Prediction of Academic Achievement in College

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PREDICTION OF ACADEMIC ACHIEVEMENT
IN COLLEGE

by

John T. Dulin, S. J.

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of Loyola University in Partial Fulfillment of
the Requirements for the Degree of
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VITA

John T. Dulin, S.J., was born in Janesville, Wisconsin, on January 12, 1927. He attended primary schools in Janesville and in Rockford, Illinois. His secondary school education was begun at St. Thomas High School in Rockford and was completed at Loras Academy, Dubuque, Iowa. He attended Loras College in Dubuque prior to entering the Society of Jesus at Milford, Ohio, in June of 1945. While at Milford he was enrolled at Xavier University, Cincinnati, Ohio, where he studied the humanities with a major in Latin and Greek. From 1949 to 1952 he attended West Baden College, a division of Loyola University, Chicago, Illinois. Here he received the degree of Bachelor of Arts in 1950 and the degree of Licentiate in Philosophy in 1952.

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CHAPTER ONE

INTRODUCTION AND STATEMENT OF THE PROBLEM

There have been repeated attempts over the past several years to predict academic achievement in college. Review of the published literature shows three general categories in terms of which such prediction is attempted: intelligence or aptitude tests, high school achievement, and non-intellectual variables. The means of prediction used in this study is Story Sequence Analysis of the Thematic Apperception Test, a new method of measuring motivation and predicting achievement. Except for the studies included in the formal publication of this method by the author (Arnold, 1962), there are no reports of the method in the recent literature. There are, however, several hundred studies over the past fifteen years which deal with the question of predicting academic achievement in college. We will confine our review here to the more recent or the more significant of these studies and refer our reader to Appendix III for a more extensive survey.

Prediction of academic achievement in college in terms of intelligence has long been a concern of both psychologists and educators. The problem is a practical one, viz., that of selecting those applicants for admission to college who will be able to do the work expected and required for a degree in a given program. The problem has become acute during the past two decades because of the increasing number of applicants and the
corresponding shortage of facilities and of personnel. Since college work is considered primarily in terms of intelligence, and since psychologists after the time of Binet have been concerned with intelligence testing, it was only natural that efforts to predict achievement in college should focus on measures of intelligence.

Research during the past fifteen years has used a variety of intelligence or aptitude measures, singly or in batteries, with or without high school achievement. The objective criterion has usually been grade point average, but even here we find considerable variation in time and number of courses. Thus, the GPA may be for one quarter, one semester, or one year, and for one or several courses. It is rare to find a longitudinal study such as that reported by Sgan (1964) studying the predictive validity of a test over a four-year period.

Although there has been considerable variation in results from predictive studies, from our survey of the literature we would agree with Michael (1965) that validity coefficients for single tests fall somewhere between 0.30 and 0.50 for men, and between 0.40 and 0.60 for women. It is rare that a coefficient of multiple correlation from a combination of two or three measures of intelligence will exceed 0.70 for either sex.

When one combines intelligence with high school achievement, however, the resulting validity coefficients are much higher. As Mayhew (1965) indicates, the combined measures result in correlations of from 0.37 to 0.83, with a median of 0.62.

Two conclusions may be drawn from this research. First, measures of intelligence are definitely limited as regards predictive validity;
second, the best single predictor of achievement in college is high school achievement. In fact, the higher predictive validity of high school performance is so consistent that Holland and Astin (1962) have suggested that we could abandon our efforts to construct increasingly sophisticated inventories and instead concentrate on obtaining more elaborate records of past achievement. Rather than taking such an extreme position, it would seem more reasonable to recognize the limitations of intelligence as a predictor of academic achievement and to ask ourselves what other variable or combination of variables might be operative both in high school and in college so as to influence the level of achievement.

As the limitations of intelligence tests became recognized, research focused increasingly on certain non-intellectual factors which might influence academic achievement. A general survey of the literature dealing with prediction of achievement on basis of non-intellectual variables reveals three basic problems underlying much effort and even more confusion. The problems are, first, to define and/or isolate a variable to be measured; second, to devise a technique by which to measure this variable; and, third, to establish an objective criterion in terms of which the measured variable can be validated.

Whereas research into the intellectual factors operative in academic achievement show at least general agreement as to the variable being measured, most of the work on the non-intellectual factors has centered on finding the variable. Hence, it is difficult to organize and classify the research material according to any clearly defined categories. One possible classification would be in terms of the kind of measure used, viz., objective
tests or self-report inventories as distinguished from projective techniques. Another classification would be in terms of the variable or hypothetical construct being investigated, such as personality or motivation.

The basic question posed by all investigators who attempt to deal with the non-intellectual factors in achievement could be stated thus: what characteristics differentiate the high achiever from the low achiever? Granted the intellectual factor, what else contributes significantly to academic achievement? Or, in terms of a common problem in college, why is it that some highly intelligent students fail to achieve while some students of average or relatively low intelligence show a high level of academic achievement? Is this due to their personality or temperament? choice of goal or level of aspiration? attitudes, values, and interests? There is general agreement that motivation is important, but there is little agreement as to what motivation is or how to measure it.

Research with the self-report inventories has, in general, been inconclusive. One measure used has been the California Psychological Inventory, with Rosenberg et al. (1962) and Gough (1964) reporting positive results, and the study by Richardson (1965) reporting negative results. We find the same positive-negative pattern over a much longer period of time from research using the Minnesota Multiphasic Personality Inventory.

McQuary and Truax (1955), Frick and Keener (1956), Drake and Oetting (1957), and Hackett (1960) all report positive results from their research with the MMPI, whereas Seegars (1962), Hewitt and Rosenberg (1962), and Andersen and Spencer (1963) report essentially negative results. Morgan's statement of fifteen years ago has been true for subsequent research not only
with the CPI and MMPI but also for a wide variety of self-report methods applied to or devised for prediction of academic achievement in college:

"In general, the studies of non-intellectual factors and achievement have not yielded clearly consistent results." (1952, 292)

Turning now to the use of projective techniques in the context of academic achievement, the question was raised several years ago by Symonds (1954) about the validity of projective test data for prediction. He discussed the problem in the light of previous inconclusive results and pointed out some limitations of projective test material. Research with projective techniques has continued nonetheless, and we have a later review by Ricciuti (1962), with further analysis of the problems involved in predicting achievement on basis of the Rorschach and the Thematic Apperception Test.

There have been relatively few studies in which the Rorschach was used to predict academic achievement in college. The most extensive study was that by Schmeidler et al. (1959), but the results indicated only personality trends. The studies by Cooper (1955), Clark (1958), and Sopchak (1958) deal specifically with the relationship between Rorschach patterns and academic achievement in college, and these report essentially negative results.

By comparison with the Rorschach there has been extensive research using the TAT or some variation of it. Much of this TAT research has centered on the achievement motivation construct, but before discussing research on achievement motivation by means of the projective techniques we
should consider briefly an objective measure of achievement motivation, viz., the Edwards Personal Preference Schedule. This instrument was used both in relation to McClelland's projective assessment of achievement motivation and in relation to actual achievement. Since both Edwards and McClelland derive their constructs from Murray (1933), and since both claim to be measuring the same variable, the question arose as to the relationship between the two approaches to achievement motivation. If the EPPS could be substituted for the more difficult McClelland measure, it would be advantageous for those involved in motivation research. However, studies by Melikian (1958), Dilworth (1958), and Marlowe (1959) all indicated no significant correlation between the EPPS and McClelland's instrument.

As regards the predictive validity of the EPPS, the positive-negative pattern in results from use of the CPI and the MMPI is found with the EPPS. There have been positive results reported by Gebhart and Hoyt (1958), Merrill and Murphy (1959), and Krug (1959), but these results are counterbalanced by the negative results reported by Shaw (1961), Goodstein and Heilbrun (1962), and Izard (1962). Although Reiter found a positive correlation of 0.26 between the EPPS and college grades, he comments: "The present findings suggest that high school achievement is a superior criterion for prediction of success and, further, that adequate measures of those nonintellectual factors which may significantly contribute to that prediction are lacking." (1964, 24)

Research using the TAT as a measure of achievement motivation has
stemmed largely from McClelland's adaptation of this technique (1953) and from Atkinson's extension of McClelland's work. Murstein summarizes and evaluates the results of research centering around the achievement motivation construct as related to academic achievement:

Concerning the question of whether n-Ach can predict grades, the weight of evidence, while far from unanimous, seems to merit the answer, 'not with any confidence.' There have been some supportive studies, but many well-controlled studies have yielded negative results. (1963, 97)

One reason for the contradictory evidence seems related to McClelland's assumption that motives are concurrently reflected in both fantasy and overt behavior. This assumption was challenged by Lazarus et al. (1957) who proposed that fantasy might serve as an alternative or substitute channel for the expression of achievement motivation when behavioral channels are blocked. Hence, there would be an inverse relationship between fantasy and action.

More recently, Broverman et al. (1960) and Cole et al (1962) have investigated the problem. Their findings support Lazarus and are in marked contrast with the results reported by McClelland (1953). As Cole et al. point out, "The conflicting results may reflect such diversity and raise questions as to whether a common construct is being dealt with throughout, as well as the equal adequacy with which various measures would tap such a construct." (1962, 211)

In other words, as we have indicated above, the basic problem is to define and/or isolate a variable to be measured.

Mitchell (1961) attempted to clarify this confusion by an analysis of the factorial dimensions of the achievement motivation construct. From this analysis he concluded that achievement motivation was not a unitary construct with invariable meaning. Further, on basis of the loading on the wish-fulfilment factor, he argues with Lazarus that there is no one-to one
relationship between the expression of a need in fantasy and its actualization in behavior. We shall return to this issue in the next chapter inasmuch as it relates to the measure of motivation used in this study.

By way of conclusion to this survey of research dealing with the non-intellectual factors operative in achievement, Mayhew's observation about the state of motivation research can well be generalized to include all other non-intellectual factors. He states, "Motivation would seem to be an important trait, although no one apparently has succeeded in measuring it with sufficient stability to allow reasonable prediction." (1965, 42)

Given this situation, the present study is not only relevant but timely as well, for we propose to test what Mayhew calls the stability of a new method for measuring motivation and predicting achievement. This method, called Story Sequence Analysis, has been used in a series of studies over the past decade and has manifested consistently high validity (Arnold, 1962). These studies, however, have been tests more of concurrent than of predictive validity, and none of them has extended over a period of years.

It is the purpose of our study to test the predictive validity of Story Sequence Analysis with a large sample of male college students from first through fourth year in college on basis of their motivation as evaluated at the beginning of their first year in college. The outside criterion to be used as a measure of achievement is the grade point average from the end of each of the four years in college. The predictive validity of our method will be established in terms of the correlation between motivation and achievement for each of the four years. We hypothesize that motivation as measured by Story Sequence Analysis is a valid means of predicting
academic achievement throughout the four year period. We hypothesize further that the correlation between motivation and achievement will be significantly higher in any given year than the correlation between intelligence and achievement.

Having established the predictive validity of our measure of motivation, we will present a means of predicting the grade point average for any given individual in any given year on basis of the individual's intelligence and motivation scores obtained at the outset of his college career.
CHAPTER II
THE MEASUREMENT OF MOTIVATION

One point of agreement among the studies attempting to predict academic achievement in college is that high school achievement is the best single predictor. Predictions based on measures of intelligence are recognized as inadequate, and the problems of defining and measuring non-intellectual factors related to achievement are not yet solved. Motivation is recognized as important, but there is no agreement as to either the definition or the measurement of motivation. In order to clarify certain underlying theoretical issues, we might begin by asking why high school performance has such a degree of predictive validity. If we take this performance as a record of an individual in a given situation functioning at a certain level, we see the record as the result of a complex set of intellectual and non-intellectual variables as utilized by the individual in that situation. In other words, the individual is evaluated on basis of his functioning, and from the level of functioning some hypothesis is formulated as to his future performance. The important point here is that the prediction is made on basis of an action pattern. There are, to be sure, elements or variables involved in this action pattern, but these are organized and utilized by each individual in his own unique way. Measurement of intelligence since the time of Binet has taken into account not only certain elements which are broadly termed "intellectual," but also the overt manifestation of these elements which is termed "intellectual behavior." It is this behavior which is sampled and measured by intelligence tests.
If intelligence must be defined and measured on basis of what is taken to be intelligent behavior, then it would seem to follow that motivation must be defined and measured on basis of what is taken to be motivated behavior. Hence, one's definition of motivation must somehow include the behavioral action or action pattern. This is what Arnold has done by defining the term "motive" as "a want that leads to action." (1960, I, 217) Hence, one may have wants or desires or needs, but unless these are in some way related by the individual to action they cannot be called motives. This seems to be one of the main differences between Arnold's approach to measurement of motivation and the approach of McClelland, Atkinson, and their collaborators. Their research focuses on the assessment of fantasy elements on the assumption that these elements are directly related to overt behavior. The questions raised by Lazarus, Broverman, and Cole are legitimate in the context of the McClelland-Atkinson research but they, too, are working with fantasy elements in their counter-proposal that these elements are inversely related to overt behavior. We would maintain that the whole issue as to whether fantasy is directly or inversely related to overt behavior is really beside the point, in that both sides emphasize fantasy elements rather than fantasied or imagined behavior. It is the emphasis on fantasied behavior which makes the method used in our study unique in the assessment of motivation.

Story Sequence Analysis as a measure of motivation is related to trends in TAT research which focus on the organizing, synthetic function of the ego in producing TAT responses (Wyatt and Veroff, 1956), as well as to studies which clarify the difference between fantasy and story telling.
(Holt, 1961). As we have indicated above, Story Sequence Analysis reflects a shift in emphasis from themes or fantasy elements to plot and outcome of the stories. The method involves a combination of three relatively distinct areas of research in modern psychology. With the emphasis on plot and outcome there is a resemblance to problem-solving in the sense that the story teller's response to the TAT card in effect sets up a problem (the plot), and solves it in his own characteristic way (the outcome). His characteristic way of solving problems resembles the relatively stable disposition of mind in a variety of situations, a disposition which the social psychologists call "attitude." The response in the form of a story is elicited by the TAT pictures, and the story is analyzed for its motivational component, which is an area of clinical research. Thus, we have spoken of Story Sequence Analysis as a new method not only in the sense of recency but also in the sense of difference.

Assessment of attitudes has been mainly the work of social psychologists, using for the most part direct assessment measures. Campbell reviews and evaluates their work, pointing out the abundance of partially-tried techniques with rather questionable validity. He comments:

"Missing is the demonstration that this pattern of consistency extends beyond paper and pencil to the 'real life' situations which are usually in mind when the concept of 'attitude' is used. While meaningful research problems exist in regard to patterns of consistency within a universe of paper and pencil responses, the bulk of the researches reviewed are predicated upon the assumption that broader consistencies exist— that overt behavioral manifestations of the attitude can be predicted." (1967, 176)

Indirect assessment of attitudes by means of projective techniques is likewise found in the area of social psychology, and Campbell's comments about
the direct assessment measures are for the most part applicable here as well. The difficulty in attitude research is similar to that mentioned above in motivation research, viz., the attempt to define and measure a variable apart from an action pattern.

Although indirect assessment of attitudes by various measures has been an accepted procedure in social psychology (Campbell, 1967), none of this work relates attitudes to motivation, and motivation research in clinical or educational psychology has rarely approached the motivation construct by assessment of attitudes. The few studies relating attitude and achievement published in recent years, moreover, all use a direct-assessment approach. For example, Bendig and Hughes (1954) constructed a 30-item test of student attitudes toward a certain course and reported high retest reliability but no established validity. There was apparently no follow-up study relating motivation as assessed by this test and academic achievement. Rowland (1959) found with two groups of college students correlations of 0.52 and 0.46 between the Academic motivation Inventory and first semester grades. Unfortunately, Rowland gives no examples of the type of question used in his Inventory although he does indicate the areas such as value structure and conformity to the peer group around which the questions were organized.

As we have indicated above, the new method of Story Sequence Analysis combines features from research in problem-solving, indirect attitude assessment, and motivation in a unique approach to the prediction of human behavior. Following the initial publication of this approach (Arnold, 1949),
and the demonstration of the method with a clinical case (Arnold, 1951), the technique was modified, specified, and refined in a series of studies over the next decade. One significant contribution was that by Snider (1954) who succeeded in differentiating high and low achievers among a high school population. In subsequent studies with such diverse groups as college students, teachers, Navy personnel, and business executives, it became increasingly clear that high and low achievers tended to handle the TAT stories in characteristic ways. By noting these characteristics, it was found further that other subjects in a given group could be differentiated as high or low achievers on basis of the attitudes expressed in their TAT stories.

Given the particular attitudes associated with different behavioral patterns, the inference was made that these attitudes expressed dispositions to action and that these dispositions could be called "motivating factors," or "motivating tendencies." Thus, a basic methodological principle was formulated: an individual's motivating tendencies shape the story action and are expressed in the story outcome in such a way that the plot sets up a problem and the outcome solves it in a characteristic way. These motivating tendencies shape a person's actions in the same way so that he would solve similar problems in similar ways. This principle obviously reflects an emphasis on ego-direction, but the rationale is not radically different from that underlying general textbook discussions of adjusting behavior (Coleman, 1960). To illustrate the ways in which an individual might face a problem, we may borrow the example used by Royce (1964, 168) of a person going for a drive and being thwarted by a tree which has fallen across the
road. There are various possible reactions to this situation. The person might crash into it, go around it, cry, worry about it, develop a permanent and obsessive hatred of all trees, change his goal and decide to go elsewhere, or just sit there. All of these reactions symbolize the ways in which people meet life's problems, and the TAT stories merely demonstrate the subject's characteristic manner of solving his problems. What Story Sequence Analysis does is to discover which reaction is associated with a given level of achievement so as to evaluate or assess the achievement level on basis of typical reactions or ways of handling certain problems. Thus, for example, the typical reaction of a high achiever when faced with a difficult task is to use the means necessary to perform the task and so achieve success, whereas the typical reaction of a low achiever in the same situation is to sit and fret about it, or to dream of success, or to expect success somehow just "to happen" with little or no effort on his part.

In order to evaluate the motivating attitude by means of Story Sequence Analysis, the first step is to extract the attitude from the story in which it is embedded. This is done by condensing the story into an import, a short but complete expression of what the story teller is saying. It is in this nucleus of the story that the individual demonstrates the action he is inclined to take when he is confronted with a given situation, i.e., his motivating attitude. The import is useful not only clinically as a clarification of the individual's problems but also experimentally as a basis for converting the qualitative material of the stories into quantitative form.
After the formulation of an import for each story in a given TAT protocol, each of the imports is assigned a quantitative score in terms of the scoring system developed from research with the method. As it became increasingly clear that high and low achievers could be differentiated on basis of their characteristic attitudes, research extended in two directions. First, quantitative values were assigned to positive and negative motivating tendencies according to their occurrence among high and low achievers. Then the method was applied to the entire range of achievement, from the highly positive to the highly negative. In this latter research (Garvin, 1960), the method was found to differentiate degrees of motivation. This study was designed to test the validity of the method with a college population composed of both males and females. The correlations were highly significant, with 0.85 reported for the men and 0.83 for the women.

On basis of research studies over a ten year period, Story Sequence Analysis was formalized and published as a method for measuring motivation and predicting achievement (Arnold, 1962). The characteristic attitudes of high, average, and low achievers were abstracted from the research material and organized under four main categories: achievement, right and wrong, human relationships, and reaction to adversity. Under these categories are headings, sub-headings, and divisions in terms of which any given import can be scored. Each of the headings is graded from highly positive (+2) to highly negative (-2) in terms of the level of motivation. Hence the score given to any single import is called the "intensity score" since it reflects the motivation level of that import. The sum total of intensity scores from a TAT protocol is termed the "consistency score" since it
reflects the consistency with which a given motivation level occurs in a record. Once the raw consistency score is obtained, it is transformed according to an index based on the proportion of scale units obtained against the total number of scale units obtainable. This final score is termed the "motivation index" and is the quantitative value used to represent the measured variable called "motivation."

By way of conclusion we might note that research in motivation over the past several years has resembled the state of research in intelligence prior to Binet. As Arnold comments, "Psychological research has always begun by investigating simple processes or functions. It has abandoned this approach only when it has become obvious that the most accurate knowledge of single functions will not allow us to predict human actions." (1960, II, 361) What Binet did, in effect, was to shift the focus from single functions and inner variables to complex behavioral manifestations of these variables. Although it may be theoretically desirable to isolate and define a variable to be measured before attempting to devise a measure, given the complexity of human behavior this procedure may not be possible. Just as intelligence must be measured in terms of action or intelligent behavior, so, too, motivation must be measured in terms of action or motivated behavior. As we have indicated above, this is precisely what most researchers have failed to realize, with the result that most of the research dealing with motivation has been negative or inconclusive when related to actual human behavior. Although a great deal of work remains to be done, it seems that the rationale underlying Story Sequence Analysis,
even apart from the effectiveness of the method as such, is a significant contribution to research in motivation psychology.
CHAPTER III
DESIGN OF THE RESEARCH

The idea for a longitudinal predictive study based on Story Sequence Analysis was suggested by Garvin's (1960) dissertation. In this investigation, a sample of college seniors, male and female, was used, with the grade point average taken from the junior year. Recognizing the limitations of his study, Garvin states:

Ideally, research of this kind should be initiated by administering the TAT to all entering freshmen. By using the graphs accompanying this paper, predictions of each student's most likely Grade Point Average may be readily made. We recognize that these predictions may not tally too well with freshman grades; following each student through the senior year is therefore desirable. Only in this way, it appears, will the achievement through four years of college, of the group tested as freshmen, indicate the degree of confidence to be placed in the freshman prediction. (1960, 42)

Hence, when the opportunity arose in the fall term of the academic year 1962-1963 to undertake such a study, the present design was tentatively sketched. For purpose of uniformity, all of the TAT administration as well as the Henmon-Nelson administration was done by the writer.

Subjects

The population-subjects were the entire freshman class, approximately 700 undergraduate students of the Arts and Science College, Lake Shore Division, Loyola University. All of the students tested were in the first semester of their freshman year in college, and the testing was done during
the fourth, fifth, and sixth weeks of the semester. Because of absences, failure to follow instructions, and incomplete tests, only 608 of the approximately 700 intelligence test scores were ultimately used. Of these, 504 were male and 104 were female.

Originally the intention was to select a sample of both male and female subjects, but the design was modified to include only males partly because a different set of cards was used by the females and partly because the female subjects were outnumbered five to one.

Test Material

For testing intelligence we used The Henmon-Nelson Test of Mental Ability, College Level, Form A, Revised Edition, 1961, by M. J. Nelson, Tom A. Lamke, and Paul C. Kelso. This is a group test of intelligence containing 100 items, with a working-time limit of forty minutes. At the time this study was begun, there was no uniform measure of intelligence required of students applying for admission to the university. Some students had taken the Scholastic Aptitude Test of the College Entrance Examination Board, some had taken the Cooperative School and College Ability Tests, and some had taken both tests. Since we wanted to use the entire class as the population from which to draw a sample, we were forced to look for a group test designed for college level which could be administered within a fifty-minute class period. Although there was no research reported on the 1961 revised edition, the test seemed adequate for our purposes. Since that time, an evaluation has been made by Crites who says of the test, "It is relatively short, easily administered, quickly scored, acceptably reliable,
As a basis for the assessment of motivation by means of Story Sequence Analysis we used the Thematic Apperception Test by Henry A. Murray. Thirteen cards were selected and divided for a double-period administration. The TAT cards used in these testing periods were: 1, 2, 3BM-GF, 4, 6BM-GF, 7BM-GF, 10, 11, 13MF, 14, 16, 17BM-GF, and 20. Since the TAT was to be administered to groups, a decision had to be made about the manner of presentation. Most commonly for group administration a slide projector is used, but with large groups this often leads to difficulties and may involve contaminating effects. We felt that distractions could be minimized and testing better controlled if the individual students each had a set of cards. Since the TAT was to be given to groups varying in size from 18 to 50, we obtained fifty sets of TAT cards for this study. The thirteen cards actually used were selected out of the set prior to the period of testing and distributed to the individual students at the beginning of the class period.

Procedure and Instructions

The subjects were tested during regularly scheduled freshman orientation classes. The total population was divided into seventeen class sections, each one containing from 18 to 50 students. Male and female subjects were mixed in these class sections which had been pre-arranged by the office of the Dean for the entire first semester of freshman year. Three periods of fifty minutes each were used for the administration of the tests. Consequently, the total testing procedure extended over a period of three weeks. Since the freshman orientation classes were conducted by different
university personnel under the general direction of the Dean of the Arts
and Science College, the testing was considered to be part of the regular
program. As we noted above, the same experimenter administered the tests
to all the students, and exactly the same instructions were given to each
group.

Administration of the Henmon-Nelson followed the directions given
in the Manual (1961, 4) and the instructions were quoted directly from the
Manual. There were no problems anticipated or found in the administration
of this test except that some students apparently became confused and
marked the wrong columns of the answer sheets. Some records were discarded
for this reason, and some were discarded where it seemed evident that the
student had opened the self-marking answer sheet and had made some changes
in the test answers.

Administration of the TAT was somewhat more complicated due to
group administration, written stories, and the requirements of Story Se-
quence Analysis. At the beginning of the class period writing material
was distributed to all of the students present and the following preliminary
instructions were given:

For our orientation class today we are going to have an exercise in
creative imagination. I am going to give each of you a set of
pictures and you are to write as dramatic a story as you can for
each picture. You may tell what has led up to the situation shown
in the picture, or tell what is happening at the moment, what
the characters are thinking and feeling. Then you are to give an
outcome to the story. Do you understand? (pause for questions)

Since you have forty-five minutes for these stories, allow your-
self no more than seven minutes for each story so that you are
sure to finish by the end of the period. Please avoid descriptions
of the cards, and avoid conversations. In other words, do not just
describe the pictures or give dialogue, but tell a story with plot and outcome.

Following these instructions, a set of seven pictures was given to each student in the class and the writing began. It was judged better not to interrupt the writing to repeat or clarify the directions, and so the following summary of instructions was written on the blackboard:

Exercise in creative imagination:
Write as dramatic a story as you can for each picture.
Tell what led up to the situation shown in the picture, or what is happening at the moment. Then give an outcome.
Do not describe the picture or give conversation.
TELL A STORY, WITH PLOT AND OUTCOME, FOR EACH PICTURE.

The experimenter checked throughout the period to see that the instructions were being followed and that time limits were observed. The few questions raised during the period were answered privately. In some cases a word of encouragement or a suggestion seemed indicated. The majority of the students spent the entire period on the stories, and all but a few finished in the allotted time.

For the second period of TAT administration the procedure was the same as for the first period as regards the distribution of writing material and instructions. As before, the TAT cards to be used had been selected prior to the class sessions for distribution immediately after the following instructions:

For our orientation class today we are going to have a second exercise in creative imagination. Your stories last week were, for the most part, quite good, and some were excellent. But you confined yourselves pretty much to the facts of everyday life. Today, I am going to give each of you another set of pictures, different from those which you had last week. You are to write as dramatic a story as you can for each picture. You may tell what has led up to the situation shown in the picture, or tell what is happening at the moment, what the characters are thinking and feeling.
Then you are to give an outcome to the story. Do you understand? (pause for questions)

Since you have forty-five minutes for these stories, allow yourself no more than seven minutes for each story so that you are sure to finish by the end of the period. You will notice that one card today is blank. There is no picture on this card, so you should try to imagine a picture and then tell a story about it just as you did about the other pictures. Please avoid descriptions of the cards, and avoid conversations. In other words, do not just describe the pictures or give dialogue, but tell a story with plot and outcome.

Following these instructions, a set of six pictures was given to each student in the class and the writing began. As during the first period, the writing was not interrupted for repetition of the directions, but these were written on the blackboard. The written instructions for the second period were exactly the same as for the first period except for the following addition:

For the blank card:
Imagine a picture, and then tell a story about it just as you did for the other pictures.

The experimenter again checked throughout the period to see that the instructions were being followed and that time limits were observed. There were fewer questions, in general, during this second period of administration. Most of the questions concerned the blank card, and again these were answered privately. The timing was better during this session than during the first session, so that very few failed to finish in the allotted time.

Organization of the Data and Sampling Procedure

The first step in organizing the material was the correction of the Henmon-Nelson Test for the male population and the ranking of the population-subjects on basis of their total raw score. The raw score was used instead
of the percentile score because the latter failed to differentiate ade-
quately the upper levels of ability. The ranked scores were then grouped
according to deciles, and the sample of 100 was drawn from the decile groups
on a percentage basis. Thus, since there were seven scores in the decile
group 91-100, the sample from this group would be 7/504 or 1.4% so that one
score was chosen at random from the seven in this group. The same procedure
was followed for each of the decile groups, making a stratified random
sample altogether of 100 subjects.

The next step consisted in the selection of the TAT protocols of
the sample-subjects. These protocols were inspected and evaluated according
to the following criteria:

(a) Both parts of the TAT had to be on file. If either part one
or part two was missing, the record was rejected. It was
known that some students missed one or more of the testing
sessions, but an attendance record was not made at the time
so there was no way of knowing before the sampling procedure
was begun which records were complete.

(b) All thirteen stories were to have been finished. For re-
search purposes, strict uniformity was considered necessary.
Hence, if any of the stories were omitted or were manifestly
incomplete, the record was rejected.

(c) Instructions concerning plot and outcome were to have been
followed. Since plot and outcome were emphasized in the
testing instructions, and since Story Sequence Analysis
relies heavily on these features for scoring the imports,
failure to develop at least a minimal plot or to give at least some outcome was considered to be a basis for rejection of the record.

If a given TAT protocol did not meet these three criteria, the intelligence test score was replaced in the decile group from which it was drawn and the sampling procedure was repeated. It is conceivable that applying the above criteria to the projective material could have caused a bias in the sample, but it seemed advisable to risk the possible bias in the interest of uniformity and control.

When the sampling was completed there were one hundred sets of thirteen stories. Each set was then typed and coded, so that the final copy had only two identifying notations, viz., a code number and the subject's initials. Since all of the subjects were male and the age was uniform, there seemed to be no need for addition of these details.

**Analysis of the Data**

After the completion of the above procedure, the work of importing and scoring began. In view of certain peculiarities noted from previous work with the current college population, it was considered advisable to do a preliminary study with a limited number at the extremes of the population which remained after the sample was drawn. Consequently, we chose ten subjects, five from the upper range of intelligence and five from the lower range of intelligence. The TAT protocols of these ten were then selected for importing and scoring, and the grade point average for each was obtained from the office of the Dean of the Arts and Science College.
There were no serious problems with the protocols of the subjects from the lower range of intelligence. The stories were relatively simple, straightforward examples of limited imagination, and the motivation score was roughly correlated with the actual grade point average. The two high achievers in this sample obtained significantly higher averages than did the three low achievers, and the motivation score of the two high achievers was significantly higher than the motivation score of the three low achievers.

Such was not the case, however, with the five subjects from the higher range of intelligence. The bright students were verbally more facile and developed more elaborate stories than the less intelligent students, but they expressed attitudes of cynicism, pessimism, and fatalism. Their stories were often highly imaginative and contained a number of literary allusions. These stories sometimes reflected "canned plots" which seemed to have been borrowed from literature or motion picture productions. Consequently, it was much more difficult to import and score the stories of these students, and we found serious discrepancies between the motivation score and the grade point average in three of the five records. For example, the brightest subject of this group had the highest grade point average but a relatively low motivation score. After noting this discrepancy, we re-examined the protocol in order to discover how we had misinterpreted the stories.

What we learned from this preliminary study was to be alert for certain characteristics of the college population as a whole and especially for the subtleties of some of the bright students. Since the analysis of the experimental protocols was blind as regards both intelligence and
academic achievement, we could only infer the level of intelligence from a given protocol, but when we came across a protocol resembling those of the bright students in the pilot study we were much more cautious in formulating the imports. We were handicapped in our analysis of the sample in general because of the double-period administration of the TAT. As the title of our method of TAT analysis indicates, Story Sequence Analysis relies heavily on the sequence for proper importing and scoring. It has been found that there are subtle links from story to story, and that often several of the stories will reflect different solutions of a given problem. Thus, when a story is ambiguous, it is sometimes possible to clarify the ambiguity on basis of the sequence in which the story is found. It may take two or three stories for a sequence to become established, and so it is advisable to use ten or more cards to obtain the optimal value of this aspect of Story Sequence Analysis. In our study this was impossible because of time limitations; hence, when we came to importing we could not always rely on the sequence for clarification because, in many cases, the sequence was not established.

Partly to cope with the above-mentioned difficulty in analyzing the TAT stories and partly to establish an adequate degree of accuracy in scoring the imports, the protocols were scored independently by a second person. In those cases where there was notable difference between the two consistency scores, the protocol was discussed with Dr. Arnold so that a consensus could be reached.

After the scoring of the TAT protocols, the grade point average for
each of the sample-subjects was obtained from the office of the Dean of the Arts and Science College. This was done in September, 1967, immediately prior to the programming of the material. Although it was known that all of the sample-subjects had completed at least one year of college work, it was not known how many of these subjects left or were dropped from college in their second, third, and fourth year. We anticipated some shrinkage of the sample, but not the loss of 58% which actually took place. Moreover, there were some features of the grade point data which are difficult to explain. For example, there were some students on record in first and third year, but not in second year, and there were some on record in first, second, and fourth year but not in third year. Whether this was due to faulty records or to transfer out and back into the Arts and Science College of the University is not known.

After the scores for intelligence, motivation, and academic achievement were gathered, and the conditions for the application of the Pearson Product Moment Correlation were verified, the material was programmed by Mr. Patrick Pierce on basis of a program developed by Mr. Harry Eberhauser. The computations were made on the IBM 1401 computer at the Loyola University Data Processing Center. The raw data will be found in Appendix I at the end of this study, and the formulae used as well as the results will be found in the following chapter.
CHAPTER IV

RESULTS AND DISCUSSION

As we have stated before, the purpose of this study was to establish the predictive validity of a new method for measuring the motivation factor in achievement over the four year college period with a sample of 100 male undergraduate students. Initially we intended to analyze only the total group in each year, but the question was raised as to whether the low, average, or high IQ groups were more predictable. Consequently, the total sample for each year was broken down into five sub-units on basis of Henmon-Nelson decile groups. Since there were so few at the extremes, the two highest and three lowest decile groups were combined.

The following Tables contain all the descriptive statistics resulting from the multiple linear regression analysis performed on the sample group. Basically, the tables contain the data to determine the validity of the hypotheses made in this study, the degree of confidence that we may place in the results, and the relative contributions of the individual variables in predicting academic performance in college with grade point average as the criterion.

The columns of Table 1 present the data for the total sample in each of the four years, together with the comparable data from Garvin's (1960) study. In Tables 2 to 5, the columns are broken down into five decile groups based on the Henmon-Nelson raw scores ranging from 0 to 100.
We might note here that there were no subjects in the original population in the normative decile groups 1-10 and 11-20.

The rows of each table describe comparable data. Thus, for example, row 2 of Table 1 is presenting the same variable as row 2 of Table 3. Rows 1-3 describe the arithmetic mean of the sample for the Henmon-Nelson Test, the Motivation Index, and the Grade Point Average, respectively. The formula is given by:

\[
\bar{X} = \frac{1}{N} \left( \sum_{i=1}^{N} X_i \right)
\]

where \( N \) is the sample size, and \( X_i \) are the raw data of the measures of intelligence, motivation, and academic achievement.

Rows 4-6 describe the standard deviation of the sample for each of the variables described above. The formula is given by:

\[
\sigma = \sqrt{\frac{N}{N-1} \sum_{i=1}^{N} X_i^2 - \left( \frac{1}{N} \sum_{i=1}^{N} X_i \right)^2}
\]

where the \( X_i \) and the \( N \) are as described above.

Rows 7-9 give the Pearson Product Moment Coefficient of Correlation between Henmon-Nelson and Grade Point Average, Motivation Index and Grade Point Average, and Henmon-Nelson and Motivation Index. One form of the formula is:

\[
\lambda_{XY} = \frac{N}{N \sigma_x \sigma_y} \sum_{i=1}^{N} X_i Y_i
\]
where \( N \) is the sample size, \( X \) and \( Y \) are the variables to be correlated, and \( s_X \) and \( s_Y \) are the standard deviations corresponding to \( X \) and \( Y \) respectively.

Rows 10-13:
Row 10 gives the coefficient of multiple correlation (\( R \)) between Grade Point Average and intelligence-motivation measures combined. \( R \) indicates how well, or to what extent, these variables taken together can account for the academic achievement. \( R \) is found as the positive square root of one of the following equivalent formulae:

\[
R_{1.23}^2 = \frac{\lambda_{12}^2 + \lambda_{13}^2 - 2 \lambda_{12} \lambda_{13} \lambda_{23}}{1 - \lambda_{23}^2}
\]

where the subscripts 1, 2, 3 are identified:
1 = Grade Point Average; 2 = Henmon-Nelson; 3 = Motivation Index

\[
R_{1.23}^2 = \beta_{1.3} \lambda_{12} + \beta_{1.2} \lambda_{13}
\]

where the subscripts are identified as above. The \( \beta \)'s are determined from the formulae:

\[
\beta_{1.3} = \frac{\lambda_{12} - \lambda_{13} \lambda_{23}}{1 - \lambda_{23}^2} \quad \beta_{1.2} = \frac{\lambda_{13} - \lambda_{12} \lambda_{23}}{1 - \lambda_{23}^2}
\]

Row 11 gives the multiple correlation corrected for the size of the sample being used. This corrected \( R \) is written \( R_c \) and it can be found from the formula:
\[
R_c^2 = 1 - (1 - R^2) \left( \frac{N - 1}{N - m} \right)
\]

where \( R \) is the coefficient of multiple regression, \( N \) is the sample size, and \( m \) represents the total number of dependent and independent variables being considered. Here, \( m = 3 \).

Rows 12 and 13 give the percentage contribution of each of the variables to \( R^2 \), from which one can see how much each of the variables is contributing to the total \( R \). It is simply the individual quantities on the right hand side of equation \( b \) in row ten:

- % contribution of Henmon-Nelson = \( \beta_{1.3} \lambda_{1.2} \)
- % contribution of Motivation Index = \( \beta_{1.3} \lambda_{1.3} \)

Row 14 gives the standard error of estimate for the multiple predictions. Assuming a random and normal sample, two-thirds of the values predicted by the regression equation should be within the standard error. The formula is given by:

\[
\sigma_{1.2.3} = \sigma_1 \sqrt{1 - R_{1.2.3}^2}
\]
### TABLE 1

Results for the Total Sample in Each of the Four Years

<table>
<thead>
<tr>
<th>Sample:</th>
<th>1st year</th>
<th>2nd year</th>
<th>3rd year</th>
<th>4th year</th>
<th>Garvin's</th>
</tr>
</thead>
<tbody>
<tr>
<td>(sample)</td>
<td>(100)</td>
<td>(75)</td>
<td>(54)</td>
<td>(42)</td>
<td></td>
</tr>
<tr>
<td><strong>Rows 1</strong></td>
<td>HN</td>
<td>63.73</td>
<td>64.17</td>
<td>67.15</td>
<td>66.95</td>
</tr>
<tr>
<td><strong>2 X: MI</strong></td>
<td>105.52</td>
<td>113.12</td>
<td>123.28</td>
<td>123.00</td>
<td></td>
</tr>
<tr>
<td><strong>3 GPA</strong></td>
<td>2.3335</td>
<td>2.2753</td>
<td>2.7141</td>
<td>2.7912</td>
<td>2.564</td>
</tr>
<tr>
<td><strong>4 HN</strong></td>
<td>13.77</td>
<td>13.51</td>
<td>12.61</td>
<td>11.24</td>
<td></td>
</tr>
<tr>
<td><strong>5 σ: MI</strong></td>
<td>38.18</td>
<td>33.69</td>
<td>29.30</td>
<td>27.19</td>
<td></td>
</tr>
<tr>
<td><strong>6 GPA</strong></td>
<td>0.6055</td>
<td>0.7169</td>
<td>0.6163</td>
<td>0.5675</td>
<td>0.438</td>
</tr>
<tr>
<td><strong>7 HN-GPA</strong></td>
<td>0.4445</td>
<td>0.4480</td>
<td>0.3399</td>
<td>0.4759</td>
<td>0.626</td>
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<tr>
<td><strong>8 r: MI-GPA</strong></td>
<td>0.8432</td>
<td>0.6519</td>
<td>0.6230</td>
<td>0.6104</td>
<td>0.850</td>
</tr>
<tr>
<td><strong>9 HN-MI</strong></td>
<td>0.2440</td>
<td>0.2028</td>
<td>0.1643</td>
<td>0.1187</td>
<td>0.582</td>
</tr>
<tr>
<td><strong>10 R</strong></td>
<td>0.878</td>
<td>0.727</td>
<td>0.668</td>
<td>0.733</td>
<td>0.865</td>
</tr>
<tr>
<td><strong>11 R_c</strong></td>
<td>0.876</td>
<td>0.718</td>
<td>0.651</td>
<td>0.717</td>
<td></td>
</tr>
<tr>
<td><strong>12 HNZ</strong></td>
<td>11.3</td>
<td>14.8</td>
<td>8.3</td>
<td>19.5</td>
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</tr>
<tr>
<td><strong>13 MIT</strong></td>
<td>65.9</td>
<td>38.1</td>
<td>36.3</td>
<td>34.3</td>
<td>62.4</td>
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<td><strong>14 σ:</strong></td>
<td>0.289</td>
<td>0.492</td>
<td>0.459</td>
<td>0.385</td>
<td>0.21</td>
</tr>
<tr>
<td>Sample:</td>
<td>Total</td>
<td>21-50</td>
<td>51-60</td>
<td>61-70</td>
<td>71-80</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
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<td>HN</td>
<td>63.73</td>
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<td>55.59</td>
<td>64.50</td>
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<td>X</td>
<td>M</td>
<td>105.52</td>
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<td>GPA</td>
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</tr>
<tr>
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<td>2.55</td>
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</tr>
<tr>
<td>5</td>
<td>MI</td>
<td>38.18</td>
<td>31.65</td>
<td>33.69</td>
<td>38.64</td>
</tr>
<tr>
<td>6</td>
<td>GPA</td>
<td>0.6055</td>
<td>0.3802</td>
<td>0.5396</td>
<td>0.5139</td>
</tr>
<tr>
<td>7</td>
<td>HN-GPA</td>
<td>0.4445</td>
<td>0.5278</td>
<td>0.3646</td>
<td>0.0802</td>
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<tr>
<td>8</td>
<td>MI-GPA</td>
<td>0.8432</td>
<td>0.7777</td>
<td>0.9144</td>
<td>0.8294</td>
</tr>
<tr>
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<td>HN-MI</td>
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<td>0.6239</td>
<td>0.2051</td>
<td>-0.0294</td>
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<tr>
<td>10</td>
<td>R</td>
<td>0.878</td>
<td>0.779</td>
<td>0.932</td>
<td>0.836</td>
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<td>Rg</td>
<td>0.876</td>
<td>0.742</td>
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<td>0.822</td>
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<td>12</td>
<td>HN%</td>
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<td>3.1</td>
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<tr>
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<td>MI%</td>
<td>65.9</td>
<td>57.6</td>
<td>80.2</td>
<td>69.0</td>
</tr>
<tr>
<td>14</td>
<td>σ:</td>
<td>0.289</td>
<td>0.238</td>
<td>0.195</td>
<td>0.282</td>
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</table>
### TABLE 3

Results for Total Sample and Decile Groups for Second Year

<table>
<thead>
<tr>
<th>Sample:</th>
<th>Total</th>
<th>21-50</th>
<th>51-60</th>
<th>61-70</th>
<th>71-80</th>
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<td>(16)</td>
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<td>(22)</td>
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<tr>
<td>(14)</td>
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<td>(11)</td>
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<td></td>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Rows 1</th>
<th>HN</th>
<th>64.17</th>
<th>43.25</th>
<th>55.56</th>
<th>64.41</th>
<th>75.21</th>
<th>85.00</th>
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</thead>
<tbody>
<tr>
<td>2 X: MI</td>
<td>115.12</td>
<td>100.00</td>
<td>112.06</td>
<td>115.32</td>
<td>121.64</td>
<td>113.73</td>
<td></td>
</tr>
<tr>
<td>3 GPA</td>
<td>2.2753</td>
<td>1.9008</td>
<td>2.1081</td>
<td>2.1514</td>
<td>2.5493</td>
<td>2.8264</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rows 2</th>
<th>HN</th>
<th>13.51</th>
<th>4.80</th>
<th>2.12</th>
<th>3.13</th>
<th>2.62</th>
<th>3.10</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 X: MI</td>
<td>33.69</td>
<td>30.53</td>
<td>23.89</td>
<td>33.24</td>
<td>27.96</td>
<td>48.91</td>
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</tr>
<tr>
<td>3 GPA</td>
<td>0.7169</td>
<td>0.5118</td>
<td>0.7037</td>
<td>0.5512</td>
<td>0.6966</td>
<td>0.8058</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rows 3</th>
<th>HN-GPA</th>
<th>0.4480</th>
<th>0.8072</th>
<th>0.0790</th>
<th>0.2611</th>
<th>-0.2590</th>
<th>0.4161</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 X: MI-GPA</td>
<td>0.6519</td>
<td>0.5707</td>
<td>0.5490</td>
<td>0.6038</td>
<td>0.8051</td>
<td>0.8553</td>
<td></td>
</tr>
<tr>
<td>3 X: MI-MI</td>
<td>0.2028</td>
<td>0.6012</td>
<td>0.0363</td>
<td>0.0333</td>
<td>-0.1031</td>
<td>0.5730</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Rows 4</th>
<th>HN%</th>
<th>14.8</th>
<th>58.67</th>
<th>0.5</th>
<th>6.3</th>
<th>4.6</th>
<th>-4.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 X: MI%</td>
<td>38.1</td>
<td>7.63</td>
<td>30.00</td>
<td>36.0</td>
<td>63.3</td>
<td>78.55</td>
<td></td>
</tr>
<tr>
<td>3 GPA</td>
<td>0.492</td>
<td>0.297</td>
<td>0.587</td>
<td>0.419</td>
<td>0.394</td>
<td>0.411</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rows 5</th>
<th>HN-GPA</th>
<th>0.4480</th>
<th>0.8072</th>
<th>0.0790</th>
<th>0.2611</th>
<th>-0.2590</th>
<th>0.4161</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 X: MI-GPA</td>
<td>0.6519</td>
<td>0.5707</td>
<td>0.5490</td>
<td>0.6038</td>
<td>0.8051</td>
<td>0.8553</td>
<td></td>
</tr>
<tr>
<td>3 X: MI-MI</td>
<td>0.2028</td>
<td>0.6012</td>
<td>0.0363</td>
<td>0.0333</td>
<td>-0.1031</td>
<td>0.5730</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rows 6</th>
<th>HN%</th>
<th>14.8</th>
<th>58.67</th>
<th>0.5</th>
<th>6.3</th>
<th>4.6</th>
<th>-4.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 X: MI%</td>
<td>38.1</td>
<td>7.63</td>
<td>30.00</td>
<td>36.0</td>
<td>63.3</td>
<td>78.55</td>
<td></td>
</tr>
<tr>
<td>3 GPA</td>
<td>0.492</td>
<td>0.297</td>
<td>0.587</td>
<td>0.419</td>
<td>0.394</td>
<td>0.411</td>
<td></td>
</tr>
</tbody>
</table>
TABLE 4

Results for Total Sample
and Decile Groups for Third Year

<table>
<thead>
<tr>
<th>Sample:</th>
<th>Total</th>
<th>21-50</th>
<th>51-60</th>
<th>61-70</th>
<th>71-80</th>
<th>81-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>HN</td>
<td>67.15</td>
<td>46.60</td>
<td>55.25</td>
<td>64.53</td>
<td>75.42</td>
<td>85.70</td>
</tr>
<tr>
<td>MI</td>
<td>123.28</td>
<td>128.40</td>
<td>114.40</td>
<td>123.07</td>
<td>123.00</td>
<td>131.90</td>
</tr>
<tr>
<td>GPA</td>
<td>2.7141</td>
<td>2.6720</td>
<td>2.5550</td>
<td>2.5620</td>
<td>2.6767</td>
<td>3.1990</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rows</th>
<th>HN</th>
<th>MI</th>
<th>GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>12.61</td>
<td>2.06</td>
<td>1.83</td>
</tr>
<tr>
<td>5 σ</td>
<td>29.30</td>
<td>18.85</td>
<td>26.19</td>
</tr>
<tr>
<td>6</td>
<td>0.6163</td>
<td>0.6477</td>
<td>0.3655</td>
</tr>
</tbody>
</table>

| HN-GPA | 0.3399 | 0.6799 | -0.0878 | 0.1352 | 0.1404 | 0.5759 |
| MI-GPA | 0.6230 | 0.8819 | 0.3687  | 0.3176 | 0.3761 | 0.7677 |
| HN-MI  | 0.1643 | 0.7357 | -0.0391 | 0.1340 | -0.0888| 0.5809 |

| R      | 0.668 | 0.883 | 0.840  | 0.331 | 0.903 | 0.784  |
| R_c    | 0.651 | 0.748 | 0.801  |----* | 0.880 | 0.711  |

| HN%    | 8.3  | 4.6  | 0.5   | 1.3  | 3.1  | 11.3   |
| MI%    | 36.3 | 73.4 | 70.2  | 9.7  | 78.5 | 50.2   |

| σ      | 0.459 | 0.304| 0.198 | 0.481| 0.287| 0.417  |

* indicates that the value was not computable, a fact which is usually due to small sample size.
TABLE 5

Results for Total Sample
and Decile Groups for Fourth Year

<table>
<thead>
<tr>
<th>Sample:</th>
<th>Total</th>
<th>21-50</th>
<th>51-60</th>
<th>61-70</th>
<th>71-80</th>
<th>81-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>(42)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3)</td>
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<tr>
<td>(9)</td>
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<tr>
<td>(13)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(11)</td>
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<td>(6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rows 1</th>
<th>HN</th>
<th>66.95</th>
<th>46.67</th>
<th>55.78</th>
<th>64.46</th>
<th>74.91</th>
<th>84.67</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 X MI</td>
<td>123.00</td>
<td>134.67</td>
<td>107.89</td>
<td>126.00</td>
<td>130.00</td>
<td>120.50</td>
<td></td>
</tr>
<tr>
<td>3 GPA</td>
<td>2.7912</td>
<td>2.4500</td>
<td>2.4511</td>
<td>2.7654</td>
<td>2.9718</td>
<td>3.1967</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Rows 4</th>
<th>HN</th>
<th>11.24</th>
<th>1.70</th>
<th>2.53</th>
<th>2.87</th>
<th>2.47</th>
<th>2.69</th>
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</thead>
<tbody>
<tr>
<td>5 σ: MI</td>
<td>27.19</td>
<td>2.87</td>
<td>21.23</td>
<td>34.75</td>
<td>21.71</td>
<td>22.13</td>
<td></td>
</tr>
<tr>
<td>6 GPA</td>
<td>0.5675</td>
<td>0.0942</td>
<td>0.2926</td>
<td>0.5015</td>
<td>0.6675</td>
<td>0.5496</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rows 7</th>
<th>HN-GPA</th>
<th>0.4759</th>
<th>-0.1666</th>
<th>-0.1273</th>
<th>0.4714</th>
<th>-0.1192</th>
<th>0.7869</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 r: MI-GPA</td>
<td>0.6104</td>
<td>-0.9876</td>
<td>0.3868</td>
<td>0.5841</td>
<td>0.8731</td>
<td>0.8522</td>
<td></td>
</tr>
<tr>
<td>9 HN-MI</td>
<td>0.1187</td>
<td>0.3192</td>
<td>-0.0667</td>
<td>0.3461</td>
<td>-0.3022</td>
<td>0.6166</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rows 10</th>
<th>R</th>
<th>0.733</th>
<th>-----*</th>
<th>0.400</th>
<th>0.651</th>
<th>0.886</th>
<th>0.915</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 R_c</td>
<td>0.717</td>
<td>-----*</td>
<td>-----*</td>
<td>0.555</td>
<td>0.856</td>
<td>0.853</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rows 12</th>
<th>HN%</th>
<th>19.5</th>
<th>-----*</th>
<th>1.3</th>
<th>14.4</th>
<th>-1.9</th>
<th>33.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 MI%</td>
<td>34.3</td>
<td>-----*</td>
<td>14.7</td>
<td>27.9</td>
<td>80.4</td>
<td>50.5</td>
<td></td>
</tr>
</tbody>
</table>

| Rows 14 | σ     | 0.385 | -----*| 0.268 | 0.380 | 0.309 | 0.222 |

* indicates that the value was not computable, a fact which is usually due to small sample size.
Beginning with Table 1, we find several interesting features of the results. From the mean and standard deviation scores, we see that the sample is somewhat above average in both intelligence and motivation, and that there is a consistent rise from first to third year as the group becomes increasingly homogeneous. The slight decline in fourth year seems due to the fact that some of the highest achievers leave college at the end of third year to begin their professional training in medicine or law. One peculiarity in our sample is the drop in GPA mean in second year, with a notable increase in standard deviation. We can only speculate as to what has caused this change. We know that there was a 25% decrease in sample size from first to second year, and from inspection of the raw data we know that two-thirds of those who dropped were low achievers and one-third were average or moderately high achievers. Furthermore, we know that 10 of the remaining 75 had less than 2.0 GPA and that half of these were dropped at the end of second year without having raised their GPA. Also, from the raw data, we see that over-all there was a drop in GPA from the first year level even among some average and high achievers. Hence, the loss of some average or moderately high achievers, the retention of some low achievers, and the general decrease in achievement level during second year may be some factors entering into the picture.

We have stressed the above feature because it may have some bearing on the sharp drop in correlation between MI and GPA from first to second year. The correlations between IQ and GPA held relatively constant through second year, drop in third year, and rise again in fourth year, whereas the
correlations between MI and GPA drop sharply from first to second year, and then hold relatively stable through fourth year. How to account for these variations is difficult. It could be a peculiarity of the sample or it could reflect adjustment problems common to first and second year college students. Given the purpose of our study, we are not as interested in the MI-GPA relationship as we are in the HI-GPA relationship. The correlation of .8432 between MI and GPA for first year is highly significant in itself and shows the predictive validity of Story Sequence Analysis over a period of several months, from October to May of the academic year. This correlation is far higher than any reported in the literature and provides solid evidence to substantiate this measure of motivation.

There is remarkable similarity between our correlation of .8432 for first year and Garvin's correlation of .850 between the MI of fourth year students and their GPA from third year. Given the differences in design and in administration of the test, differences in age and degree of selection, and differences in time of testing related to time of grading, we would not expect this degree of similarity. Despite these differences, we may consider this study to be in some sense a replication of Garvin's study and consequently we may understand the similarity in terms of reliability.

Two other differences between Garvin's study and ours should be noted. First, his measure of intelligence (ACE) showed much higher correlation with GPA than ours did. Most of the reported research with the ACE is with freshman GPA as the objective criterion, and the average correlation is about .47 (Mayhew, 1965). The differences in sample as regards age and educational level and the differences in GPA between first and third year may account
for the higher correlation between intelligence and achievement but even when these factors are taken into consideration the fact still remains that Garvin's correlation of .626 between ACE and GPA is unusually high.

Of greater interest, perhaps, in relation to our study, is the correlation of .582 between the ACE and MI in Garvin's study. It is somewhat difficult to explain in view of our correlations of .2440 to .1187, from which we would infer that the measures of intelligence and motivation are quite independent as regards the variable which each is measuring. This is as it should be if we are isolating a variable for measurement purposes. It is interesting that the correlations between MN and MI decrease consistently over the four year period, so that by fourth year the relationship appears negligible.

To return to the correlation of .8432 between MI and GPA in freshman year, two questions immediately present themselves. First, how do we account for the sharp drop in correlation from first to second year? Second, how do we account for the relatively stable correlation from second to fourth year? As regards the first question, one might explain the reduced correlation on basis of a 25% loss of the sample from first to second year except for the fact that a loss of 20% more from second to third year does not affect the correlation significantly. Another possible explanation could be in terms of the variable which we are measuring, viz., motivation, and the changes in motivation during the first two years of college. This is plausible, but it seems strange that motivation should change that much during second year so as to affect achievement to such an extent in second
year and not in third or fourth year. If we are measuring attitudes, and if attitudes are relatively stable personality factors, we might expect a gradual change over an extended period of time but hardly a drastic change followed by a stabilization.

In our attempt to clarify the marked difference in correlation between motivation and achievement from first to second year, we selected out of the sample the 42 students who comprised the fourth year total for a computer rerun with this group alone. While recognizing that a strict comparison could not be made because the total sample included this group of 42, we thought that such a procedure might shed some light on the variation in correlation which was not anticipated. Consequently, we took the group of 42 and revised the program slightly so as to obtain the arithmetic means, standard deviations, and correlations of their intelligence, motivation, and achievement scores from first through fourth year. Prior to the computer rerun we inspected the raw data and found that 3 of the 42 had defective records. Therefore #78, #75, and #39 were dropped from the sample because retaining them would have resulted in a sample size of 41 in second year and 40 in third year. For the remaining 39 the program was rerun on the IBM 1401 computer used for the original work. These results are found in Table 6.

Since this group of 39 successfully completed four years of college, we expected that their motivation level would be significantly higher than the motivation level of the larger sample. We expected further that the correlation between motivation and achievement for this group would not
only be higher but also more stable from year to year than the comparable correlation for the larger sample. As can be seen from Table 6, our expectations were not confirmed. The motivation level was somewhat higher, but the correlation between motivation and achievement was considerably lower and showed greater fluctuation from year to year than the comparable correlation for the larger sample. Whereas the MI-GPA correlation for the total sample of 100 in first year was 0.8432, the MI-GPA correlation for the group of 39 in first year was 0.6673. Even granting the fact that the sample of 100 included the group of 39, and recognizing the effect of restriction of range from the smaller group, this difference is the opposite of what we would have expected.

The main question which concerns us, however, is not the MI-GPA correlation in first year but the drop in the MI-GPA correlation between first and second year. In this connection we see that the group of 39 showed a drop in correlation from 0.6673 in first year to 0.4582 in second year, which parallels the drop in correlation from 0.8432 in first year to 0.6519 in second year for the larger group. From these results we would infer that whatever affected the motivation of the total sample likewise affected the motivation of the 39 who completed their college work. As we have indicated above, there are various possible explanations of this phenomenon.

The most likely explanation of our questions seems to be in terms of the common adjustment problems encountered by many students during second year of college. Since these are qualitative in nature and specific to the individual, they are difficult to evaluate in a generalized way. Yet
TABLE 6

Results of Analysis of Data
For Group of 39 Over the Four-Year Period

<table>
<thead>
<tr>
<th>Sample:</th>
<th>1st year</th>
<th>2nd year</th>
<th>3rd year</th>
<th>4th year</th>
</tr>
</thead>
<tbody>
<tr>
<td>(39)</td>
<td>(39)</td>
<td>(39)</td>
<td>(39)</td>
<td>(39)</td>
</tr>
</tbody>
</table>

Rows 1
HN

<table>
<thead>
<tr>
<th>Rows</th>
<th>Rows 1</th>
<th>Rows 2</th>
<th>Rows 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HN</td>
<td>66.74</td>
<td>66.74</td>
</tr>
<tr>
<td>2</td>
<td>MI</td>
<td>122.10</td>
<td>122.10</td>
</tr>
<tr>
<td>3</td>
<td>GPA</td>
<td>2.5795</td>
<td>2.5251</td>
</tr>
<tr>
<td>4</td>
<td>HN</td>
<td>11.48</td>
<td>11.48</td>
</tr>
<tr>
<td>5</td>
<td>MI</td>
<td>26.76</td>
<td>26.76</td>
</tr>
<tr>
<td>6</td>
<td>GPA</td>
<td>0.5232</td>
<td>0.6220</td>
</tr>
<tr>
<td>7</td>
<td>HN-GPA</td>
<td>0.5455</td>
<td>0.4896</td>
</tr>
<tr>
<td>8</td>
<td>MI-GPA</td>
<td>0.6673</td>
<td>0.4582</td>
</tr>
<tr>
<td>9</td>
<td>HN-MI</td>
<td>0.0938</td>
<td>0.0938</td>
</tr>
<tr>
<td>10</td>
<td>R</td>
<td>0.825</td>
<td>0.641</td>
</tr>
</tbody>
</table>

we know that the adjustment includes modification of goals, changes in program, increasing social involvement and increasing financial obligations. By the end of second year, for most students, either some satisfactory adjustment has been made or the student drops out. The particular problems and the way in which these problems affect achievement can be ascertained only from direct contact with the individual students. In some instances, especially with bright students, high school was no challenge and as a
consequence the individual might fail to develop good study habits. Or he might assume that since he achieved above average work in high school with a minimum of work, he might do the same in college. Such a person can sometimes get by for a time on his innate ability, but eventually his poor preparation and lack of discipline catches up with him and he begins to flounder. There are other cases where the opposite is true. A person with average or below average ability may have worked hard in high school to achieve an acceptable level for admission to college, only to find college work too much for him. Plant and Richardson (1958), in discussing the IQ of the average college student, have indicated that for freshmen it is 116 and for mixed classes it is 120. Given the social pressure today to attend college, we might expect to find many students whose ability is not adequate for college-level work. These may be very highly motivated at the beginning, only to succumb to discouragement when it becomes increasingly evident that they are unable to meet the challenge of college work.

The problem is obviously complex and cannot be explained in terms of any single variable. We may criticize measures of intelligence on basis of their inadequacy to predict achievement, yet often there is a tacit assumption underlying our criticism that achievement can be explained in terms of a single variable. Although to date we have not had a measure of motivation comparable to most measures of intelligence as regards predictive validity, even the measure used in this study has inevitable limitations despite its remarkable validity. Thus, for example, if a given individual lacks the minimal intelligence necessary for college level work, he may be highly motivated and yet fail to achieve. Hence, in working out
our design, the question arose as to the predictive validity of Story Sequence Analysis with different levels of intelligence. Unfortunately, the shrinkage was such that we can propose only tentative conclusions because of the small numbers in the decile sub-groups.

Although the correlations between MI and GPA for the decile sub-groups show considerable fluctuation over the four year period for all but the upper two groups, the correlations between HN and GPA show even greater fluctuation, even in first year. This may be due to the small size of the decile groups or to certain peculiarities of our sample. At any rate, one would not expect a range from -0.3412 to +0.6310 between intelligence and achievement in first year, and the fluctuation continues through fourth year where the range is from -0.1666 to +0.7869. The two extreme decile groups show consistently the highest HN-GPA correlation until fourth year when the low group breaks down. The next two groups, 51-60 and 71-80, show the greatest variation from the sample mean, with generally negative correlations over the four year period. The median group fluctuates from far below to slightly above the mean.

We emphasize the above correlations between intelligence and achievement because by comparison the correlations between motivation and achievement are relatively stable. It is interesting that the decile group 71-80 which shows consistently negative or low positive correlation between HN and GPA shows the least variation of all the decile sub-groups in correlation between MI and GPA. Further, this was the only group which showed a consistent increase in MI score along with a consistent increase
in MI score along with a consistent increase in GPA from first to fourth year. The other groups all showed a drop in GPA during second year despite an increase in MI, though the 81-100 group also showed a decrease in MI in second year. It is interesting to compare the groups 21-50 and 51-60 on basis of MI and GPA over the four year period. The MI of the lower group rose significantly in third year and again in fourth year, whereas the MI of the higher group rose only slightly in third year and dropped in fourth year, so that those with lower intelligence surpassed those with higher intelligence in third year and nearly equalled them in fourth year.

Many more comparisons could be made with the data presented here, but we should return to the primary purpose of this study, viz., to test the validity of Story Sequence Analysis as a measure of motivation over a four year period. We hypothesized that motivation as measured by this new method is a valid means of predicting academic achievement throughout the four year college period and our results substantiate our hypothesis. We further hypothesized that motivation as measured by this method is more valid as a predictor of academic achievement in any given year than intelligence as measured by the Henmon-Nelson Test of Mental Ability. Again our results substantiate our hypothesis.

As we would expect with high correlations between motivation and achievement and with moderate correlations between intelligence and achievement, the multiple correlations between intelligence-motivation and achievement are highly significant, ranging from 0.878 in first year to 0.668 in third year. The change in trend for fourth year seems due both to change in the population and to the shift in percentage of contribution by HN and
MI in that year. Garvin's multiple correlation is close to ours for the year of testing, 0.865 as compared with 0.878, and the percentage of contribution to R from the measures of intelligence and motivation are likewise similar, at least for first year.

A second feature of this study, related to and derived from the validity of our measure, has to do with the prediction of grade point average for a given individual from first year through fourth year on basis of our measures of intelligence and motivation. Obviously one cannot expect to predict exactly what each individual will achieve, even when the measures have a high degree of predictive validity. Yet, if some estimate could be made, it would serve a useful purpose both for admission and for counseling purposes. Given our statistical data, and given an individual's measure of intelligence and motivation, there are three possible ways of estimating grade point average. To illustrate, we will select five students at random from our sample and show the variations in individual prediction by inspection of the means and standard deviations, by use of the graphs constructed from the multiple linear regression coefficients, and by use of the formula from which the graphs are derived.

An estimate of grade point average in terms of means and standard deviations would utilize the data in rows 1-3 and 4-6 found in Tables 2 to 5 of this chapter. Thus, for example, subject #13 has an intelligence score of 46, and a motivation score of 138. He would fall into the decile group 21-50, and his grade point average would be estimated in terms of the group means of 42.82, 94.18, and 2.0718 for intelligence, motivation, and achievement respectively, in the first year of college. In view of the first year standard deviations of 5.89, 31.65, and 0.3802 for intelligence, motivation,
and achievement respectively, and in view of the percentage contribution of
our measures of intelligence (3.1%) and motivation (57.6%) to the multiple cor-
relation (R = .779; R_c = .742) for this decile group in first year of college,
one can estimate a grade point average of 2.40 for subject #13. Comparing
this GPE with the subject's GPA of 2.22, the residual is only .18. Following
the same procedure with the data from Tables 3, 4, and 5, a prediction can
be made of the GPA for second, third, and fourth year. Comparing the GPE
with the GPA for each of these years, we find the GPE to be: 2.20, 2.70,
and 2.40 compared with the GPA of 2.37, 2.66, and 2.33. The residuals are
-0.17, 0.04, and 0.07 for second, third, and fourth year respectively. It
happens that with subject #13 the inspection method of predicting grade
point average is remarkably accurate, but this is not always the case, as
can be seen from the data in Table 7 comparing the three methods with five
subjects. One reason for the accuracy appears to be the fact that with the
inspection method we are using the decile groups rather than the total group
for each year. Furthermore, the subject chosen to illustrate the application
of the data to prediction of grades contributed 1/17, 1/12, 1/5, and 1/3 to
the decile means in each of the four years. If we were attempting to es-
tablish the reliability of the inspection method rather than merely to
illustrate the application of the method, we would need a subject from
another sample. The same should be said of the two methods described be-
low, although for these methods the total sample data rather than the decile
sub-group data have been used. Since the two methods are based on the use
of the multiple linear regression equation, we will discuss them together.

The general form of the multiple linear regression equation for one
dependent and two independent variables is \( Y' = b_1X_1 + b_2X_2 + A \), where \( b_1 \) and \( b_2 \) are the partial regression coefficients and \( A \) is a constant to be determined. The dependent variable is \( Y' \) and the independent variables are \( X_1 \) and \( X_2 \) respectively. In our analysis \( Y' = \text{GPA}' = \text{the predicted grade point average} \). \( X_1 = \text{HN} = \text{The Henmon-Nelson Score} \). And \( X_2 = \text{the motivation index which is derived from the TAT} \). Thus we may write:

\[
\text{GPA}' = b_1\text{HN} + b_2\text{MI} + A
\]

This will determine, given the \( \text{HN} \) and \( \text{MI} \) values, a plane in three dimensions which will best fit the data used to establish the coefficients and the constants in the least squares sense, that is, the sum of the squares of the deviations from the regression plane is forced to be minimal.

Another way of presenting these data would be to establish a two-dimensional coordinate system by parametrically varying \( \text{GPA}' \) (that is, by allowing it to assume fixed values comparable to the actual grade point average), and by letting \( \text{HN} \) represent the ordinate or \( y \)-axis, and \( \text{MI} \) the abscissa or \( x \)-axis. We could then write the equation above as follows:

\[
\frac{\text{GPA}' - b_2\text{MI} - A}{b_1}
\]

The values that have been determined for the regression analysis give us four equations to predict the \( \text{GPA} \), and these are as follows:

1st year: \( \text{HN} = \frac{\text{GPA}' - 0.012390 \text{MI} - 0.3147}{0.011163} \)

2nd year: \( \text{HN} = \frac{\text{GPA}' - 0.012451 \text{MI} + 0.2550}{0.017482} \)
The results of these equations are found in graphs 1 to 4 for each year respectively. These graphs can be used to predict the grade point average for any given individual in terms of our measures of intelligence and motivation.

To illustrate the use of the graphs with subject number 13, we may take his HN score of 46 and his MI score of 138 to find the intercept GPA' value for each of the four years. These values would be 2.55, 2.25, 2.65, and 2.50 for each of the four years respectively. Comparing these predicted values with his actual grade point average (GPA-GPA), we find residuals of 0.33, -0.12, -0.01, and 0.17 for each of the four years. Further illustrations of the use of the graphs to predict individual grade point average, together with the comparisons of the graph method of prediction with the inspection and formulae methods of prediction, may be found in Table 7.

What we have called the "formula method" of prediction simply consists in converting the above formulae to their original form (GPA' - $b_1$HN + $b_2$MI + A) while retaining the numerical values for $b_1$, $b_2$, and A, and inserting the individual values for intelligence and motivation for the results. As an illustration of the predictive value of this method, we may again take the HN and MI score of subject #13, insert them into the formula with the raw score regression coefficients and the constant for first year,
GRAPH ONE

To be Used for Predicting Grade Point Average in the First Year of College

GPA = 3.5
GPA = 3.0
GPA = 2.5
GPA = 2.0
GPA = 1.5
GPA = 1.0
GRAPH TWO

To Be Used for Predicting Grade Point Average in the Second Year of College
GRAPH THREE

To Be Used for Predicting Grade Point Average in the Third Year of College

GPA = 3.5

GPA = 3.0

GPA = 2.5

GPA = 2.0

GPA = 1.5

GPA = 1.0

Henmon-Nelson Score

MI Score
GRAPH FOUR

To Be Used for Predicting Grade Point Average in the Fourth Year of College

GPA = 3.5
GPA = 3.0
GPA = 2.5
GPA = 2.0
GPA = 1.5
GPA = 1.0
and solve for GPE. Thus the formula reads:

\[ \text{GPA'} = (0.011163)(46) + (0.012390)(138) + 0.3147 \]

\[ \text{GPA'} = 2.538 \]

In like manner, the HN and MI scores would be inserted into the formula with the raw score regression coefficients and the constants from second, third, and fourth year to solve for GPE for those years. The results are 2.267, 2.642, and 2.543 for each year respectively. Theoretically, these scores should be the same, or nearly the same, as the scores from the graph method since both methods are based on the multiple linear regression equation.

When we compare the results of application of these two methods, shown on Table 7, we see that predictions from these two methods are close. Consequently, for all practical purposes, the easier graph method may be substituted for the more exact but more difficult formula method in predicting individual grade point averages.

As regards the use of the inspection method, if only the means and standard deviations are available, one has no choice but to use this method. But it seems inherently less exact than the two methods based on the regression equation, and even though it compares favorably with these methods as regards the data on Table 7, the fact remains that the inspection method provides only a rough estimate of later performance.

As we have indicated above, this research was designed to test the predictive validity of a new method for measuring motivation and to provide a means for predicting individual academic achievement over a four year college period. To the degree that our measure is a valid predictor, the
TABLE 7

Comparison of Predicted Grade Point Estimate (GPE) and Actual Grade Point Average (GPA), by Three Methods of Prediction, with Five Sample Subjects, One Selected at Random from Each Decile Group: (1) Inspection Method; (2) Graph Method; (3) Formula.

<table>
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<th>Subject #13:</th>
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</thead>
<tbody>
<tr>
<td>HN = 46; MI = 138</td>
<td>1st yr.</td>
<td>2nd yr.</td>
<td>3rd yr.</td>
<td>4th yr.</td>
</tr>
<tr>
<td>(1) AN = 46; Mt = 138</td>
<td>GPE - GPA</td>
<td>GPE - GPA</td>
<td>GPE - GPA</td>
<td>GPE - GPA</td>
</tr>
<tr>
<td>Residual:</td>
<td>(.18)</td>
<td>(.17)</td>
<td>(.04)</td>
<td>(.07)</td>
</tr>
<tr>
<td>(2) AN = 46; Mt = 138</td>
<td>2.40 - 2.22</td>
<td>2.20 - 2.37</td>
<td>2.70 - 2.66</td>
<td>2.40 - 2.33</td>
</tr>
<tr>
<td>Residual:</td>
<td>(.33)</td>
<td>(.12)</td>
<td>(.01)</td>
<td>(.17)</td>
</tr>
<tr>
<td>(3) AN = 46; Mt = 138</td>
<td>2.538 - 2.220</td>
<td>2.267 - 2.370</td>
<td>2.642 - 2.660</td>
<td>2.543 - 2.330</td>
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<tr>
<td>Residual:</td>
<td>(.318)</td>
<td>(.103)</td>
<td>(.018)</td>
<td>(.213)</td>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HN = 54; MI = 112</td>
<td>1st yr.</td>
<td>2nd yr.</td>
<td>3rd yr.</td>
<td>4th yr.</td>
</tr>
<tr>
<td>(1) AN = 54; Mt = 112</td>
<td>GPE - GPA</td>
<td>GPE - GPA</td>
<td>GPE - GPA</td>
<td>GPE - GPA</td>
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<tr>
<td>Residual:</td>
<td>(.01)</td>
<td>(.07)</td>
<td>(.03)</td>
<td>(.03)</td>
</tr>
<tr>
<td>(2) AN = 54; Mt = 112</td>
<td>2.20 - 2.19</td>
<td>2.10 - 2.03</td>
<td>2.40 - 2.43</td>
<td>2.50 - 2.53</td>
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<tr>
<td>Residual:</td>
<td>(.06)</td>
<td>(.12)</td>
<td>(.02)</td>
<td>(.08)</td>
</tr>
<tr>
<td>(3) AN = 54; Mt = 112</td>
<td>2.305 - 2.190</td>
<td>2.084 - 2.030</td>
<td>2.419 - 2.430</td>
<td>2.395 - 2.530</td>
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<tr>
<td>Residual:</td>
<td>(.115)</td>
<td>(.054)</td>
<td>(.011)</td>
<td>(.135)</td>
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<table>
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</thead>
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<td>HN = 67; MI = 31</td>
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<td>3rd yr.</td>
<td>4th yr.</td>
</tr>
<tr>
<td>(1) AN = 67; Mt = 31</td>
<td>GPE - GPA</td>
<td>GPE - GPA</td>
<td>GPE - GPA</td>
<td>GPE - GPA</td>
</tr>
<tr>
<td>Residual:</td>
<td>1.70 - 1.89</td>
<td>1.70 - 1.89</td>
<td>1.70 - 1.89</td>
<td>1.70 - 1.89</td>
</tr>
<tr>
<td>(2) AN = 67; Mt = 31</td>
<td>1.70 - 1.89</td>
<td>1.70 - 1.89</td>
<td>1.70 - 1.89</td>
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<tr>
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<td>1.70 - 1.89</td>
<td>1.70 - 1.89</td>
<td>1.70 - 1.89</td>
</tr>
<tr>
<td>(3) AN = 67; Mt = 31</td>
<td>1.447 - 1.890</td>
<td>1.447 - 1.890</td>
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<td>1.447 - 1.890</td>
<td>1.447 - 1.890</td>
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<td>4th yr. GPE - GPA</td>
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<td>-------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>HN = 73; MI = 154</td>
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<tr>
<td>(1)</td>
<td>3.50 - 3.61</td>
<td>3.25 - 3.90</td>
<td>3.65 - 3.94</td>
<td>3.75 - 4.00</td>
</tr>
<tr>
<td>Residual:</td>
<td>(-.11)</td>
<td>(-.65)</td>
<td>(-.29)</td>
<td>(-.25)</td>
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<tr>
<td>(2)</td>
<td>3.15 - 3.61</td>
<td>2.95 - 3.90</td>
<td>3.25 - 3.94</td>
<td>3.35 - 4.00</td>
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<tr>
<td>Residual:</td>
<td>(-.46)</td>
<td>(-.95)</td>
<td>(-.69)</td>
<td>(-.65)</td>
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<tr>
<td>(3)</td>
<td>3.037 - 3.610</td>
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<td>3.161 - 3.94</td>
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<tr>
<td>Residual:</td>
<td>(-.573)</td>
<td>(-.961)</td>
<td>(-.779)</td>
<td>(-.720)</td>
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<table>
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<th>4th yr. GPE - GPA</th>
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</thead>
<tbody>
<tr>
<td>HN = 83; MI = 46</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(1)</td>
<td>1.80 - 1.89</td>
<td>1.60 - 1.76</td>
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<tr>
<td>Residual:</td>
<td>(-.09)</td>
<td>(-.16)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>1.80 - 1.89</td>
<td>1.75 - 1.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual:</td>
<td>(-.09)</td>
<td>(-.01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>1.811 - 1.890</td>
<td>1.769 - 1.760</td>
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<tr>
<td>Residual:</td>
<td>(-.089)</td>
<td>(-.009)</td>
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method or methods for predicting individual achievement are valid. Whether these methods are reliable is a further question and calls for further research with another sample. We have illustrated the use of these methods by taking five subjects from our sample and with their scores for intelligence and motivation, we have given estimates of their achievement.

As we can see from the data in Table 7, the three methods used for prediction are not equally accurate when used with a given set of scores for intelligence and motivation, nor are they equally accurate when used with the scores of different individuals. This is as we would expect simply from what we know of the statistical data. In view of the expected variation, it is remarkable that the residuals are as small as they are for the five illustrative subjects. Except for subject $71$, all of the residuals are within the standard deviation for the total group GPA in a given year.

One interesting feature of the residuals is the tendency to underestimate achievement with all three methods of prediction. Whether this is merely a peculiarity of the sample or a characteristic of the methods cannot be ascertained from our data. Nor does the illustrative sample help us answer the question as to whether the methods are more effective with subjects of low, average, or high intelligence. To answer these questions would require a reliability study with a sample drawn from another comparable population. This would be only one of a series of studies with Story Sequence Analysis in which both validity and reliability could be further established by varying age, sex, and level of education, as well as by varying the criterion of achievement.
Given the limited objectives of this study, it would be unwarranted to generalize the predictive validity of Story Sequence Analysis beyond the male college population and the grade point criterion. Yet from the highly significant results of the present study we may well anticipate comparable results from similar studies using Story Sequence Analysis as a means of measuring motivation in achievement.
CHAPTER V
SUMMARY AND CONCLUSIONS

This study was designed to test the predictive validity of Story Sequence Analysis, a new method for measuring the motivation factor in achievement. A sample of 100 subjects was drawn from a male population of 504 undergraduate students tested at the beginning of their freshman year in college by means of the Henmon-Nelson Test of Mental Ability and the Thematic Apperception Test. The TAT protocols were analyzed and scored according to the method of Story Sequence Analysis. When the analysis was completed, the grade point average from each of the four years in college was obtained for each of the sample-subjects. The material was then programmed and correlations were obtained between intelligence and achievement, motivation and achievement, and intelligence and motivation by use of the Pearson Product Moment Coefficient of Correlation.

Results show validity coefficients of 0.8432, 0.6519, 0.6230, and 0.6104 between motivation and achievement for each of the four years respectively. These results confirm our first hypothesis that motivation as measured by Story Sequence Analysis is a valid means of predicting academic achievement throughout the four years of college. Given the correlations between intelligence and achievement of 0.4445, 0.4480, 0.3399, and 0.4759 for each of the four years respectively, the results
confirm our second hypothesis that the correlation between motivation and achievement will be significantly higher in any given year than the correlation between intelligence and achievement. The multiple correlations with the measures of intelligence and motivation combined and using the same criterion for achievement were 0.878, 0.727, 0.668, and 0.733 for each of the four years respectively.

A second feature of this study, related to and derived from our statistical data, involved the prediction of an individual's grade point average from measures of intelligence and motivation. Graphs were constructed on basis of the multiple linear regression coefficients so that an estimate can be made of the grade point average for an individual student from first through fourth year of college with any given Henmon-Nelson score and any given motivation score. To illustrate the graph method of estimating grade point average, and to compare this method with two other methods, we selected five students at random from the sample and showed the variations in individual prediction.
BIBLIOGRAPHY


Royce, J. E., 1964, Personality and Mental Health, Bruce, Milwaukee.


APPENDIX I

DATA USED IN STATISTICAL CALCULATIONS FOR THIS STUDY

<table>
<thead>
<tr>
<th>Code</th>
<th>Initial</th>
<th>IQ</th>
<th>MI</th>
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<th>2nd yr.</th>
<th>3rd yr.</th>
<th>4th yr.</th>
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<td>192</td>
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<td>8</td>
<td>1.76</td>
<td>1.21</td>
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</tr>
</tbody>
</table>

<p>| 87   | P. K.   | 80 | 112| 2.67    | 2.17    | 2.58    | 2.62    |
| 86   | F. V.   | 80 | 138| 2.92    | 2.92    | 3.29    | --      |
| 85   | R. M.   | 79 | 38 | 1.32    | --      | --      | --      |
| 84   | G. K.   | 78 | 42 | 1.80    | --      | --      | --      |
| 83   | J. O.   | 78 | 119| 2.05    | 1.79    | 2.80    | 2.92    |
| 82   | R. J.   | 77 | 138| 3.03    | 2.62    | 3.41    | 3.29    |
| 81   | E. H.   | 76 | 69 | 1.61    | 1.95    | --      | --      |
| 80   | R. K.   | 76 | 112| 2.48    | --      | --      | --      |
| 79   | D. M.   | 75 | 119| 2.59    | 2.80    | 2.46    | 2.95    |
| 78   | T. P.   | 75 | 115| 2.26    | --      | 2.74    | 2.82    |
| 77   | R. R.   | 75 | 85 | 1.86    | 1.50    | 1.29    | --      |
| 76   | J. S.   | 75 | 100| 2.25    | 1.81    | 1.84    | 1.56    |
| 75   | R. B.   | 74 | 177| 3.11    | 3.19    | --      | 3.71    |
| 74   | R. H.   | 73 | 96 | 2.93    | 2.40    | --      | --      |
| 73   | R. M.   | 73 | 138| 3.06    | 3.28    | 2.87    | 3.26    |
| 72   | W. P.   | 73 | 146| 3.30    | 3.40    | 3.35    | 3.45    |
| 71   | R. R.   | 73 | 154| 3.61    | 3.90    | 3.94    | 4.00    |
| 70   | S. S.   | 72 | 77 | 1.86    | --      | --      | --      |
| 69   | L. K.   | 72 | 115| 2.38    | --      | --      | --      |
| 68   | L. S.   | 71 | 112| 2.69    | 1.96    | 2.35    | 2.11    |
| 67   | J. S.   | 70 | 54 | 1.86    | 1.84    | --      | --      |</p>
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APPENDIX II

FIVE ILLUSTRATIVE TAT
PROTOCOLS, IMPORTS AND SCORES

S.B. (#13) - TAT Stories:

1. Picture #1 is that of a young boy who is placed before a problem of studying when he would rather be outside doing something else. He appears bored with the subject matter and doesn't seem too interested. He is wishing that he could study something that would have more appeal to him. He is in a relatively good background for studying, however, where there are few distractions for him, but he is still not interested in studying. This could be due to the fact that he is tired or needs to let out some steam so that he might be able to do his studies that he knows he is responsible to himself and to others as well as his future. If he doesn't master the violin, he will not make a success of himself and be able to enter into society as a mature man.

2. Picture #2 is a picture of a farm girl who, although she has been raised on a farm, has managed to educate herself. She looks back at her parents laboring on their farm, wondering whether she should remain with them or go out and earn a living free from them in a way that she feels would be better suited to her. The loyalty to her parents is strong, but she must grow to an adult and seek her way in the world for herself. She finally leaves the farm for the city life where she meets new problems. She often thinks that they are too much for her, but she regains her strength and faces up to them and finally conquers them. She wants to succeed but really has doubts about whether it is immediately worthwhile. Finally she does succeed and conquers her problems and becomes a mature person in society. After she accomplishes this she returns to help her parents with the knowledge she has acquired.

4. Picture #4 is a picture of a man and a woman who have had an argument about some matter. The man is angered and turns to leave. The woman, feeling sorry for the things that she said that have offended him, and because she loves him, is trying to apologize to him and regain his friendship. It could be because she really loves him or because she doesn't want to have the man as an enemy. Finally the argument is settled and the man and woman come to terms and are again on good relations which they both really wanted in the first place. They are both happy again and get married and live a normal life with the usual amount of ups and downs.
10. Picture #10 is that of a husband and wife who have just undergone a great hardship, perhaps a loss in the family or an argument between themselves. They seek consolation in each other and feel better because of mutual love and understanding. They are able to live through the apparent crisis and continue living a happy life together. There must be a great deal of love and mutual understanding between them because of their ability to console one another.

11. This picture is very vague. It appears to be an old classic of the Roman times describing one of the myths of the Romans about crossing the river Styx. This seems evident by the serpent and the gloom. The people, if they are people, on the bridge, seem to be dragging along. The picture suggests gloom and unhappiness in the world of Hell. Or it could possibly be people leaving a great tragedy or escaping from a great terror to a more "blue horizon" because of the light across the bridge.

13. This picture is that of a man who has either killed a woman in a sexual crime, or has found his wife or loved one the victim of a murder. He is horrified by the sight of the crime. This could be because of his own guilt or because the loss is too great to endure. He does seem lost, almost as if he would like to lose himself from all reality. He doesn't want to face up to the facts. However, he knows that he must face up to the facts and either, after running from his crime if it is his, return to face his punishment and clear his conscience or, if it was not his crime, he realizes that he must find the culprit and bring that person to his justice.

3. The person looks like she had just met with a suppressing idea. She evidently feels badly about something she has done. She feels like crying to let off her anxiety but this is childish. She feels sorry for herself and falls into despair. However, she comes back to earth and faces reality and discusses her problems with someone and feels much better. She then is able to re-face the everyday problems of life and conquer them.

6. The man in the picture has just told his mother, a widow, that he is no longer going to live with her. He is going to get married. She seems appalled with the idea of being left alone. The son seems to grieve over the fact that he is leaving home and his mother in an unhappy state, but he faces this and realizes that he must think of himself also and that his mother must realize this. He is in love with a girl and wants very much to marry her, however, he still has doubt as to whether or not he should leave his mother and enter into marriage with questions about his, his future wife's, and his mother's future. He does overcome these problems, and marries his girlfriend and lives a happy and guilt-free life while still helping his mother.

7. This is a picture of a father and son talking about the son's future. The son has wanted to talk to his father for a long time, but he
has never felt that he could. Finally he does talk to his father and finds out that his dad is not so hard to talk to. They discuss the idea of marriage and decide that the son will be ready for marriage when he is able to see a prosperous future with some substantial basis for forming the marriage. The young man is mature enough to realize the problems that he will be confronted with and this begins to make himself prepared to provide for his future wife and family so that he will be able to provide a fruitful life for them. Then after he has made the necessary preparation in the economic field, he is able to undertake marriage and marries his fiance and provides his family with a healthy and prosperous life, both in a monetary and spiritual way.

14. The picture is of a young man looking out in the evening to the enveloping night wondering what will happen to him. He wants to become a success and be a son that his father could be proud of but he has doubts that he might not live up to the expectations of his parents. He knows that he must become a man and face the problems that he is confronted with but somehow he is lazy and doesn't conquer the everyday school assignments. However, he finally does accomplish the necessary tasks and gives his father something to be proud of. He becomes a man fit to enter the adult world, and lead his own life happily.

16. This blank card is a picture of the country with a father and his son and dogs just starting a pheasant hunt. The air is fresh, and crisp. A fresh blanket of snow is on the ground. They hunt and the dog finds some birds and the day is prosperous. They get a couple of birds, not the limit, but some, and return home happily. On the way home they talk about the days hunt and look forward to the next time that they will be able to come to the country and hunt again. But for now it is time to come back to the world and live one's life of reality. However, after the hunt they look forward to going home to their family and friends.

17. The picture is of an athlete on his descent after a rope climb. He looks for his time on the scoreboard to see if he did well. His time is not up to par, however, he looks forward to the next meet when he may try for a better time.

20. This is a picture of a man out for a short walk in the late evening. On his walk he ponders the accomplishment and defeats of the day and why he acted the way he did at certain times. He looks forward to the next day and has an optimistic outlook for the future. However, if it is not as good a day tomorrow as he anticipates, he will live the day with little regret, or some, but will look for the next happy day. Stevenson had a quotation which might fit in a vague sense here - "To travel hopefully is better than to arrive."
S.B. (#13) - TAT Imports and Scores:

(1) Despite your advantages, you are simply not interested in the task before you, but you know that you must master it if you are to make a success of yourself.        -1 I  B, 5c

(2) So you go ahead on your own, facing and conquering the problems as they come up, until finally you succeed; and then you return to help your loved ones.          +2 I  B, leiii

(4) And when an argument threatens to break up your relationship, you feel sorry and apologize; so finally things are settled and you are happy again together.     +1 III A, 3c

(10) When your happiness is tried by great hardship, you seek consolation in each other and are able to live through the crisis, continuing a happy life together.    +2 III A, 3c

(11) For people can stay in gloom and unhappiness or put a tragedy behind them and go on to brighter things.         +2 III F, 2a

(13) If you give in to impulse or witness a crime, you may not want to face up to the facts, but you know you must accept the punishment or bring the culprit to justice.       +2 II A, 1a

(3) When you feel bad about something you have done you may feel sorry for yourself, but after discussing your problems with another you feel better and are able to conquer everyday problems.     +2 IV A, 1b

(6) And when you are torn between leaving one who depends on you and leading your own life, you are sad and confused; but you overcome this and leave, so you have a happy life and also help the other.        +2 I  D, 1d

(7) You discuss your situation with someone older and wiser, and then make the necessary preparations for the future, so that you are ready when the time comes to undertake the challenge and provide for others.     +2 III C, 4a

(14) Though you have some doubts about living up to the expectations of others, you know that you must grow up, face everyday problems, and conquer them; and you finally accomplish the necessary tasks so that others are proud of you.    -1 I  A, 3a 1
(16) When you have pleasant experiences with someone you like, you look forward to doing it again though in the meantime you must come back to the real world of family and friends. -1 I B, 7b

(17) But when your performance isn't up to par, you look forward to the next time and trying to do better. -1 I E, 2b

(20) So, at the end of a day you look back over your accomplishments and defeats, and look forward to the next day optimistically. -1 III F, 1b

+15
-5
+10 MI = 138
1. The first picture indicates a boy who could possibly be distressed over the situation of playing a violin. The boy probably previous to this time was enjoying some other activity until called in to practice his violin. Thus we see him sitting at the table with little interest in his task of playing the violin. After a while he probably does take up the instrument and practices, but with little effort put into it. He probably isn't very good at playing the instrument due to his lack of interest.

2. The girl in this picture is of school age and has had previous school training. Her mother and father are of European origin, and not accustomed to schooling or education, unless in the manual area. The father is a hard working farmer who tries to support his family in the only way he knows best. The mother cares for her family and tries to be a good wife and helpmate to her striving husband. They have a daughter whom they wish to have an education. Although they themselves have not had too much education they wish their daughter to be better than they are in life. The daughter seems to be depressed maybe because her parents don't understand that she would like to help them out on the farm so they could live a more relaxed life. She probably feels that her parents have done too much already for her.

4. The situation leading to this probably started because the man in the picture has committed some sort of crime or he feels guilty about some wrong he did. The woman in the picture influenced the man to commit this wrong. Now the man realizes that he should confess his guilt, but the woman, through her feminine ways and cunning, tries to persuade the man not to confess. We see the man fighting his inner convictions with his bodily weakness for the woman. The woman is only interested in her own self-pleasures and not concerned how the man feels inside himself. The man most likely either confesses his wrong and casts off the woman or gives in to her desires and thus is a crushed person.

10. This picture represents a woman who is deeply in love with a man. They probably have had fun together previous to this picture. They have a deep respect and admiration for each other. The woman now is sad and afraid because her husband must go to war. The husband loves this woman deeply but feels compelled to protect her in the best way he knows. He most likely is killed in the way by trying to protect what he believes. The woman, upon learning of his death at first feels must remorse and sadness. Later, as years passed, she realized how noble a person she married and always has a deep reverence for him until the day she dies.

11. The mountains in this picture, due to a landslide, have fallen down on four mountain climbers killing two of them and trapping two. One, however, manages to free himself from this imprisonment and tries to seek
help for the other. In a vain attempt he calls for help but none comes. He tries to remove the rocks to no avail. Finally after complete exhaustion, rescuers come and free the man trapped and also help the other to safety.

13. We see here a doctor who after studying for many years and making many sacrifices has lost a life. The woman who lies in the bed had a disease which science has not found a cure. The doctor who had been treating this person for a long time has come to know this person in a very intimate way. Through all his knowledge and effort he is not able to save her. This is a crushing blow to his lack of knowledge we see here. Although it is no fault of his, the doctor feels a deep helplessness when such a situation takes place.

3. This is a story of a woman who during her life she never received affection from her husband. One night while she was away at work, she came home and found her husband with another woman. Extreme anger filled her and she, in a burst of fit, took a loaded gun from the drawer in the house. She shot both the woman and her husband in this rage. Now she is repenting for having acted rashly. The rest of her life she will regret what she did and most likely will go insane.

6. This is a picture of a son and mother. The mother all through her marriage has tried to rear her son in the best way she could. Now that she has grown older the son and his wife don't want to be bothered in housing his mother. The son is forced by his wife to tell the mother that she must go to an old people's home. The mother is shocked at hearing this. The son doesn't want to put his mother away but, due to nagging and threat of his wife's leaving him, he enforces her wishes. The mother dies of a broken heart in the home and the husband later gets a divorce from his wife or kills her.

7. This is a picture of a father and son. The son is not informed about the facts of life. The father has been afraid all through the boy's life to tell the boy what he should know. The boy himself has led a sheltered life. Now that the boy is in his manhood, the father tries to help the son out. The son, however, due to unpleasant experiences in his youth is afraid of women, etc. The father tries to relate what he did back in his youth. This proves to be fruitless and the boy is left undecided about his state in life. Later, through the help of a close friend, the young man is able to gain the knowledge and lead a normal life.

14. This is a picture of a boy who is going to end his life. He has been rejected by the company who was going to employ him. His wife and eight children are dying of hunger and all hope is lost. His emotional life is in a whirl. He thinks he has failed himself and his family. Just before he jumps he prays to God for forgiveness and then jumps. His wife and family are left without any support. He proved to be a bigger fool than when he was alive.
16. This is a story about a pre med student who has tried to pass his courses but so far has had a bad time. Every test he studies for proves to be fruitless or near it. His future is unsettled whether to continue or give up. In his own mind he wants to, but things prove contrary. He keeps trying, but for how long?

17. This is a story of an emotionally disturbed patient who thinks he is a bell ringer. Every day he tries to get a rope or something like a rope and pretends to ring a bell. He does this because during his youth he was in an auto accident, and his brain was injured. The car was hit by a fire engine whose bells were ringing. All through this he will go on ringing bells because of the damage done. This is a picture of a person who is really one of the most miserable people in the world. A person who has lost his reason and mental knowledge.

20. This is a picture of a gangster who is waiting for a victim to be killed. This person was hired by a mobster who pays to have the work done for him. This person has no morals or sense of right or wrong. All he knows is the animal way to live. In the end, this person is shot down or taken to jail to rot away his life. He could have used his abilities in helping people instead of finding an easy way out.
G.C. (#23) - TAT Imports and Scores:

(1) People who lack interest in a task may fiddle around for a while but will put little effort into it and so will never be very good at it. +2 I F, 2b

(2) Even when loved ones work hard to help you better yourself, this only makes you depressed because you would like to help them and make their life easier. -1 III C, 1a

(4) Though you realize that you should do what is right according to your inner convictions, your emotions may pull you in the opposite direction; but if you give in to your desires you will be ruined. +2 II B, 1a

(10) When duty calls, you may be compelled to separate from someone you love dearly; and though at first there is remorse and sadness, as the years pass the thought of your love will be consoling. +2 IV A, 1b

(11) And when you have tried everything you could think of to no avail, others will come to the rescue and help you to safety. -1 IV A, 1a

(13) Despite all your knowledge and your efforts, you are not able to save them; and this is a crushing blow for you feel a deep helplessness in such a situation. -2 IV A, 4a

(3) Though you may be justly angry, if you give in to impulse and destroy another, you will repent this rash act for the rest of your life and in the end lose out yourself. +2 II A, 1a

(6) And if you listen to selfish advice, giving in to nagging and threats, you will hurt others badly but you will get revenge. -2 IV A, 5c

(7) Parents may be afraid to tell their children what they should know, and though they try their efforts are fruitless; so it is through others that the children gain the knowledge and lead a normal life. -2 I D, 4b

(14) But if you despair when you have failed, you will cause more harm and be a bigger fool. +2 II A, 1b

(16) When your efforts prove almost fruitless, you are unsettled whether to continue or give up; and though you keep trying, you wonder for how long. +1 I A, 1c
(17) An accident may cause you to spend your life in meaningless activity because you are no longer fully human, and you are really one of the most miserable people in the world.  

(20) But if a person has no morals and lives like an animal, in the end he will perish because he tried to find an easy way out instead of using his abilities to help people.
1. The young man looked at the violin sleepily. He hated it. He wanted to smash the blessed thing into a million little pieces so that he'd never have to play it again. Why? The reason for this was so simple: baseball.

He would much rather be out with the gang, playing baseball in the vacant lot across the street. This he enjoyed more than anything else in the world. He was the best hitter in the block, and played first base, where he didn't do so badly either.

He'd play first base, waiting expectantly for the ball and runner to come his way. Oh, how he liked to see the other team lose this game, or any game, for that matter. When it was his turn to bat, there would go a homerun. Just then his mother shook his shoulder and he woke up. He picked up the violin and began to play on it.

2. She would get up early every morning and do her chores. She would milk the cows, feed the chickens, pigs, and other livestock, collect the eggs, and then eat breakfast.

She would then help her father to harness the old plow horse to the plow so that the fields could be tilled by him later in the day.

After this was over, she would go to school and learn all there was to learn there. By mid-afternoon she was finished. She would then walk the four miles back home with an armload of books which her father despised. He felt that a girl shouldn't need any schooling whatsoever. And he saw to it that she did very little homework each night by making her do most of the evening chores. That was why she was still in the 6th grade, and 18 years old.

4. He dreaded the thought of coming home each night. There his wife, beautiful Brunhilda, would nag him constantly. Not once did he ever get a word in edgewise.

When he entered the door each night, she was there, waiting patiently for the friendly peck on the forehead from her husband. But this time he was in no mood to fool around with her. As soon as he picked up his things and got in the door she began to nag and nag. Finally, completely disgusted, he turned his head from her and left her arms, leaving her standing there like a dummy. She couldn't understand it. He never had acted this way before.

And as our hero turned away, he squelched the famous "urge to kill" that so many men have endured from their wives and mothers and mothers-in-law. How he loathed nagging!

10. After a long and peaceful walk discussing their plans after marriage, he took his girl in his arms and held her close, almost crushing her as he kissed her passionately. They broke, and walked towards her front porch. There they sat, holding hands, kissing each other. They were content to stay that way forever. Again, he kissed her and she responded. She pushed her mouth hard against his. Their tongues washed and saliva was
exchanged.
When they broke several minutes later, he once again told her of his continued love for her. He once again outlined plans for their future life together. Although they had not set a date, they knew that they would marry some day soon. He whispered something in her ear, and they both jumped into his car to find a justice of the peace.

11. There it was at last! The crew of the GILGAMESH could see the Treasure of Alpha Centauri before them and dazzling them with its richness of precious stones and metals. A party of four stepped outside in space suits. Suddenly, the men in the cabin heard a sharp scream over the intercom. Rushing over to the television, they saw a gigantic monster come out of a cave to one side of the treasure and devour the men. The captain quickly ordered all guns trained on the cave and gave the command to fire. Scorching fire and heat hit the mountainside. The cave was closed off by molten lava. Everyone left the ship and went after the treasure. Suddenly, the monster once again appeared and devoured them all. The Treasure remains where it has for over 100,000 years because of this "watchdog".

13. The man stood back in horror. Putting his hand to his face he wept, long and hard. Behind him, on the sofa, lay the partially covered body of his wife, killed by his own hand.
Why had he done it? What could have possessed him to do it? Suddenly he knew the answer: He was an inferior. He was no good to anyone at all. He walked over to the dresser, took out a loaded .45 revolver, and placed it against his head. He began to squeeze the trigger. But he couldn't do it - he didn't have the "guts" necessary to take his own life. He dropped the gun on the floor, walked out of the building and onto the street where a speeding auto promptly put an end to his misery.

3. How could she ever tell her parents? They wouldn't understand why she had done a thing such as that. Not their girl, the girl down the street maybe, but not mine.
She had the most miserable time of her life. All alone, now that Johnny had been killed yesterday in that auto crash, she had to face the future. Why had they done that? She asked herself this, but she couldn't tell anyone the reason for their secret act. Her parents would not believe this were she to tell them.
How could she tell her mother and father that she was pregnant? How would they react to that news? And especially to the news that the father was dead. Would they understand why she had allowed herself to go so far? She doubted it. But she must tell them. They would know what to do. She must go to them and tell them that she was expecting a baby - and that the real reason for her act was a consuming passion for love - because she didn't get any from the two she loved most, her mother and father.

6. His mother stood there, bleakly staring out of the window. Marty had just told her the news that he had just enlisted in the Navy, and
was accepted for sea duty. She just stood there, facing the window, hoping that what her little boy had just relayed to her was not true.

But, when he insisted and showed the enlistment papers to her, she sat down in a chair and began to cry. Thoughts ran through her head - why? Why had Marty, her little boy, joined the navy? Didn't he love his mother? And on and on the thoughts went. She thought of many ways to hold him but quickly dismissed them. They wouldn't work, her son was too smart. Suddenly, her heart stopped beating. She slumped to the floor, dead of a heart attack.

Marty ran to her and cried like a baby. The "mama's boy" had lost his mother.

7. The two men were whispering in a corner. One was known as "X", and the other as "F". Both were top flight special agents for their country, the USSR. They had just completed a mission to the US, and they were discussing it in private.

Their mission was to plant several small but very powerful bombs so the key city points in America would be hit. And they had succeeded. These bombs, when exploded, would spray a highly dangerous disease for thousands of feet in all directions, killing everyone instantly. And it was their baby.

But "X" had begun to feel his conscience bother him. And he said so. Suddenly, a member of the FBI walked in and sat down next to them, in the same booth. "X" and "F" shut up. The man looked at them questioningly, and smiled a hello at them. Suddenly, both "X" and "F" started to talk at once. Both of them had called the FBI and let them know of the plot.

14. John wanted to go UP there! He wanted to be free from Mother Earth, and let the world of space take him and show him the many wonders of the universe.

He stared up at the sky through the open window. All he could see was stars - stars in a background of velvety blackness, across which a cloud strayed. He yearned to be free, really free, where God had intended man to be. Out in space. Finally, he gave up and went to bed, but he couldn't get to sleep. He just tossed and turned, endlessly, trying to imagine what space was like, then he finally dozed off. Just then the alarm woke him. He quickly dressed in clear coveralls, and stepped into the waiting van which would take him to his space capsule. John Glen would finally see what space was really like.

16. The crew of the XSL 372J gazed as their ship dropped out of normal space and went into orbit. Although seasoned veterans of space flights, this was the first time that man had penetrated hyper space. All they could think of was the brightness of the outside. Space was black, and hyper was supposed to lack light of any kind. They were filled with a mixture of fear and awe. They were still filled with awe and fear when the ship vaporized, killing all and becoming tiny atoms in hyper space.

17. From his perch he could see everything and everyone below him. He could see the couples necking, petting, and much worse. After all, a 10 year old must learn these things sometime. What better time than when he
is hanging onto a rope in an outdoor theatre, dangling from a roof top, and waiting for a "Donald Duck" cartoon to start.

20. The man leaned against a light pole and lit a cigarette. He pulled the brim of his hat down and his collar up because of the chill present on this night. He leaned back and took a deep drag. Then he heard footsteps behind him. It sounded like a woman in high heeled shoes. He slipped his right hand into his pocket and left it there. He took another drag on the cigarette.

The woman walked along, completely without fear. Just as she was approaching him he turned around and faced her. He smiled - she smiled - they glided into each other's arms and kissed. Evil thoughts went through his mind. Damn her folks anyway! Why can't they let a 22 year old girl out with me? Don't they trust their daughter with me.
(1) You may hate the work and spend your time daydreaming about what you would rather do, but parents wake you up to reality and you apply yourself to the task.

(2) And when parents despise your interests and put every possible obstacle in your way, you make little progress.

(4) So you dread the thought of coming home to their nagging, but they keep it up until you become completely disgusted and walk out on them, squelching the famous "urge to kill."

(10) You may plan your future rationally, only to give in to passion and act on impulse.

(11) Just when it seems that your goal is within reach, disaster strikes and you all perish.

(13) After destroying another, you are horrified by your action and try to destroy yourself; but you lack the courage, so you go your way, only to have an accident put you out of your misery.

(3) When children do wrong and get in trouble, they can expect no understanding from their parents because the real reason for the wrongdoing was the lack of parents' love.

(6) For when they hear the news, they just stand there, hoping it is not true; and when they are convinced that the loss is real, they collapse, so everyone loses in the end.

(7) When your work involves serious harm to others, your conscience begins to bother you and you notify the authorities who can prevent the harm.

(14) You may want to be free and to explore the unknown, and if you are one of the chosen few you will have the opportunity to see what it is really like.

(16) But when you venture into the unknown, your fear and awe are followed by your destruction.
(17) But sometimes you get yourself into a position where you see too much, though you have to learn these things sometime.

(20) Still, you resent the fact that others don't trust you; but you go ahead anyway happily disregarding them.
1. Johnny has been admonished by his parents for not practicing his violin. He has been told that some day he will be a famous musician but Johnny wishes only to go out and play baseball. He is at the present debating whether to flaunt parental authority and go out to play ball or stay and play the violin. Believing that John is a well-balanced child, I believe he stays and practices his violin lesson, rewarded by the knowledge of the fact that the ball game was rained out.

2. Jane returns home from school to visit her father, Jim, and mother, Jane. She has been tempted to quit higher education and marry a farmer. Witnessing her parents slavery to the land she realizes her need to educate herself and become independent. She believes she can also help retire her parents with sufficient money to prevent them from working the rest of their lives. She returns to school, is inspired and graduates. Eventually she earned enough money for herself but not for her parents. Her parents are not despondent but are filled with joy knowing their child is free from slavery to the land.

4. John and Marsha are in a very difficult situation. John is being sought by the police for murder. Marsha has heard police sirens and is afraid for her lover. John leaves to face his destiny and gives himself up. Marsha will not let him go. John fights away from her and is sentenced by the police. John is executed and Marsha mourns for him. After two weeks she has found another man, a pool hustler from New York.

10. Bill comforts Cora, his wife. They have just lost their only son in an airline crash over the Rocky mountains. Cora feels this is the end of the world but Bill has strength and perks up her spirits. Bill and Cora adopt a son from Korea. In the following years they begin the establishment of a home for orphans.

11. A severe nuclear war has caused violent volcanos and eruptions which, in turn, have changed the surface of the earth into a vast pre-historic wasteland. The world now dominated by monsters and wierd forms of plants and animals must retrace previous evolutionary steps to foster the coming of man. Finally, after some two-million years, man has established cities and communities once again. Unfortunately his civilization is again destroyed by inventions of science.

13. Dan has entered his wife's room only to find her naked and dead. After having been out all night on a drunken orgy, he returns to find her lifeless. Dan had been to the neighborhood tavern and had seduced a young woman in a room above. Leaving in the morning, as the woman lay nude on the bed in a manner similar to the position of his wife, Dan strolled merrily home. Here he found his wife raped and dead. Ashamed for his morals, he rushed back to the tavern only to find the woman laying with another man.
Dan pulled out his revolver and shot both the man and woman.

3. Bill is an extremely depressed boy living in the 19th century. He has just exploded into a fit of rage and shot his mother. Wrestling with his conscience, he tries to gather enough courage to end his life also. As he gathers his composure he realizes that he must end it all. Grabbing the gun he pulls the trigger only to find out the gun is now empty. He is later taken away by the police.

6. Bill's mother has claimed she saw a flying saucer. Bill, a scientist, believes she is crazy and out of her mind. Staring blankly at her yard, she sees it again. Bill rushes out to prove to her that it is only a mirage. He is unfortunately run over by the wheels of the space-ship.

7. Ted smiles slightly as he tells Roger that his wife and daughter might meet with an accident if he does not cooperate. Roger ponders his problem trying to decide whether or not he should relinquish the secret plans. After a while he realizes nothing is worth making a martyr of his wife or daughter. He relinquishes the plans.

14. Zoler, an inhabitant of Nepturanite, awoke in the middle of the clay to find a mysterious group of people invading his planet. They came in silver tubes of metal adorned with wing-like structures. Realizing the threat posed by the invaders, Zoler reaches for a disintegrating gun, only to die from suffocation due to lack of nitrogen.

16. Fred and Ethel are in a grocery store buying a loaf of Roman Meal bread. Seeing that they have no money, they proceed to beg the owner to give them a loan. The owner laughs out loud and grabs the loaf of bread. Fred and Ethel leave dejectedly, only to discover a wallet containing enough money to buy the loaf of bread.

17. Bob Rollins, intercollegiate inter-solar rope climbing champ demonstrates his technique to a group of athletic students. Bob advocates rugged conditioning and vigorous coordination exercises for training. Immediately after saying this, he loses his grip and falls flat on his face.

20. Old man Phillips has just been thrown out of the house again. After having been gone for four weeks he returns home only to be thrown out by Stella, his wife. Determined not to let this happen again, Phillips forces his way back in again. Stella has unfortunately left, however, to seek a divorce. Phillips doesn't really care as long as he can stay in his own house.
(1) A person may debate whether to do his work or to play, but if he is well-balanced he will work, rewarded by the knowledge that the chance to play was spoiled by nature. +1 I B, 4d

(2) Though you are tempted to quit your work, you realize it is necessary so you keep at it and succeed, bringing joy to others despite the fact that you could not help them as you had hoped. +2 III E, 2a

(4) Your feelings may interfere for a time with what is right, and though you mourn the loss of a loved one, you find someone to take his place. +1 IV A, 1c

(10) Losing your loved one may seem like the end of the world for you, but with the help of another you can begin again and devote your life to those in need. +2 IV A, 2a

(11) Yet, no matter how much is accomplished, in time the cycle is complete and man's achievements lead to his own destruction. -2 IV A, 4d

(13) For people who give in to impulse lose out in the end, and those who cooperate in wrongdoing will perish. +2 II A, 1b

(3) If you give in to impulse and harm another, you may be frustrated in trying to punish yourself but authorities will step in and take over. +2 II A, 1a

(6) And if you don't take them seriously but try to prove them wrong, you will meet disaster. +2 III A, 5b

(7) So, after thinking things over you realize that nothing is worth bringing harm to your loved ones. +2 III A, 5b

(14) For those who fight violence with violence will perish. +2 III B, 1a

(16) Though others ridicule your privation and make you sad, your luck will help you survive. -1 IV A, 1b

(17) Yet even people who are successful may lose their grip and fall if they are not careful. +2 I B, 3b
(20) So when others rebuff you, you force your way back and don't care what they do so long as they leave you alone.
R.B. (#91) - TAT Stories:

1. Johnny is thinking how wonderful it would be to be able to play the violin. The only trouble is that his family is very poor and the violin cannot be afforded by his parents. Johnny wants it very much and says, "Maybe I could go to work after school to earn the money to pay for this fine instrument." As he is thinking about his troubles, the store manager comes to him and says, "Johnny, you would like that very much wouldn't you? I will let you have it if you promise to come into my store after school and clean up and run errands for me!" Johnny agrees and begins to cry. He then takes the violin and walks proudly home.

2. Though Mary is only 14 years old and Tom, plowing the field, is 23, she is very much in love with him. Mary hates the thought of having to go to school while her loved one is out in the field under the glorious sun. She says to herself, "Why, of why doesn't Tom notice me? Doesn't he realize I have grown up into a young lady? I'm not a tom boy anymore. Even now he doesn't look back to say good-by as I leave for school. Can't he see that I love him very much and would give anything to have him for my own. Maybe he will notice me tomorrow and then I will be happy forever."

3. After seven years of married life Bill tells Nancy that he would like a divorce because he loves another woman. Nancy does not understand how he could do such a thing to her. Over seven years her love for him has grown while his has lessened. She pleads with him to give her another chance but he just about ignores her. The love for her in his heart has gone. Nancy will not give up the only man she ever loved. She won't let go of him. She begs and pleads with him to love her again. She finally wins him over and he agrees to forget this other woman and promises to love Nancy always.

10. It is now the beginning of World War II and Sam, the only son of Mr. and Mrs. Goldberg is leaving to join the fighting men overseas. They are at the train station and he is kissing his mother good-by. His mother loves him very much but she knows that he must go out and defend his country even if it means losing his life. She tries to look brave and fights back her tears. She holds him tightly because she knows that there is a great possibility that she will never be able to hold him again. He kisses her again and boards his train. His mother walks away, never to see her boy again for he is killed serving at the front line.

11. High in the treacherous mountain ranges of Tibet lives the most feared animal in the world today. That animal is the Squank. Size does not matter to him. He will attack anything from an ant to an elephant. Men fear him more than all the guns ever invented. The one and only way of destroying this beast is to rub a piece of kriptanite on his back. Only the bravest of the brave would even dare attempt such a feat. Such a man is Rodney Dangerfield. If any man could kill the Squank it would be Rodney. Rodney sets out on his treacherous climb. Up the mountain he climbs. As he
reaches the level near the Squank he trips and falls to his death on the rocks below. Now there is no one to save the world from the Squank.

13. Jane had come to Dr. Janiss' home. She was pregnant but did not want the baby. She begged him to perform an abortion. When she offered him a sizable amount of money he agreed. While performing this illegal and immoral operation his hand slipped and she began to hemorrhage. There was nothing he could do about it. He tried but to no avail to stop the bleeding. She bled to death. Now Dr. Janiss realizes that all his years in the medical profession have gone for naught. He will never be able to practice again as long as he lives.

3. "Why, O why did I give in to his desires," says Jane. "He said that the only way I could prove that I loved him was to give in to him. He loves me very much, but why did he have to do it. Now I am pregnant and he won't even look at me because he thinks I am just one of the "run of the mill" tramps who goofed and got herself pregnant. He no longer has respect for me and is now telling everyone how he talked me into it. I wish I could die!"

6. John, who is a Roman Catholic, desires to marry Betty, who is a Baptist Negro. He told his mother that he loves Betty very much and would like to marry her. His mother is too shocked to say much. She just turns away from him, shaking with shock. He understands why his mother would be shocked but still loves Betty very much. He then decides that he must leave home if he is to marry Betty. He leaves his home, never to return again.

7. Dave, who is 17 years old, has been called by his father into the study. His father is going to try to tell him about the facts of life. Dave enters, and his father says "Sit down son, there is something I must tell you." The father sits close to the son and attempts to explain that there is a difference between boys and girls. Dave listens quietly for a while and then begins to cry, for what his father told him was very different from what he heard in back alleys, and he leaves the room with a greater appreciation and respect for his sex.

14. Don, at the window, cannot help wondering how he is going to pay the electric bill so they can have their lights turned back on. He is making $32.47 a week and he has seven kids and his wife is constantly sick. There just isn't enough money to pay for food and doctor bills and have some left over for electricity and gas. He feels there is only one way out for him, and that is suicide. He climbs to the window sill and jumps. He forgot that he lived on the ground floor and fell into the petunia patch and then decides to give life another try.

16. Ron and Judy are at the local drive-in. Judy has a reputation for being an easy "make". Should he or shouldn't he try to do some heavy "making out". He sits there for a while and thinks whether or not he should. He puts his arm around her and she nestles up close. All the time
he's thinking "I'll bet this girl would put out nice," but I don't think I should. She, meanwhile, is waiting for him to make his first move. Then he decides (WILL HE OR WON'T HE). He doesn't and nice thinking wins out over dirty thoughts again.

(This story is not necessarily true, the names and some of the facts have been changed to protect the guilty.)

17. John was sleeping and a fire broke out in his room. The only method of escape was by rope. He did not have time to get some clothes on. As the fire is licking at the top of the rope he tries to slide down from the 49th floor of his building. By the time he gets to the bottom he has more rope burns all over his body than he would have had if he had stayed in his room. Only the wastepaper basket burned.

20. It's a foggy day in London town. The British museum has lost its crown. That's why Steel Flint has been called in to find the crown. Only he can see through the thick fog of London. Steel's official title is "Intersellar space, officer candidate intern cadet reserve." Steel spends 45 seconds on the case and locates the crown on the head of the Queen of England. He returns it to the museum and heads back to WLS radio and Mort Crowley.
(1) When you want something very much, you think about your troubles in getting it, but your troubles are solved when someone comes to your rescue and provides it. -1 I B, 1e

(2) But when they don't notice you because you are young, you keep asking yourself why and think that when they notice you you will be happy forever. -1 III A, 5c

(4) Though someone's love for you lessens over the years, you still love them and plead with them so that you finally win them over to promise undying love for you. -1 III B, 2d

(10) But when duty calls and they must leave you, you try to look brave and fight back the tears as you walk away for the last time. -2 III A, 2a ii

(11) For only the bravest of the brave can even hope to survive, and when one is found to attempt the dangerous feat he meets with an accident and falls to his destruction. -2 III F, 2b

(13) And this goes to show that one little slip may lead to ruin and destruction. -1 I B, 4a

(3) But only after the harm is done do you ask yourself why you let yourself be talked into it, for now your reputation is ruined and you are left to pay the penalty. -1 II A, 2b

(6) Though your decision understandably shocks them, nevertheless you decide to go through with your plans, so you leave and never return. -1 I D, 4a ii

(7) When others try to help you, you listen to them and leave with a greater appreciation and respect for them. -1 III C, 2c

(14) But when troubles mount you feel discouraged and try to end it all, though when you fail in your attempt you decide to give it another try. -1 IV A, 3b

(16) You may be tempted to do wrong, but after sitting for a while and thinking about it you decide not to--or so you say. -1 II A, 4a
(17) And when danger threatens you act instinctively to get away, but you suffer more harm in the process than if you had stayed where you were.

(20) Still, with your uncanny ability you can solve the problem within seconds.
APPENDIX III

15 YEAR SURVEY OF LITERATURE ON PREDICTION OF ACADEMIC ACHIEVEMENT IN COLLEGE


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APPROVAL SHEET

The dissertation submitted by Reverend John T. Dulin, S.J. has been read and approved by members of the Department of Psychology.

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

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

February 1, 1968

Date

Signature of Adviser