup>2</sup>J. D. Boney, "Predicting the Academic Achievement of Secondary School Negro Students," Personnel and Guidance Journal, 44:702, April, 1966.

<sup>3</sup>Clyde Dow, "The Development of Listening Comprehension Tests For Michigan State College Freshmen," Speech Monographs, 2:120, June, 1953.

<sup>4</sup>John Caffrey, "Auding Ability at the Secondary Level," Education, 75:309, January, 1955.

<sup>5</sup>Wm. Carl Murphy, "A Study of Listening Ability and High School Grades in Four Major Academic Areas," Doctor's Thesis, Tuscaloosa: University of Alabama, Abstract: Dissertation Abstracts, 23:3693, 1963.

	<u>Boys</u>	<u>Girls</u>	<u>Total</u>
Listening Ability and English Grades	.61	.55	.53
Listening Ability and Social Science Grades	.52	.38	.41
Listening Ability and Science Grades	.57	.55	.52
Listening Ability and Mathematics Grades	.57	.47	.49

Brown, from his investigation, reported, "boys tend to listen better than girls."<sup>1</sup> Other studies disputed these findings: "Correlations of objective listening attention with sex tended to favor girls";<sup>2</sup> "There are no significant sex differences, although girls generally have higher relationships between reading and listening than do boys";<sup>3</sup> "Women scored significantly higher, on this test, than men. This is contrary to findings reported by other investigators who reveal a superiority of men over women";<sup>4</sup> "The performance of women was significantly superior to that of men in B-C Listening."<sup>5</sup>

Although there seemed to be a difference of opinion among the researchers as to which sex scored higher on aptitude and listening tests and as to which sex one is best able to make predictions of academic success, this emphasizes the need for control of sex differences

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<sup>1</sup> Charles T. Brown, "Three Studies of the Listening of Children," Speech Monographs, 32:137, June, 1965.

<sup>2</sup> Farrow, op. cit., p. 3146.

<sup>3</sup> Rose, op. cit., p. 2007.

<sup>4</sup> John Haberland, "Speaker Effectiveness and the Brown-Carlson Listening Test," School and Society, 86:199, April 26, 1958.

<sup>5</sup> Walter S. Friesen, "A Descriptive Study of Freshman Performance in English Composition I At Kansas State University, 1961, In Relation to Fifty-two Variables," Doctor's Thesis, Greeley: Colorado State College, Abstract: Dissertation Abstracts, 24:290, 1964.

in predicting academic success.

Literature on Non-intellectual Variables Used in Prediction of Academic Success

Even though the present study was limited to predicting academic success from test scores and sex differences some mention should be made of other variables often used by researchers in predicting academic success. These variables can be roughly grouped into two areas, personality factors and sociological determinants. An attempt to review the studies in this area would be exhaustive. A review of representative studies reported by Lavin in his evaluative survey of recent literature on determinants of academic achievement will suffice for this review.<sup>1</sup>

Personality Factors as Predictors. A number of studies were reported using personality measures as predictors. School achievement was associated to some degree with measures of: study habits, attitudes toward school, interests, achievement motivation, independence, anxiety, impulsivity, introversion, self image, adjustment, aggression, cognitive style, defensiveness, extrasensory perceptions, and various multivariant approaches. Most of these studies had yielded only slightly positive or inconclusive results. In most studies ability was controlled either by means of partial correlation analysis or by multiple correlation in which the contribution of a personality variable to a battery of intellectual factors is assessed. The result was rather low correlations (.29

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<sup>1</sup>Lavin, op. cit., pp. 64-149.