A FACTOR ANALYTIC STUDY OF THE RELATIONSHIP
BETWEEN ATTITUDINAL VARIABLES
AND ACADEMIC LEARNING

A DISSERTATION
Presented in Partial Fulfillment of the Requirements for the
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The Ohio State University

by
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CHAPTER 1

The Problem in Perspective

Academic learning can be conceptualized as a change in behavior that results from treatment designed to produce such change. This research focuses on the relationship between academic learning and attitudinal variables. Attitude refers to the non-cognitive aspects of personality. The major emphasis of this study is on the contribution of certain of these non-cognitive aspects to the academic learning process. A brief review of psychology's concern with academic learning follows. The bulk of this review centers around attitudinal aspects of learning in an attempt to place the major concern of this research in perspective.

Galton (1897) believed that ability was completely determined by genetic composition, and lamented the fact that no amount of schooling could overcome genetic deficit. Since that time the nature-nurture controversy has received considerable emphasis. As late as 1958 Burt echoes the Galtonian position, but gradually the mainstream of psychological thought has come to agree on the position... Hunt (1961): that heredity sets the limits of intellectual achievement, but environment determines the degree of development within these limits. Although the issue is far
from settled, the question now is no longer how much of each, heredity and environment, but how they combine within the individual to produce various levels of intellectual functioning (Anatasi, 1958).

In recent years other factors besides heredity and environment have been considered to be important contributors to academic achievement. Seashore (1939) added a third factor, work methods, which he defined as patterns of behavior or adjustment employed by the individual as he is making use of his biological equipment in the learning process. He affirmed that physiological limits could be extended by employing appropriate work methods to problems-solving situations. Seashore's basic idea was received by psychologists and educators, and made the basis for study-improvement programs. For example, Robinson's (1961) program evolves from Seashore's work. He divides work methods into "remedial" and "higher level skills" and outlines specific skills and how they are to be employed in study.

Another possible dimension of academic learning is the attitudinal. As stated above attitude refers to the non-cognitive aspects of personality. As Krathwah et al. (1964) note, separation of non-cognitive and cognitive components of the individual is arbitrary; yet seems useful for definition and research. Attitudinal aspects of a person are believed to result from, yet to some degree, define
environment; they seem to be in part inherited, but modifiable. They have a bearing on what work methods are efficient for a particular individual. In a comparative study of the effectiveness of the Brown-Holtzman Survey of Study Habits and Attitudes, and the College Inventory of Academic Adjustment in predicting achievement level, DeSena (1965), found that certain attitudinal factors such as maturity of goals, level of aspiration, set, and personal efficiency may be important in determining achievement level.

Much of the assistance in the form of counseling and other personalized attention given to students with academic difficulties lends implicit support to the premise that attitudinal dispositions may be one of the sources of scholastic difficulty. It seems, however, that these personalized attention approaches have been extremely unsuccessful in raising a student's level of academic achievement.

Moore and Popham (1960) show that counseling seems to have no effect on achievement in terms of grades, but does improve perception of self-concept, which has been found to be related to achievement. The literature on personalized assistance for students in academic difficulty is over-populated with failure to improve grade point average. Chestnut (1965) reviews 15 studies conducted between 1956 and 1963 on the effects of group counseling in raising the grades of underachievers, and only two reported positive
results. A notable exception to this trend is a study by Ofman (1964) who found counseling beneficial to a group of under-achievers. This study not only contained a relevant baseline group, but also expanded the grade point average criterion to include eight semesters.

Since these personalized attempts at assisting students in academic difficulty have not been particularly successful, specific information is needed concerning which, if any, attitudinal variables relate to learning. Before an investigation of these relationships can be approached, however, it is important that certain terms be clarified. Learning, academic learning, academic achievement, and discrepant achievement need to be differentiated before the variables relevant to them can be explicated.

Learning can be viewed as a relatively permanent change in behavior that occurs as a result of practice (Hilgard and Atkinson, 1967 p. 270). In the academic situation learning can be conceptualized as a change in behavior that results from treatment designed to produce such change. Academic achievement, however, is a more global term and is difficult to define. English and English (1958) define academic achievement as "the attained ability to perform school tasks" (p. 6). This definition is somewhat vague and does not clarify the relationship of academic achievement and academic learning. Researchers also seem to have trouble defining academic achievement since in most
research in which academic achievement is used as a criterion, it is defined in terms of grade point average. The problem with this kind of a definition is that grade point average is an extremely contaminated measure. It includes in somewhat confused and vague proportions motivation, application of ability, interpersonal skills, relationship with instructors and a gamut of behaviors that may not be directly related to academic learning. It is difficult, therefore, to speculate the precise relationship between academic learning and academic achievement, and it is also difficult to define either term operationally.

The concept of discrepant achievement has been widely researched. It refers to a difference in actual achievement level and predicted achievement level based on a scholastic aptitude test such as the American College Test (Peters and Plog, 1961). From such comparisons of actual and predicted achievement evolve conceptions of over-under- and normal achievers.

This discrepant achievement research focuses on attitudinal characteristics of learners at various achievement levels. Although the precise relationship between these characteristics of the individual and academic learning is not clear, a knowledge of the discrepant achievement literature enables one to postulate attitudinal variables relevant to learning in an academic setting.
As Taylor (1964) points out, a review of this research on the qualities of over-under- and normal achievers indicates a lack of theoretical orientation to account adequately for those variables which appear to relate to achievement. Comparison of results of different studies in achievement is complicated not only by the absence of a theoretical framework, but also by different criteria used in each study to define over-, under-, and normal achievement. Freshmen first quarter or semester grades are often used, and the adequacy of this criterion to define achievement level is questionable. Since most of the research is atheoretical, the description of the habits and characteristics of students at the various levels of achievement is incomplete if not conflicting.

Berger (1963) found that arts college freshmen who exhibited a willingness to accept limitations, achieve a higher grade point average at the end of their first year. Berger (1961) conducted a literature search which indicated to him that the under-achiever: 1) sets extremely high standards for himself, 2) denies he has put his whole-hearted effort into his scholastic endeavors, and 3) believes he should achieve with little effort, and is unwilling to risk being wrong, being disappointed or doing poorly.

Heilbrun (1962), employing an adjective checklist to predict first year college drop-outs at the University of
Iowa found the drop-outs to be lower in achievement. These drop-outs recorded lower scores on order and endurance scales, and higher scores on a heterosexual scale than those who remained in school. In his research with National Merit Scholarship students Astin (1964) discovered that self-ratings on traits such as scholarship, drive to achieve, persistence, and perseverance were better predictors of scholastic attainment than any combination of the extensive test battery that he employed. In fact, with these high ability students this method even rivaled high school rank for efficiency in predicting college grades.

Astin's findings seem to agree with the fairly well substantiated proposition that one's sense of self-worth is directly related to academic achievement. Studies (Gough 1953, Morgan, 1952, Lum 1960) tend to indicate that the over-achiever is self-confident, adequate as a person, and holds a relatively high opinion of himself. Conversely, the under-achiever is characterized as self-effacing and depressed about his own worth (Shaw et al. 1960, Roth and Meyersburg 1963).

Other research indicates under-achievers to be hostile and aggressive toward authority, and these attitudes seem to stem from unsatisfactory relationships with parents (Shaw and Brown 1957). Powell and Jourard (1963) found that over-achievers are more likely to confide in their peers while under-achievers are more likely to confide in their
parents. They interpreted these results to indicate a failure on the part of the under-achiever to emancipate himself from his parents. The over-achiever, on the other hand, appears to have a good relationship with his parents, who are interested and supportive concerning his academic success.

Taylor (1964) summarizes the salient personality traits that appear to be positively related to levels of achievement: 1) degree to which a student is able to handle anxiety, 2) the value a student places on his own worth, 3) the ability to conform to authority demands, 4) student acceptance by peers, 5) less conflict over independence-dependence, 6) activities centered academic interests, and 7) realism of goals (p. 76).

From this picture it becomes evident that achievement is in part dependent upon the social structure in which the academic setting exists, as well as, the attitudinal composition of the individual. Achievement appears to be dependent to some degree on how the individual responds to his academic setting, on how he perceives himself in relation to it, and in turn on how he thinks he is perceived by the significant others in the academic milieu.

A theoretical framework that encompasses these attitudinal dispositions and that enables one to systematically research them is Rotter's (1954) social learning theory. Social learning theory is the theoretical
orientation for this research, since it provides order for and allows predictions from what has already been empirically demonstrated about academic achievement. Rotter's (1954) work appears to provide a useful framework for future investigations of academic learning.

A Concept of Academic Learning in Terms of Social Learning Theory

A basic premise of Rotter's (1954) social learning theory is that all learning is social and determined not only by individual needs and reinforcement values, but also by the learner's expectancies of reinforcement. Knowledge of an individual's expectancies can be valuable in predicting behavior. The result of Patton's (1966) work suggests that in a counseling situation a client's response to a situation in which a counselor tries to modify the client's behavior depends in part upon the extent to which the content of their discussion is congruent with the client's prior expectations. Patton defines psychological treatment, of which counseling is a part, as a social influence process. He employs Pepinsky's definition (1966) of social influence: "any situation in which one or more persons . . . can be interpreted as acting to modify the beliefs or behavior of one or more other persons" (p. 11). The definition of academic learning proposed in this paper,
behavior change as a result of treatment designed to produce such change, seems consonant with those of Patton (1966) and Pepinsky (1966), and thus hypotheses derived from their work seem applicable in the academic learning situation.

Rotter (1954) affirms that an individual's behaviors are not independent, but belong in functionally related systems. It seems, therefore, that an individual's perceptions concerning his environment and his relationship to it, his generalized expectancies, would be relevant to his particular expectancies and performance in the academic learning situation.

One of the purposes of this research is to determine if the findings of academic learning and achievement research can be better understood and organized in social learning terms; if work in this area can be conducted with this theory as a theoretical framework, and if from this base more accurate predictions can be made.

Academic learning, then, is conceptualized in social learning terms, as a social influence process dependent in part upon the expectancies of the learner. It is postulated that the effects of social influence are in some measure determined by these expectancies. The research is particularly concerned with how the learner's generalized attitudinal expectancies, as measured by instruments relevant to social learning theory, relate to his performance on a traditional academic learning task.
It is hypothesized that individuals who have more optimistic generalized expectancies will carry this optimism into the academic situation and perform at a higher level than those whose generalized expectancies are more pessimistic.
Scores on the following scales, obtained from Ss who participated in the research, were treated as input variables in a factor analytic design: the Srole Anomie Scale (Srole 1956), the Internal-External Locus of Control Scale (Rotter, Seeman, and Liverant 1962; Rotter, 1966), the Marlowe-Crowne Social Desirability Scale (Crowne and Marlowe, 1964), an adaptation of the Myers-Briggs Type Indicator, (Myers, 1962), a pre-test and post-test (Mayo, no date given), difference score on an academic learning task, and a standard score composite on the American College Test (Peters and Plog 1961). A principal components analysis with a varimax rotation (Cooley and Lohnes 1962) was employed. All the measures with the exception of the ACT score were obtained from the subjects during a five week period. The ACT is administered to each student upon his admission to The Ohio State University. These entrance scores were utilized in the study.
The sequence of procedures in securing the data were as follows:

1) Administration of the five attitudinal inventories whose sequence of presentation had been counter-balanced to offset order effects.

2) Administration of a pre-test of 30 multiple choice items covering concepts of psychological measurement.

3) A wait period of two weeks.

4) Presentation of a lecture dealing with concepts of psychological measurement.

5) Immediately following the lecture administration of the post-test of 30 multiple choice items dealing with concepts of psychological measurement. The post-test contained the same items as the pre-test in reversed order.

The Sample

The 163 subjects who participated in this study were undergraduate students at The Ohio State University, and were drawn from the following two groups: (1) 119 subjects from seven sections of an introductory education course which, at the time of this study was required in all undergraduate curricula in the College of Education, and (2) 44 subjects from two sections of beginning psychology.

There were 65 men and 98 women in the total group. Neither course has any pre-requisites so the groups consisted mostly of freshmen and sophomores. To control for possible sex
differences differential coding was used so factors due exclusively to sex could be determined from inspection of the clusters.

Setting

The setting for the administration of all instruments and the lecture was the classroom. All procedures were executed during the regular class sessions, and presented as part of the course. This was done to duplicate as closely as possible the environmental conditions found in the typical academic learning situation. Students were told that they would be examined on the content of the lecture and that this examination would count in their course grade.

Procedure

Before the experimenter appeared at any of the class sessions the instructors informed their students that there would be some research conducted in their classes, that part of it would involve a lecture and an examination and that their score on this examination would be included in their course grade.

The 44 Ss from the beginning psychology class received all the attitudinal measures during one session, followed by the pre-test one week later. After a two week interval a confederate of the experimenter appeared at their classes and gave a 25 minute lecture (appendix 1) and then
administered the post test. The procedure differed for the Ss in the beginning education class only in the fact that they received the pre-test immediately following the attitudinal measures, but they experienced the same length of time as the other group between the pre and post test measures. The instructions given each group (appendix 2) were identical except for variations to make them local to each class situation.

The remarks by the lecturer were identical for all groups. During the course of his presentation he passed out information sheets (appendix 3) illustrating some of the points he was making; the students were allowed to refer to these sheets during the testing.

Ss were able to complete the attitudinal inventories and the pre-test in about 52 minutes; it took them about 20 minutes to complete the post-test.

Hypotheses

The hypotheses in this study are in the form of a factor structure predicted from the input variables. These factors reflect an attitudinal composition, which according to social learning theory, seems relevant to academic learning. The hypothesized factor loadings are shaped by the specific constructs the individual scales are intended to measure.
1. **Factor I (V)** will be a generalized verbal factor. This factor can be defined as an ability to manipulate abstract symbols and to see relationships among them. It is clearly related to what psychologists such as Cronbach (1960) have come to call general verbal intelligence. The loadings on this factor will be:

1.1 American College Test Composite Standard Score
1.2 Pre-test score on the academic learning task
1.3 Post test score on the academic learning task
1.4 Sensing-Intuitive (SN) scale of the adaptation of the Myers-Briggs Type Indicator.

2. **Factor II (C)** will be a sense of control or command factor. An individual who possesses this factor may be characterized as one who is able to understand and order his environment, and has accurate and realistic expectancies concerning the manner in which his behavior will influence it. It seems that an individual who can order his environment, and approach situations realistically will be better able to organize academic tasks to schedule assignments appropriately, and thus to perform more effectively. The loadings on this factor will be:

2.1 Internal-External Locus of Control Scale, negatively loaded
2.2 Judgment-Perception (JP) scale on the adaptation of the Myers-Briggs Type Indicator, negatively loaded
2.3 Thinking-Feeling (TF) scale on the adaptation of the Myers-Briggs Type Indicator, negatively loaded

2.4 Post test score on the academic learning task.

3. Factor III (D) will be an emotional distance factor. It can be described as a feeling of estrangement from the predominant values of the social system. An individual who has high scores on this factor finds the accepted behaviors in his society unreinforcing to himself and his own behavior unreinforced by his society. Since the accepted behavior in the collegiate society is academic success, it would seem the emotionally distant individual is not reinforced by success and the behavior leading up to it. He thus achieves less, as he is less interested and motivated to achieve. The loadings on this factor will be:

3.1 The Srole Anomie Scale
3.2 The Extroversion-Introversion (EI) scale of the adaptation of the Myers-Briggs Type Indicator
3.3 The Marlowe-Crowne Social Desirability Scale, negatively loaded
3.4 Internal-External Locus of Control Scale
3.5 Pre-test score on the academic learning task, negatively loaded
3.6 Post test score on the academic learning task, negatively loaded.
4. **Factor IV (I) will emerge as an intuitive awareness factor.** It reflects an awareness of the possibilities in the environment, a sensitivity toward interpersonal relationships. Awareness and sensitivity to possibilities and people should enable a student to understand what his instructors require, and also to interpret and solve problems in a variety of ways utilizing whatever information he has. The loadings on this factor will be:

4.1 Internal-External Locus of Control Scale, negatively loaded
4.2 Sensing-Intuiting (SN) scale on the adaptation of the Myers-Briggs Type Indicator
4.3 The Marlowe-Crowne Social Desirability Scale
4.4 Post test score on the academic learning task
4.5 Pre-test score on the academic learning task.

5. **Factor V (A) will be an approval aspiration cluster that reflects a striving for reinforcement.** It characterizes individuals who try to use their awareness of the environment to gain acceptance. In the academic community one means of acceptance is scholastic success; therefore, it would appear that those with this need for approval would be high achievers. The loadings on this factor will be:

5.1 The Marlowe-Crowne Social Desirability Scale
5.2 The Srole Anomie Scale, negatively loaded
5.3 The Extroversion-Introversion (EI) scale of the adaptation of the Myers-Briggs Type Indicator,
negatively loaded

5.4 The post test score.

Measures of the Variables

The measurement of the variables was accomplished by administration of the following instruments: The Srole Anomie Scale (Srole, 1956), Internal-External Locus of Control Scale (Rotter, Seeman, and Liverant 1962; Rotter, 1966), The Marlowe-Crowne Social Desirability Scale (Crowne and Marlowe, 1964), an adaptation of the Myers-Briggs Type Indicator (Myers, 1962), and an adaptation of the Mayo Test of Teacher Competency in Measurement Test (Mayo, no date given). Each of these instruments and the method of scoring them is reproduced in full in Appendix 4, A-F. The instruments, the variables they purport to measure, the rationale for their use in this study and predictions made from them will now be reviewed.

Anomie

Durkheim (1897) in his classic work on suicide delineated the basic concept of anomie which has characterized more precise definitions and empirical investigations on the topic during the last seventy years. He discusses three types of suicide, the last being anomic which occurs as a result of the individual being unable to integrate himself into the society. Although Durkheim's emphasis
was sociological, indicating that society created no place for a particular individual, the concept can be conceptualized in psychological terms. An anomic individual can be viewed as a person who experiences anxiety, isolation and purposelessness, who finds his particular social system void of any meaning. While societies may be classified as anomic, so may individuals, even within the most stable and cohesive appearing groups. To use Reisman's (1950) terms the individual is neither a successful conformist who has adjusted, nor an autonomous being who is capable of such an adjustment, but rejects it, but rather an anomic person incapable of conforming. Popular literature today treats these concepts with labels such as the fragmented society or the alienated individual, but the meanings seem essentially the same.

Seeman (1959) conceptualizes five dimensions of anomie and has defined them in the language of Rotter's social learning theory. His dimensions and their definitions are: 1) normlessness, ... "a high expectancy that socially unapproved behaviors are required to achieve goals;" 2) meaningless ... "a low expectancy that satisfactory predictions about future outcomes of behavior can be made;" 3) isolation ... assigning low reward value to goals or beliefs that are typically highly valued in a given society;" 4) self-estrangement, ... "the degree of dependence of a given behavior upon future anticipated
rewards;" and 5) powerlessness . . . "the expectancy or probability held by the individual that his own behavior cannot determine the occurrence of the outcomes or reinforcements he seeks" (p. 784-790).

In this study anomie is conceptualized as meaninglessness and isolation in the sense of Seeman's second and third definitions. While any such dimensions are arbitrary, and imputation of cause and effect is not intended, these concepts of meaninglessness and isolation define a type of alienation or anomic state that is hypothesized to be related to learning in the academic setting. Since this academic setting can be viewed as a highly structured social system, which reflects the social system of the culture in which it exists, it seems reasonable to hypothesize that individuals alienated from the mainstream of values in this specific system or the general culture will not be successful in performing the tasks prescribed by academe. Leckie (1960) found a self-image of competence was inversely related to anomie, and as stated earlier (Taylor 1964) self-concept is positively related to achievement level.

The instrument chosen to indicate the degree of anomie being experienced by the subjects is the Srole Anomie Scale (Srole 1956, appendix 4-A). This scale consists of 7 items and the form used here employs a True-False format. Streuning and Richardson (1965) conducted a factor analytic
study of this scale, and concluded it is unidimensional and reflects a continuum from self-to-other belongingness to self-to-other alienation. This study suggests that the Srole Scale is primarily a measure of a pessimistic worldview. These two interpretations of alienation are consonant with anomie as isolation and meaninglessness. An inspection of the individual items lends face validity to this assertion.

In studies using the Srole Scale, Bell (1957) found a strong negative relationship between anomie and informal interaction with fellow workers, friends and others, and Rose (1959), a similar correlation between anomie and social participation. McDill (1961) found a positive correlation between anomie and negativeness of world view, and distrustfulness of other people. In general this research indicates a negative relationship between anomie and interpersonal relationships and social skills. It was noted earlier that these skills or lack of them may be variables in determining grade point average, a universal measure of achievement level.

The factor loadings of this variable were hypothesized on the basis of this conception of anomie as isolation and meaninglessness, the contents of the Srole Scale, and the research surrounding it. It was predicted that anomie will load positively on Factor III (D) emotional distance which is hypothesized to be inversely related to learning, and
negatively on Factor V (A) approval aspiration which is hypothesized to relate positively to learning.

Internal-External Locus of Control

As Lefcourt (1966) indicates a great deal of research following from diverse theoretical orientations has been concerned with "the degree to which an individual is able to control important events occurring in his life space" (p. 206). An expanding body of research surrounds Rotter's (Rotter, Seeman and Liverant, 1962; Rotter, 1966) conception of locus of control derived from the expectancy hypothesis of social learning theory. The control dimension distributes individuals according to the degree to which they accept personal responsibility for what happens to them (Rotter, Seeman and Liverant, 1962). Lefcourt (1966) summarizes the concept as follows:

internal control refers to the perception of positive and/or negative events as being a consequence of one's own actions and thereby under personal control, external control refers to the perception of positive and/or negative events as being unrelated to one's own behaviors in certain situations and therefore beyond personal control (p. 207).

The concept has been investigated from two viewpoints: in the first the task is labeled by the experimenter for the Ss with a specific control expectancy; in the second control is viewed as a generalized expectancy or characteristic of the individual. The second meaning of the dimension, as generalized expectancy, is employed in this
study, as the task is academic and can be assumed to be regarded by most of the Ss as a skill task. That the two meanings relate, however, is indicated by James (1957) who showed that externals differed from internals in the same way that overall populations differed with chance and with skill instructions. The empirical development of the construct can be seen by reviewing the research of Rotter, his students, and colleagues.

Rotter (1966) indicates that an individual who believes he can control his own destiny is more alert to those aspects of his environment which provide useful information for his future behavior. Seeman and Evans (1962) utilizing a shortened version of the I-E scale and characterizing the I-E dimension as powerlessness found hospitalized TB patients, who were externals, had less objective knowledge about their own conditions, as evidenced by ward behavior and independent ratings by staff members. Seeman (1963) found reformatory inmates who were lower on the external scale retained more highly relevant information on factors related to achieving successful parole. There was no difference, however, between the high and low externals on amount of relevant information retained on factors concerning the reformatory setting, and long range prospects for a noncriminal career. As Lefcourt (1966) points out these findings indicate the importance of values as well as expectancies for making differential predictions
Rotter (1966) states that internals place greater value on skill and achievement reinforcements, and are generally more concerned with ability. He hypothesizes, however, that in the academic college environment the relationship between internal orientation and achievement is not clear-cut. He speculates that many people, particularly males, become externals as a means of defense, and are really highly competitive in specific situations such as those offered by highly structured academic achievement situations. The strength of the relationship between internal orientation and achievement striving is still in doubt, and to compound the uncleanness of the relationship the range of internal and external control attitudes in the college student population is somewhat restricted. The work of Franklin (1963) and Efran (1963) with high school students seems to substantiate this relationship, as does the work of Rotter and Mulry (1965).

Locus of control then seems a relevant if somewhat unclear attitudinal variable in academic learning, and in need of further investigation. The I-E Scale as developed by Rotter, Seeman and Liverant (Rotter, 1966, appendix 4-B) was chosen as the instrument for this investigation as it evolved from social learning theory, and the research upon which the hypotheses are based has utilized this scale and its variants.
Based on this conception of the locus of control dimension, as defined by the I-E Scale, it was hypothesized that the scale, with external orientation scored as high, would load negatively on Factor II (C) control and on Factor IV (I) intuitive awareness, and positively on Factor III (D) emotional distance. These hypotheses do not seem to contradict any of the theoretical underpinnings of social learning theory, or the findings of the research reviewed above.

Social Desirability

The origin of the concept of social desirability can be traced to the early decades of the century, to beginning work in personality assessment and research. As Crowne and Marlowe (1964) point out: "it is an observation of very long standing that scores on personality questionnaires are influenced by factors other than the manifest content of the items" (p. 3). The long standing problem of interpreting derived measures of any kind becomes accentuated when the measures are instruments of personality assessment. The problems of response set, factors other than item content influencing scores, have come to be systematically investigated in the last twenty years. Cronbach (1946, 1950) began to show how the S's interpretations of items, the test itself and the testing situation can influence individual scores.
Response sets can be induced (McClelland et al. 1953), or may be the result of a pre-determined attitude on the part of the subject. Common response sets which have received a great deal of attention are yea-saying and nay-saying, but the most thoroughly investigated response set is social desirability.

Edwards (1953, 1957) has done some pioneering and convincing work in investigating and substantiating social desirability as a meaningful phenomenon in determining behavior in the test taking situation. He defines the social desirability of an item as its tendency to elicit a favorable response. He asked judges to rate items as to their degree of social desirability and found a high positive correlation, \( r = .87 \), between these ratings and probability of endorsement by subjects in a testing situation. He maintains that regardless of item content, it is possible to describe each item on a personality instrument in terms of its position on the social desirability continuum.

Edwards (1957) devised a social desirability scale, consisting of such items as those from the MMPI validation scales, to determine the degree of an individual's approval need, his social desirability. Marlowe and Crowne (Crowne and Marlowe, 1964) devised their own scale, believing that since the Edwards scale was derived from clinical scales it was difficult to determine from a particular score whether
the individual was simply normal, or pathological with high social desirability. The criteria for the Marlowe-Crowne Scale were: items that possessed clear-cut cultural approval; yet, would be virtually untrue of everyone in the population, and have minimum abnormal or pathological implications. Social desirability then is not error variance, but valid variance, and useful in understanding and predicting behavior.

The basic orientation to which the rationale and usefulness of the Marlowe-Crowne Scale belongs is social learning theory. The authors of this scale believe that concepts useful in explaining behavior in other contexts are useful in explaining behaviors in the test taking situation. The social learning theory premises of needs, expectancies, and reinforcements apply to the testing situation. Social desirability, which reflects need for approval can be understood in social learning theory terms. It seems feasible that social desirability as determined in the testing situation might contribute to the explanation of generalized behaviors, expectancies, and reinforcement values. To have an estimate of an individual's need for approval should increase accuracy of behavior prediction.

In the academic setting Middletown and Guthrie (1959) conclude that over-achiever's achievement is motivated by social acceptance, Merrill and Murphy (1959) and others assert that the over-achiever attempts to create favorable
impressions and is eager to please. Lichtman and Julian (1964) found a significant negative relationship between the Marlowe-Crowne Social Desirability Scale and the Internal-External Locus of Control Scale, and a negative, but non-significant relationship between the Locus of Control Scale, and a need achievement measure. This work indicates the possibility of a positive relationship between achievement and social desirability as measured by this scale.

Social desirability then seems to be a substantiated construct, that can be placed in the social learning theory framework, that can be useful for prediction, and that shows promise as an attitudinal variable related to learning in the academic setting. The hypotheses concerning the factors upon which social desirability will load seem consistent with the above review. Social desirability is hypothesized to load positively on Factor IV (I) intuitive awareness, and Factor V, (A) approval aspiration, and load negatively on Factor III (D) emotional distance.

Personality Typing

The Myers-Briggs Type Indicator as an instrument of attitudinal assessment has proved empirically useful, but does not fit into the social learning framework of this study. In point of fact it does not bear out its own theoretical orientation, Jungian typology. It is employed in
this research however, for exploratory purposes as it does seem to relate empirically to aptitude and achievement and is a useful device in its own right, although its theoretical underpinnings are not congruent with what the items seem to measure.

The basic premise of this instrument (Myers, 1962) is that much apparent random behavior is consistent and can be accounted for by certain basic differences in the manner individuals prefer to exercise perception and judgment. Perception is broadly defined as the process of becoming aware of people, events, or ideas, while judgment is defined as coming to conclusions about people, events, or ideas.

The manual (Myers, 1962) states that the four scales each represent a dichotomous variable, and that these four scales interact in a complex manner relating to behavior. As Mendelsohn (1965) points out there is no proof for either of these assumptions and that . . . "it appears that the scales measure only limited aspects of their underlying constructs, and that all the data support the argument that interpretations based on item content are more accurate and parsimonious" (p. 147). In this study then the scales are treated as continuous rather than dichotomous variables, and were scored in such a way that high positive scores refer to the second letter, for example, P, and low negative scores refer to the first letter, for example, J. The scales and what they empirically appear to measure are:
Judgment-Perception (JP) a preference for order and planning as opposed to spontaneity and novelty.

Extroversion-Introversion (EI) having to do with an ease and liking for interpersonal contact, as opposed to discomfort in that type of a situation.

Sensing-Intuitive (SN) a preference for the practical and conventional as opposed to the ideational or the theoretical.

Thinking-Feeling (TF) a preference for a legalistic rational approach as opposed to a humanistic sympathetic one.

Logically the predictions made about how these scales will load seem sound, and there has been some research which lends support to these hypotheses. Ross (1961) found that students with J scores were rated as thorough, responsible and steady. Myers (1962) reports studies with National Merit Scholarship Finalists which describe the scholastic aptitude of the types. Intuitives and introverts as measured by these scales seem to occur with greater frequency within the gifted group. Studies quoted by Myers (1962) indicate that J students have lower aptitude than P students, but higher grade point averages indicating that Js seem to apply themselves more in their school work.

The hypothesized loadings for these scales are: positive loadings for the SN scale on Factor I (V) verbal, for the EI scale on Factor III (D) emotional distance, and
for the SN scale on Factor IV (I) intuitive awareness, and negative loadings for the JP and TF scales on Factor II (C) control. Time limitations made it necessary to shorten the test so that it consists of 95 items rather than the 166 on the original Myers-Briggs. These 95, however, represent all the scorable items on the original form, and it is believed these items will give some general indications of the relevance of these variables to academic learning.

The Academic Learning Task

To measure competence in the academic learning task, an adaptation of the Mayo Test of Teacher Competence in Measurement, Forms A and B (Mayo, no date given) was employed. In personal communication with Dr. Mayo it was learned that the items on this test, when factor analyzed gave high verbal loadings, and thus seem appropriate as a criterion measure for an academic task. The items on this test were based on items from a similar test published by the National Council on Measurement in Education (Ebel 1962). For the purpose of this study 30 items were selected and administered as a pre-test (appendix 4-E); these same items in reversed order were then administered after the lecture as the post test (appendix 4-F).
Analysis of Data

Twenty-five subjects were eliminated from the original sample due to the fact that there was no American College Test score available. Item 94 on the adaptation of the Myers-Briggs Type Indicator was eliminated due to a typographical error in its preparation.

A principal components factor analysis, with 1.00 in each diagonal entry and a varimax rotation was employed (Cooley and Lohnes 1962). The input design requested six factors in an attempt to demonstrate the possible existence of any clear-cut factors beyond the five hypothesized.
CHAPTER III

Results and Discussion

As noted in Chapter 2 all the variables with the exception of Sex (1) were treated as continuous and scored accordingly. The variables which contain two attitudinal positions, Internal-External Locus of Control (7), Extroversion-Introversion (9), Sensing-Intuiting (10), Thinking-Feeling (11) and Judgment-Perception (12), were also scored as continuous variables. A perfect score on the first term in each pair is represented by a 0; a perfect score on the second term in each pair is represented by the highest number of points on the scale. Thus a high negative factor loading for any of these 5 variables is in reality a high positive loading for the first named term in the pair. Conversely, a high positive factor loading for any of these 5 variables is a high positive loading for the second named term in the pair. High negative loadings then indicate Internal (7), Extrovert (9), Sensing (10), Thinking (11), and Judgment (12) orientations. High positive loadings indicate

\*The Arabic numeral in parentheses after each variable denotes the position of that variable in the matrix.
External (7), Introvert (9), Intuiting (10), Feeling (11), and Perception (12) orientations.

The remaining variables, ACT (2), Pre-Test (3), Post Test (4), Difference Score (5), Anomie (6), and Social Desirability (8), represent one continuous dimension and are scored from low to high. The loadings of these variables then are directly proportional to the strength of their relationship to the factor upon which they load.

The results, based on these scoring procedures, will be discussed in terms of 1) the nature of the distributions, 2) the rotated factor loadings, and 3) a comparison between predicted and obtained factors.

The Nature of the Distributions

Table 1 presents the mean, standard deviation, skewness and kurtosis, as well as the standard deviation for the distributions of each of the 12 input variables. Of these 12 distributions five differ significantly from normal.

Sex (1), Anomie (6), Extroversion-Introversion (9), and Thinking-Feeling (11) are distributions whose skewness differs significantly from normal. The positive skewness of the sex variable is explained by the fact that part of the sample was drawn from a beginning education course which has a predominantly female enrollment. Sex (1) was coded 0 for female and 1 for male. Although there is a
significantly greater proportion of females in the sample, this does not necessarily negate the results for males. The coding allows one to determine whether sex is an important variable in the composition of any given factor. A high positive loading indicates that the factor can be interpreted as a predominantly male phenomenon; a high negative loading indicates that the factor can be interpreted as a predominantly female phenomenon.

Anomie (6) has high positive skewness with a mean of only 1.718 on a 7 point scale. While this distribution is not normal in a statistical sense, it is to be anticipated in a collegiate population. In general, it seems logical to assume that the majority of college students do not feel isolated from society, and do not at this stage of their lives possess a particularly pessimistic view of the world. A quite different distribution would have been likely if the sample had consisted of extreme intellectuals or dropouts.

The Extroversion-Introversion (9) distribution also has significant positive skewness indicating that there are in the sample significantly more extroverts than introverts. Again this finding seems commensurate with the nature of the individuals in the sample. Extroverts, according to the theory of the test (Myers, 1962) and the empirical results obtained from its use (Mendelsohn, 1965) seem to
**TABLE 1**

**MOMENTS OF THE DISTRIBUTIONS**

<table>
<thead>
<tr>
<th>VARIABLE NO. NAME</th>
<th>MEAN</th>
<th>SE</th>
<th>ST DEV</th>
<th>SE</th>
<th>SKEWNESS</th>
<th>KURTOSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 SEX</td>
<td>0.399</td>
<td>0.038</td>
<td>0.491</td>
<td>0.007</td>
<td>0.417*</td>
<td>-1.849**</td>
</tr>
<tr>
<td>2 ACT</td>
<td>21.350</td>
<td>0.324</td>
<td>4.134</td>
<td>0.202</td>
<td>-0.213</td>
<td>-0.444</td>
</tr>
<tr>
<td>3 PRE</td>
<td>11.982</td>
<td>0.265</td>
<td>3.380</td>
<td>0.194</td>
<td>0.323</td>
<td>0.149</td>
</tr>
<tr>
<td>4 POST</td>
<td>18.294</td>
<td>0.341</td>
<td>4.347</td>
<td>0.233</td>
<td>-0.283</td>
<td>-0.128</td>
</tr>
<tr>
<td>5 DIFF</td>
<td>6.282</td>
<td>0.296</td>
<td>3.779</td>
<td>0.219</td>
<td>0.196</td>
<td>0.180</td>
</tr>
<tr>
<td>6 ANOMIE</td>
<td>1.718</td>
<td>0.122</td>
<td>1.558</td>
<td>0.068</td>
<td>0.560**</td>
<td>-0.759*</td>
</tr>
<tr>
<td>7 IE</td>
<td>9.436</td>
<td>0.338</td>
<td>4.309</td>
<td>0.209</td>
<td>0.267</td>
<td>-0.464</td>
</tr>
<tr>
<td>8 SD</td>
<td>16.442</td>
<td>0.456</td>
<td>5.817</td>
<td>0.278</td>
<td>-0.170</td>
<td>-0.516</td>
</tr>
<tr>
<td>9 El</td>
<td>17.982</td>
<td>0.906</td>
<td>11.571</td>
<td>0.560</td>
<td>0.589**</td>
<td>-0.473</td>
</tr>
<tr>
<td>10 SN</td>
<td>29.773</td>
<td>0.994</td>
<td>12.693</td>
<td>0.560</td>
<td>0.023</td>
<td>-0.732</td>
</tr>
<tr>
<td>11 TF</td>
<td>31.239</td>
<td>0.956</td>
<td>12.229</td>
<td>0.563</td>
<td>-0.400*</td>
<td>-0.618</td>
</tr>
<tr>
<td>12 JP</td>
<td>24.344</td>
<td>0.920</td>
<td>11.750</td>
<td>0.512</td>
<td>0.329</td>
<td>-0.764*</td>
</tr>
</tbody>
</table>

SE - SKEWNESS = 0.190
SE - KURTOSIS = 0.378

* SIGNIFICANT AT .05 LEVEL
** SIGNIFICANT AT .01 LEVEL
turn their judgments or perceptions toward people rather than ideas and seem comfortable in interpersonal situations. This type of behavior seems characteristic of college students in a vocationally oriented institution, such as the one from which the Ss were drawn.

The Thinking-Feeling (11) distribution has a significant negative skewness indicating Ss possess a more sympathetic supportive approach to life rather than a rational legalistic one. This may reflect to some degree the higher number of females in the sample. It seems that the Ss are concerned with feelings rather than analysis of facts; this attitude is also mirrored in the slight but non-significant negative skewness of the Social Desirability (8) distribution.

Sex (1), Anomie (6), and Judgment-Perception (12) show significant kurtosis, all being platykurtic. The kurtosis of the Sex distribution is explained by the dichotomous nature of the variable and the majority of females in the sample.

Anomie (6) as shown in other studies does not distribute normally; few people have high scores on this variable and thus the curve possess platykurtosis. The platykurtic nature of the Judgment-Perception (12) distribution seems in part to be due to the manner in which the Myers-Briggs is constructed. The theory of the test regards the
variables as dichotomous, JP being the major dichotomy. Even continuous scoring is devised in such a way that no score can be exactly in the middle of the distribution. One has to score as either a J or a P, not a combination. The extreme flatness of this curve, however, seems to indicate that there were few scores around the mean, and that most Ss scored rather decidedly as either a J or a P.

The scores obtained by the Ss produce distributions which do not deviate significantly from normal with the exception of the cases noted above. The exceptions are commensurate with the type of population from which the sample was drawn, and agree with the results of previous research using these instruments.

The Loadings of the Rotated Factors

Table 2 presents the intercorrelation matrix which was factored. An examination of this matrix gives an over-all picture of the interrelationships among the twelve variables. Correlations of \( r = .202 \) or above are significant at the .01 level of confidence; correlations of \( r = .155 \) or above are significant at the .05 level of confidence. The significant correlations are indicated in the table.

The intercorrelation matrix was factor analyzed by computer, employing a principle components analysis with 1.000 in each diagonal entry. A varimax rotation was
<table>
<thead>
<tr>
<th>VARIABLE NO. NAME</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 SEX</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 ACT</td>
<td>-0.087</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 PRE</td>
<td>-0.029</td>
<td>0.451**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 POST</td>
<td>0.040</td>
<td>0.571**</td>
<td>0.537**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 DIFF</td>
<td>0.079</td>
<td>0.260**</td>
<td>-0.263**</td>
<td>0.567**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 ANOMIE</td>
<td>0.051</td>
<td>-0.167*</td>
<td>-0.170*</td>
<td>-0.070</td>
<td>0.077</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 IE</td>
<td>-0.085</td>
<td>-0.142</td>
<td>-0.185*</td>
<td>-0.153</td>
<td>-0.003</td>
<td>0.38**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 SD</td>
<td>-0.135</td>
<td>-0.157*</td>
<td>-0.046</td>
<td>-0.160*</td>
<td>-0.148</td>
<td>-0.152</td>
<td>-0.294**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 SI</td>
<td>0.201*</td>
<td>0.065</td>
<td>0.033</td>
<td>0.095</td>
<td>0.078</td>
<td>0.109</td>
<td>0.105</td>
<td>-0.203**</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 SN</td>
<td>-0.090</td>
<td>0.329**</td>
<td>0.117</td>
<td>0.255**</td>
<td>0.133</td>
<td>-0.227**</td>
<td>0.071</td>
<td>0.045</td>
<td>-0.122</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 TF</td>
<td>-0.466**</td>
<td>0.038</td>
<td>0.045</td>
<td>-0.001</td>
<td>-0.023</td>
<td>-0.032</td>
<td>0.167*</td>
<td>0.093</td>
<td>-0.154</td>
<td>0.196**</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>12 JP</td>
<td>-0.072</td>
<td>0.032</td>
<td>-0.150</td>
<td>-0.027</td>
<td>0.099</td>
<td>0.003</td>
<td>0.321**</td>
<td>-0.163*</td>
<td>-0.033</td>
<td>0.407**</td>
<td>0.221**</td>
<td>1.000</td>
</tr>
</tbody>
</table>

* SIGNIFICANT AT .05 LEVEL
** SIGNIFICANT AT .01 LEVEL
utilized. The results of this analysis and a discussion of the rotated factors follows.

Table 3 represents the rotated factor matrix with communalities and eigenvalues indicated. The program submitted for analysis limited the output to six factors. Rotated factors are indicated by Arabic numerals as opposed to Roman numerals used to label the predicted factors.

The first factor shows high loadings on ACT (2), 0.741, Pre-Test (3), 0.907, and Post Test (4), 0.691. It is distinguished by a moderately high loading on Sensing-Intuiting (10) of 0.274, and a negligible loading on the Difference Score (5) of 0.007. This factor is labeled as Factor 1 (V) Verbal.

The signs of Factor 2 (D) Emotional Distance have been reflected for clarity of explanation. This factor contains high loadings from Anomie (6) of 0.853, and Internal-External Locus of Control (7) of 0.802. Social Desirability (8) has a moderately negative loading, -0.374. Sex (1) and Thinking-Feeling (11) with loadings of -0.854, and 0.819 respectively account for the significant loadings on Factor 3. This factor seems to represent feeling orientation as related to being female; and it is difficult to label more precisely than simply female feeling.

Factor 4, (RP) Regression Phenomenon is distinguished by an extremely high loading, 0.987, on the Difference
### TABLE 3

**ROTATED FACTOR MATRIX LOADINGS**

<table>
<thead>
<tr>
<th>VARIABLE NO. NAME</th>
<th>COMMUNALITY 6 FACTORS</th>
<th>COMMUNALITY</th>
<th>Dᵃ</th>
<th>EMOTIONAL DISTANCE</th>
<th>FF</th>
<th>FEMALE FEELING</th>
<th>RP</th>
<th>REGRESSION PHENOMENON</th>
<th>CA</th>
<th>CONCRETE ANALYTICAL</th>
<th>EA²</th>
<th>EXTROVERT APPROVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEX</td>
<td>0.749</td>
<td>-0.048</td>
<td>0.001</td>
<td>-0.854</td>
<td>0.024</td>
<td>0.034</td>
<td>0.064</td>
<td>-0.064</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td>0.672</td>
<td>0.741</td>
<td>-0.119</td>
<td>0.029</td>
<td>0.292</td>
<td>-0.123</td>
<td>-0.084</td>
<td>-0.124</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRE</td>
<td>0.908</td>
<td>0.907</td>
<td>-0.087</td>
<td>0.029</td>
<td>-0.268</td>
<td>0.071</td>
<td>0.016</td>
<td>-0.016</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POST</td>
<td>0.915</td>
<td>0.691</td>
<td>-0.037</td>
<td>-0.017</td>
<td>0.656</td>
<td>-0.026</td>
<td>-0.062</td>
<td>-0.064</td>
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</tr>
<tr>
<td>DIFF</td>
<td>0.990</td>
<td>-0.007</td>
<td>0.044</td>
<td>-0.039</td>
<td>0.987</td>
<td>-0.089</td>
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<td>0.089</td>
<td>0.195</td>
<td>0.188</td>
<td>0.591</td>
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<td>0.079</td>
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<td>0.758</td>
<td>0.159</td>
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</table>

⁽ᵃ⁾SIGNS REFLECTED
Score (5), and a more moderate loading, 0.656 on the Post Test (4). This factor also has a negative loading of -0.268 on the Post Test (3). The Difference Score (5) is a function of the Pre-Test and Post Test scores, and these two variables explain all the significant loadings on the factor.

Factor 5, was labeled (CA) Concrete Analytical as it contains negative loadings from each of the following scales: Judgment-Perception (12) -0.855, Sensing-Intuiting (10) -0.758, Internal-External Locus of Control (7) -0.220, Thinking-Feeling (11) -0.200. This indicates that judgment, sensing, thinking and internal locus of control variables are those which are loading.

Factor 6 also has the signs reflected for clarity of explanation. With the signs reflected Extroversion-Introversion (9) has a high negative loading, -0.889, and Social Desirability (8) a positive loading, 0.591. This means that extroversion and social desirability compromise the factor and hence it was named (EA) Extrovert Approval.

The similarities and differences between the predicted and obtained factors will now be discussed, along with how these obtained factors support and fail to support the major thesis of this study concerning attitudinal variables and academic learning.
A Comparison Between Predicted and Obtained Factors

Table 4 presents a comparative summary of the predicted and obtained factors. The loadings of the predicted factors are presented in the order of their prediction, although this order has no special meaning. The loadings of the rotated factors are presented in the order of their magnitude.

Predicted Factor I (V) Verbal was hypothesized to load on the following variables: ACT (2), Pre-Test (3), Post Test (4), and Sensing-Intuiting (10). Obtained Factor 1 was labeled as (V) Verbal and loaded on those same four variables. The loadings in order of descending magnitude are: Pre-Test (3), ACT (2), Post Test (4), and Sensing-Intuiting (10). These results agree with numerous other studies which have found that an important factor in academic learning is general verbal ability. These results also tend to indicate that the Sensing-Intuiting Scale of the Myers-Briggs Type Indicator may to some degree reflect verbal ability rather than a preference for obtaining information via the senses or via intuitive processes. Obtained Factor 1 clearly supports the hypothesized loadings of predicted Factor 1.

Factor II was hypothesized to be a Control (C) factor and to have negative loadings from the following variables:
TABLE 4
A COMPARISON OF PREDICTED AND OBTAINED FACTORS
HYPOTHESIZED FACTORS AND LOADINGS

<table>
<thead>
<tr>
<th>I (V)</th>
<th>II (C)</th>
<th>III (D)</th>
<th>IV (I)</th>
<th>V (A)</th>
</tr>
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<tr>
<td>VERBAL</td>
<td>CONTROL</td>
<td>EMOTIONAL DISTANCE</td>
<td>INTUITIVE AWARENESS</td>
<td>APPROVAL ASPIRATION</td>
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<tr>
<td>ACT(2)</td>
<td>IE(7)</td>
<td>ANOMIE(6)</td>
<td>SN(10)</td>
<td>SD(8)</td>
</tr>
<tr>
<td>PRE-TEST(3)</td>
<td>JP(12)</td>
<td>EI(9)</td>
<td>SD(8)</td>
<td>ANOMIE(6)</td>
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<tr>
<td>POST TEST(4)</td>
<td>TF(11)</td>
<td>SD(8)</td>
<td>PRE-TEST(3)</td>
<td>EI(9)</td>
</tr>
<tr>
<td>SN(10)</td>
<td>POST TEST(4)</td>
<td>IE(7)</td>
<td>POST TEST(4)</td>
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</tbody>
</table>

PRE-TEST(3) -
POST TEST(4) -

OBTAINED FACTORS AND LOADINGS

<table>
<thead>
<tr>
<th>1 (V)</th>
<th>5 (CA)</th>
<th>2a (D)</th>
<th>6a</th>
<th>3</th>
<th>4</th>
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<tr>
<td>VERBAL</td>
<td>CONCRETE ANALYTICAL</td>
<td>EMOTIONAL DISTANCE</td>
<td>EXTROVERT APPROVAL</td>
<td>FEMALE FEELING</td>
<td>REGRESSION PHENOMENON</td>
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<tr>
<td>PRE-TEST(3)</td>
<td>JP(12)</td>
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<td>EI(9)</td>
<td>SEX(1)</td>
<td>DIFF(5)</td>
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<td>ACT(2)</td>
<td>SN(10)</td>
<td>IE(7)</td>
<td>SD(8)</td>
<td>TF(11)</td>
<td>POST TEST(4)</td>
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<tr>
<td>POST TEST(4)</td>
<td>IE(7)</td>
<td>SD(8)</td>
<td>ACT(2)</td>
<td>PRE-TEST(3) -</td>
<td></td>
</tr>
<tr>
<td>SN(10)</td>
<td>TF(11)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

aSIGNS REFLECTED
Internal-External Locus of Control (7), Judgment-Perception (12), and Thinking-Feeling (11). It was further hypothesized that the Post Test (4) would load positively on this factor. A relatively close approximation to Factor II emerged in the rotated factor matrix as Factor 5 (CA) Concrete Analytical. The loadings on this factor are all negative and in order of descending magnitude they are: Judgment-Perception (12), Sensing-Intuiting (10), Internal-External Locus of Control (7), and Thinking-Feeling (11). As stated above, the negative loadings indicate that it is judgment, sensing, internal locus of control, and thinking that are actually loading on the factor.

Because of the high sensing loading, which was not predicted, the factor was not labeled control since this loading somewhat changes the complexion of the factor. Factor 5 seems to emphasize a highly organized concrete approach, which is similar to the hypothesized (C) Control, yet different from it. Factor 5 (CA) Concrete Analytical does not have a loading on the Post Test (4), and in this sense does not support the hypothesis underlying Factor II concerning the relationship between an attitudinal variable similar to control, and academic learning as delineated by the Post Test (4).

Factor III was labeled (D), Emotional Distance and it was predicted that it would contain negative loadings
on Extroversion-Introversion (9), Social Desirability (8), the Pre-Test (3) and the Post Test (4). Positive loadings for this factor were hypothesized for Anomie (6), and Internal-External Locus of Control (7). Factor 2 of the rotated matrix with signs reflected was labeled as (D) Emotional Distance, and has positive loadings on Anomie (6) and Internal-External Locus of Control (7). Factor 2 has a negative loading on Social Desirability (8). The Pre-Test (3) and the Post Test (4) did not load on the rotated factor as predicted.

These results seem to indicate that there is an emotional distance phenomenon in operation, and that it can be demonstrated through the Anomie (6), Internal-External Locus of Control (7), and Social Desirability (8) scales. The academic task, however, does not load on this factor and thus the data fail to demonstrate a relationship between Emotional Distance (D) and academic learning.

Predicted Factor IV was (I) Intuitive Awareness. The predicted loadings for the factor were all positive and were as follows: Sensing-Intuiting (10), Social Desirability (8), Pre-Test (3), and Post Test (4). This factor did not appear in the rotated matrix and thus did not substantiate any of the hypotheses concerning it.

Factor V was labeled (A) Approval Aspiration and had hypothesized positive loadings on Social Desirability (8), and Pre-Test (4), and hypothesized negative loadings on
Anomie (6) and Extroversion-Introversion (9). Factor 6 (EA) Extrovert-Approval in the rotated matrix appears similar to the hypothesized Factor V. This obtained factor, with signs reflected for clarity of explanation, has a high negative loading on Extroversion-Introversion (9) and a positive loading on Social Desirability (8). This indicates that extroverts as predicted are more approval oriented. The important failure in the predicted loadings is the failure of the Post Test (4) to load on the rotated factor.

These results indicate that some sort of approval phenomenon is operating, and that it is decidedly related to extroversion. Social Desirability's (8) negative correlation with the Introversion segment of the Extroversion-Introversion Scale (10) might partially explain the negative relationship (See Table 2) between Social Desirability (8) and the Post Test (4). Previous studies (Myers 1962) demonstrate that introversion is related to academic success. The factor loadings here, however, fail to demonstrate a relationship between either Social Desirability (8) or Extroversion-Introversion (9) and the academic task, and thus do not give support to the hypothesized relationship between these variables and learning.

Two factors emerged from the rotated matrix which were not predicted: Factor 3 (FF) Female Feeling, and Factor 4 (RP) Regression Phenomenon. Factor 3 has a high negative loading on Sex (1) and a high positive loading
on Thinking-Feeling (11). This seems to be the only factor in which Sex (1) plays a significant role, and appears unrelated to any loadings in the predicted factor structure.

Factor 4 as stated in the previous section is a regression phenomenon reflecting the Difference Score (5) as a function of a S's score on the Pre-Test (3) and the Post Test (4). The loadings are positive and in descending order of magnitude are: Difference Score (5), Post Test (4), ACT (2). There is one negative loading on the Pre-Test (3). The importance of this factor is not the fact that it was not predicted, but rather the fact that it may have kept the Pre-Test (3) and the Post Test (4) from loading on the other factors.

In summary, a comparison of the predicted and obtained factors shows 1) Factor I (V) Verbal and its loadings were accurately predicted, 2) Factors similar to II (C) Control, III (D) Emotional Distance, and V (A) Approval Aspiration did emerge, but did not load on the academic task, the Post Test, thus lending no support to the major premise of this study, 3) Factor II (I) Intuitive Awareness did not emerge, and 4) two unpredicted factors were in the rotated matrix, Factor 3 Feminine Feeling and Factor 4 (RP) Regression Phenomenon.
Discussion

The results of this study do not support the major premise that certain attitudinal variables are relevant to academic learning. As defined and measured in this research, these attitudinal variables did not significantly load with the cognitive task, the Post Test, on any of the six rotated factors.

It was predicted that factors such as emotional distance, control, intuition, and approval aspiration would make a difference in Post Test performance. They did not. The only significant component of Post Test performance was general verbal ability. Factors similar to emotional distance, control, and approval aspiration did emerge in the rotated matrix, but they contained no Post Test loadings.

Two interpretations of these results seem feasible: 1) verbal ability alone accounts for all the significant variance in performance on cognitive academic tasks, and 2) the attitudinal variables predicted to be relevant to academic learning may in fact be products of or part of general verbal ability. Each of these interpretations will be discussed in turn.

The first interpretation implies that verbal ability is the only significant predictor of performance on tasks typically required in the academic setting. This
interpretation further implies that high ability students will consistently maintain superior performance regardless of such accidents of instruction as the teacher, the situation, or their own dispositions.

In an experimental setting not as conventional as the one employed here one might find verbal ability less important in determining performance. For example, Rogers (1967) makes a distinction between cognitive and experiential learning. He defines the former as transmitting a store of information, and the latter as a process of discovery. According to Rogers experiential learning demands personal involvement and commitment, and thus more than sheer intellectual ability.

A learning situation such as a counseling practicum is an example of such a type of instruction that might de-emphasize, but not eliminate the importance of verbal ability. Here special skills are said to be needed; factors such as sensitivity, empathy, honesty, and openness are believed to be important. In this type of situation attitudinal variables might be more relevant. Given equal or approximately equal commitment to the task, however, there is every reason to believe that even in this setting the highly verbal student will perform more adequately.

It appears that this type of student discovers quickly what is required and responds appropriately. The
more able the student, therefore, the easier it is for him to display organization, test-wiseness, affect or whatever the situation rewards. According to the interpretation that verbal ability accounts for all the significant variance on cognitive academic tasks, one must consider that this so-called experiential learning may be cognitive. The sensitive counselor may simply be the bright individual who by virtue of his superior verbal ability is better able to understand what the client is communicating and respond appropriately. According to this interpretation, verbal ability seems to so completely overshadow attitudinal variables that their relationship to the academic learning task is insignificant or non-existent.

The second interpretation follows from the first and in essence broadens the definition of verbal ability. This interpretation examines whether attitudinal variables predicted to be relevant to academic learning may in fact be products of or a part of verbal ability. Perhaps some of the attitudinal variables and expectancies, which have been under investigation in this study, are incorporated into the individual's self-concept as a result of his perceptions concerning his verbal abilities.

According to this assumption it is reasonable to assume that students of superior ability have more optimistic expectancies concerning their academic performance.
than do students of lesser ability. If expectancies are contributing something to performance, their contributions may not be the results of generalized expectancies as hypothesized, but rather may be more specific to the academic setting, and in direct relation to the past successes or failures of the individual student. Based on the results of this study, these successes and failures apparently depend primarily on verbal ability. From this framework these expectancies do not, as hypothesized, to any degree offset the effects of ability, but rather result from it. According to this interpretation an individual who is intellectually able will have a greater sense of control in the academic setting. He will perhaps feel less alienated from his social system, if he feels in some sense that he is in control of it. The intellectually able college student may also have less need for approval outside the academic setting since his ability gains approval for him from parents, professors, and peers.

These speculations are in line with the correlations found in Table 2. Here one sees that Internal-External Locus of Control, Anomie, and Social Desirability correlate with ACT score as well as the Post Test. The correlations of Anomie and Social Desirability are significant at the .05 level. These correlations might indicate that the more highly verbal student is internally controlled, less
alienated, and has lower approval needs than the less verbal student. In short this interpretation postulates that attitudinal variables such as control, alienation, and approval if at all relevant to academic learning are relevant as a part of generalized verbal ability. On the basis of the measurement instruments employed here these variables cannot be meaningfully separated from this generalized ability.

To accept either of these interpretations one must reconcile them with the review of the discrepant achievement literature discussed in Chapter 1. In part, this study was based on the fact that this literature strongly suggests that attitudinal variables are relevant in academic learning. The results of this study and the two interpretations of the results presented above indicate that these variables are not relevant.

The difference may possibly be explained in terms of the fact that the results of the majority of the discrepant achievement literature depend upon postdiction, while here an attempt was made to predict specific attitudinal variables and their relevance to academic learning. In the work reviewed in Chapter 1, the under-achiever is discovered after the fact. Students picked for study are ones who are not performing commensurate with their expected performance as determined by an ACT score or some equivalent
measure. The students are then intensely studied to determine how they differ from individuals classified as normal-achievers. These differences are expressed in terms of personality traits which are said to be related to various achievement levels. It is unclear, however, as to whether some discrepant achievement traits are present in individuals classified as normal achievers.

In this study an entirely different sequence of procedures was utilized. Specific attitudinal variables were isolated before performance was assessed, and in a very specific set of hypotheses these variables were predicted to be related to an academic learning task. Using this approach as opposed to one of postdiction, it was found that verbal ability was by far the most important factor in Post Test performance. These results do not negate the findings of discrepant achievement research, but they do not in any way verify them.

While, as clearly evidenced in this study, verbal ability is the best predictor of academic achievement for the majority of students, the question still remains as to why verbal ability tests do not predict as accurately for some people as they do for others. This study did not answer that question. The research has perhaps eliminated some possible answers to that question. In particular, it appears to have eliminated generalized expectancies,
especially as these expectancies apply to phenomena measured by the Srole Anomie Scale (Srole 1956), Internal-External Locus of Control Scale (Rotter, 1966), Social Desirability Scale (Crowne-Marlowe, 1964), and the Myers-Briggs Type Indicator (Myers, 1962). In the process of eliminating these possibilities, however, the research did not establish any variables relevant to academic learning other than general verbal ability.

In summary, the results obtained in this research can be interpreted as indicating 1) verbal ability accounts for all the variance in academic performance or 2) certain attitudinal variables are in fact a product of verbal ability. These attitudinal variables can perhaps supplement this verbal ability, but not supplant it.

Either interpretation leads to the conclusion that in the conventional academic setting the only significant contributor to performance variance is verbal ability. There is little that can add to this as a predictor of performance.

Treatments such as counseling or study skill courses should aim at utilizing this ability. According to the results of this research, the brighter the student the more successful will be the treatment. The brighter the student the more successful will be his academic performance, as long as performance is measured in terms of cognitive skill tasks such as the one employed in this study.
CHAPTER IV

Summary

A factor analytic study was designed to test hypothesized relationships between attitudinal variables and academic learning. Academic learning for the purposes of this study was conceptualized as a change in behavior which results from treatment designed to produce such change. Attitudinal variables were defined as non-cognitive aspects of personality which result from yet undefined environment. These variables are to a degree genetically determined, but modifiable.

The theoretical framework within which this study was conducted is Rotter's (1954) Social Learning Theory. This theory maintains that all learning is social, and that it depends on needs, reinforcements, and expectancies. A basic premise of this theory is that behavior is determined not only by reinforcement, but also by expectancy of reinforcement. The emphasis of the research focuses on this postulate of the theory. The major thesis of the study is that Ss with different generalized expectancies and attitudinal compositions will perform differentially on a traditional academic learning task.
Attitudinal variables were treated as continuous and were derived from the following instruments: Srole Anomie Scale (Srole, 1956), Internal-External Locus of Control Scale (Rotter, 1966), Marlowe-Crowne Social Desirability Scale (Crowne and Marlowe, 1964), and an adaptation of the Myers-Briggs Type Indicator (Myers 1962). This last instrument yields four scales: Extroversion-Introversion, Sensing-Intuiting, Thinking-Feeling, and Judgment-Perception.

In addition to these seven attitudinal variables the following five were included in the matrix to be factored: Sex, Standard Score Composite on the American College Test (Peters and Plog 1961), a Pre-Test score on an academic learning task, a Post Test score on this task after treatment, and a Difference score between the pre and the post measures.

The procedure for the investigation was: 1) administration of the attitudinal variables in counter-balanced order, 2) administration of the Pre-Test, 3) a wait period of two weeks, and 4) presentation of a lecture by a confederate concerning concepts of psychological measurement, and 5) administration of the Post Test immediately following the lecture.

The sample contained 163 Ss, 65 males and 98 females, drawn from populations of a required introductory freshman education course, and a beginning psychology course. The
setting for the administration of the inventories and the treatment was the assigned classroom for each of these courses. The procedures were executed during two regularly scheduled 48 minute class periods, two weeks apart.

The hypotheses were in the form of five predicted factors and their loadings. These predicted factors and their hypothesized loadings follow. Factor I (V) was predicted to be a general verbal factor with four loadings:

1.1 American College Test Composite Standard Score
1.2 Pre-Test Score on the academic learning task
1.3 Post Test Score on the academic learning task
1.4 Sensing-Intuiting scale of the adaptation of the Myers-Briggs Type Indicator.

Factor II (C) was defined as a control factor, and four loadings were hypothesized:

2.1 Internal-External Locus of Control Scale, negatively loaded
2.2 Judgment-Perception scale on the adaptation of the Myers-Briggs Type Indicator, negatively loaded
2.3 Thinking-Feeling scale on the adaptation of the Myers-Briggs Type Indicator, negatively loaded
2.4 Post Test score on the academic learning task.

Factor III (D), an Emotional Distance factor, was predicted to have six loadings:

3.1 The Srole Anomie Scale
3.2 The Extroversion-Introversion scale of the adaptation of the Myers-Briggs Type Indicator
3.3 The Marlowe-Crowne Social Desirability Scale, negatively loaded
3.4 Internal-External Locus of Control Scale
3.5 Pre-Test Score on the academic learning task negatively loaded
3.6 Post Test Score on the academic learning task, negatively loaded.

Factor IV (1) was predicted as an intuitive awareness factor with the following five loadings:

4.1 Internal-External Locus of Control Scale, negatively loaded
4.2 Sensing-Intuiting scale on the adaptation of the Myers-Briggs Type Indicator
4.3 The Marlowe-Crowne Social Desirability Scale
4.4 Post Test Score on the academic learning task
4.5 Pre-Test Score on the academic learning task.

Factor V (A) approval aspiration was hypothesized to have the following four loadings:

5.1 The Marlowe-Crowne Social Desirability Scale
5.2 The Srole Anomie Scale, negatively loaded
5.3 The Extroversion-Introversion scale of the adaptation of the Myers-Briggs Type Indicator, negatively loaded
5.4 The Post Test Score.

A principal components analysis with a requested output of six factors was submitted for computer solution, 1.000 was placed in each diagonal entry and a varimax rotation was employed.

Rotated Factor 1 emerged with significant loadings on the Pre-Test, ACT, Post Test, and Sensing-Intuiting Scale. These were precisely the loadings for predicted Factor I, and so this factor was labeled (V) Verbal.

Rotated Factor 2 was judged to be close to the Emotional Distance (D) phenomenon contained in predicted Factor III. This rotated factor loaded on Anomie, Internal-External Locus of Control, and carried a negative loading on Social Desirability. It did not load, however, on the academic learning task, the Post Test.

Rotated Factor 3 had significant negative loadings on Sex and significant positive loadings on Thinking-Feeling. This factor did not seem to relate to any of the five predicted factors.

Rotated Factor 4 carried significant positive loadings on the Difference Score, the Post Test, and the ACT score, and significant negative loading on the Pre-Test. This factor was labeled (RP) Regression Phenomenon. This factor was not related to any of the five predicted factors.
Rotated Factor 5 carried negative loadings on Judgment-Perception, Sensing-Intuiting, Internal-External Locus of Control, and Thinking-Feeling. This factor was labeled (CA) Concrete Analytical, and was similar to hypothesized Factor II (C) Control. This factor, however, did not load on the Post Test, and thus did not support the major premise of the study.

Rotated Factor 6 was labeled (EA) Extrovert Approval, and was judged to be similar to predicted Factor V (A) Approval Aspiration. This factor, also carried no loading on the academic learning task, but carried a high negative loading on the Extroversion-Introversion Scale and a positive loading on the Social Desirability Scale.

It was concluded that although some of the predicted phenomena were present in the rotated factors, the major premise of the study was not supported since the Post Test loaded on only the verbal factor and the regression phenomenon factor.

Two interpretations of the results were explored: 1) verbal ability accounts for all the variance in academic performance, and 2) certain attitudinal variables are a product of verbal ability. Either interpretation leads to the conclusion that in the conventional academic setting the only significant contributor to performance variance is verbal ability. There is little that can add to this
as a prediction of performance. Certain attitudinal variables can perhaps supplement this verbal ability, but not supplant it. Although the study established the superiority of verbal ability as the best predictor of academic achievement for the majority of students, it left unanswered the question why verbal ability tests predict more accurately for some students than for others.
APPENDIXES
Appendix I

The Classroom Lecture
The Classroom Lecture

I. Introduction:

Testing and classroom evaluation of all kinds seem to be so much a part of our daily lives that we often take them for granted and yet in some instances know very little about them. It seems, however, that there are certain fundamental concepts that are necessary if one is to have a somewhat accurate view of the evaluation enterprise.

II. What is a test?

Lee J. Cronbach, an acknowledged leader in psychological testing has defined a test as: "systematic procedure for comparing the behavior of two or more persons" (p. 21). (repeats this a second time more slowly.) From this definition it becomes evident that before a test score can be interpreted certain assumptions concerning the nature of the measuring instrument, i.e., the test -, and the characteristics of the population being tested need to be made. One of the most important assumptions concerns the individuals taking the test. (i.e. using Cronbach's definition the ones to be compared). If individuals' scores on the test are to be considered at all comparable, then we must assume that these individuals
have had the same or practically the same exposure to the material which the test covers.

This is why students from a lower socio-economic background are at a disadvantage in most standardized test situations. It is particularly difficult to compare these students on traditional intelligence tests such as the Wechsler Adult Intelligence Scale or the Stanford-Binet, as these tests are highly weighted on verbal skills. A "culturally deprived" environment is particularly devoid of verbal opportunities. It seems likely then that often the equal exposure assumption is violated when these students are being tested.

There are many kinds of tests i.e. many systematic ways of comparing individuals. We talk, in the classroom, about objective tests i.e. multiple choice, true-false etc.; we also speak of essay examinations. Personal judgment is involved in the construction of all these tests, in fact in all testing be it standardized intelligence testing, personality inventories, or a college quiz.

The examiners or test constructors exercise judgment as to what to ask, what is the best way to ask it etc. even in a so-called objective test personal judgment is exercised. The objective part of the test refers to the manner of scoring once the correct answers have been established through the personal judgment of those who make out the answer key. Given the answer key any adult
can score an objective test; this is not the case with an essay examination. Tests, however, are only as good as the personal judgment and thinking of the individuals who construct them.

III. How to look at a test score?

In and of itself a test score is meaningless; it is only meaningful in relationship to the situation in which it is obtained, and in comparison with the scores obtained by other individuals in the same situation.

First of all let us consider the concept of a norm group. To determine whether your score on a particular test is high or low, one needs to know how others performed on the test. Not only do we need to be aware of other people, but also who these other people are. (i.e. how their scores could be comparable to yours). A group considered relevant for this kind of comparison is called your norm group. The norm group needs to be appropriate. For example, comparing your vocabulary test scores with a group of third graders would not be very enlightening; but comparing them with college students of your age and class would be useful. So your standing on a test is useful only in so far as the norm group from which the standing is derived is appropriate.

Once we have established which norm group is appropriate then we need to understand the meaning of your
rank in that norm group.

IV. Some Properties of the Normal Curve or Frequency Distribution

When we are dealing with large numbers of individuals, one seems justified in assuming normalacy of distribution, and in illustrating the relative standing of individuals by means of the normal curve.

(At this point he draws the normal curve on the blackboard)

Let us then look at the properties of the normal curve before we discuss various arbitrary scoring systems which are frequently used in discussing an individual's position in the norm group.

A. Central Tendency

(Returns to the curve at the blackboard) The first property of the normal curve with which we shall be concerned is central tendency. (draws a line down the middle of the curve.) Central tendency can be defined as the best summary of the distribution.

The three measures of central tendency are: the mean, the median, the mode. In a normal curve they are all at the same point, but as we shall see in a moment, when the curve is not normal their position on it differs.

The mean is simply the arithmetic average. It is calculated by adding the scores and dividing by the number
of scores in the distribution. It is shown by the equation \( \bar{x} = \frac{\sum x}{N} \) where \( \sum \) means sum of, \( x \) means the scores, and \( N \) is the # of scores or people in the distribution. The mean is by far the most popular of the three measures as from it other statistics describing the distribution can be computed.

The mode is simply the most frequent or popular score. It can be anywhere on the distribution; but in a normal curve it is in the same place as the mean and the median.

The median is simply the score above and below which 50% of the cases are to be found. If the curve is fairly normal, it is a quick way of getting a rough estimate of how people did on the test. To illustrate how these measures can be different, let us assume that these numbers (10, 10, 20, 30, 40) represent scores on a distribution. The mean equals 22. The median equals 20. The mode equals 10.

B. Skewness

If a curve is not normal, it is said to be skewed, i.e. there are a few extreme scores at either the high or the low end. If the extreme scores are at the higher end of the curve like this (draws it) the curve is said to be positively skewed. If the extreme scores are at the low end of the scale, the curve is said to be
negatively skewed like this. (draws it)

When one has a curve that is either positively or negatively skewed, the mean is the most accurate measure of central tendency that can be employed as its computation takes into account extreme scores. In a skewed distribution if all three measures of central tendency are depicted, the mean is closest to the skewness (draws the examples) Thus in a positively skewed distribution, the mean is greater than either the median or the mode, and in a negatively skewed distribution the mean is less than either the median or the mode.

C. Variability

Another property of a distribution curve is its variability - its amount of scatter or variance - the spread of scores. For example, a curve like this: (draws it) has much more variability than a distribution that looks like this: (draws it)

There are several measures of variability such as the range, the average deviation, the quartile range.

However, the most popular and statistically useful of all the variability measures is the standard deviation. It is mathematically derived from the mean. The scatter and placement of individual scores in a frequency distribution or curve are often discussed in standard deviation units.
Standard deviation may be defined as the square root of the sum of the squares of the deviations from the mean divided by N. (Repeats a second time more slowly). In other words, it is a mathematical way of giving a measure of the spread of the scores. In short, we are interested not only in central tendency, but also in how the scores deviate from the central tendency of the distribution.

(At this point the lecturer gives to each student a copy of the appended handout) (appendix 3).

V. Scoring Systems

These diagrams which I have just given to you show equivalent arbitrary scoring systems based on standard deviation units of the normal curve.

Figure 1 2 score equivalents

The mean or midpoint of the distribution has a Z score of zero. One standard deviation to either side has a Z score of 1; +1 for the higher side -1 for the lower.

Three standard deviations to either side has a Z score of 3; +3 for the higher side -3 for the lower.

For all practical purposes 3 S.D. either side of the mean cover the range of scores on any test. This can be illustrated by figure two which gives the percentage of
cases covered by 3 Standard deviations either side of the mean.

From this figure we see that a little better than 68% of all the cases lie between -1 and +1 Standard Deviations, from either side of the mean, that a little better than 96% of the cases lie between -2 and +2 S.D. from the mean, and that over 99% of the cases lie between -3 and +3 Standard Deviations from the mean.

In Figure 3 we see the percentile equivalents of scores expressed in standard deviation units. The 50 percentile is the mean; the 84 percentile is one standard deviation above the mean and so forth.

So if a person scores at the 84th percentile, his performance is as good or better than 84 percent of the people in the norm group to which he is being compared. This has nothing to do with the number or percent right that the individual happened to have on the test. Percentile rank concerns performance relative to other people's performance. So depending on how other students in your group performed on the test, a score of half right could give you any percentile rank from 1 to 99.

Based on Standard Deviation Units then many arbitrary scoring systems have been devised.

For example, as shown in Figure 4, the Air Force has employed a system of stanines where the Mean is
equivalent to 5 and the Standard Deviation to 2. This gives a slightly truncated or shortened distribution as it is bounded by 1 and 9 and therefore includes only 96% of the cases.

Figure 5 shows T scores with a Mean of 50 and Standard Deviation units equivalent to 10. Therefore, on this scale one S.D. unit above the Mean is equivalent to 60 and one standard deviation below the mean is equivalent to 40 etc.

Figure 6 gives an illustration of the system utilized by the College Board in entrance test scores. The mean is set at 500 and the standard deviation at 100.

Figure 7 gives the equivalents employed by the Stanford Binet Intelligence Test. Here the mean is arbitrarily defined as 100 and the standard deviation made equivalent to 16.

It can be seen then that knowing the standard deviation equivalents for various tests one can compare an individual's ranks on these tests provided the norm groups are comparable.

VI. Validity

An important concept in measurement and testing is that of validity. Simply, is a test useful and if so, for what purpose or purposes is it useful? It does not
suffice to say that a test is valid; we must ask the further question: valid for what purposes in what circumstances.

The magnitude of validity is represented by a correlation coefficient (which is a relationship between two variables) e.g. a predictor variable such as the test and the criterion variable such as grade point average. This coefficient can range in value between -1 and +1. The higher the correlation either positive or negative the greater the relationship. So to obtain a validity coefficient we need measures of the same individuals on two different scales; (i.e. the predictor and the criterion) Therefore, a test that may be valid for predicting undergraduate grades may well not be valid for choosing people who will excel in engineering as opposed to those who will excel in English. To compute a validity coefficient by hand, a scatter plot may be employed. (See, for instance, Figures 8 and 9) We see in these illustrations a positive and a negative correlation of equal magnitude. A negative correlation is just as useful for prediction purposes as a positive correlation. Therefore a correlation of +.70 shows just as much relationship as a correlation of -.70. To review, then, when using a test for prediction or selection purposes,
one should be aware of what the test is valid for and under what circumstances.

VII. Reliability

In addition to being valid it is also important that a test be reliable. That is, can you depend on the results? Would an individual receive the same score if he were to take the test tomorrow? or next week? or next year?

Traditionally psychometricians speak of three kinds of reliability:

1) internal consistency

2) equivalent forms

3) test re-test

Internal consistency measures are designed to determine if the test is relatively consistent throughout in terms of difficulty. (i.e. is the test reliably measuring the same thing throughout) This is often checked by comparing an individual's scores on the even numbered questions with his score on the odd numbered questions. Of course, any number of splits are possible and some formulas take this into account.

Often for various reasons you want to be certain about an individual's score. You want to re-test him to see if a particular score is a reliable estimate of his
performance. If this is the case, it is desirable to have equivalent forms of the test i.e. separate but equivalent items for each form. To secure equivalent forms is a continual trial and error process, as it is practically impossible to determine precisely how subjects will respond to an item until it is tried. To keep the forms equivalent then is a never-ending job.

Sometimes you want to see if an individual has shown progress or change in performance as the result of some treatment such as taking a course. In this instance the test is given preceding and succeeding the treatment. Here you are interested in the stability or change in an individual's performance and therefore you need a reliable test. Even in re-testing over a time period such as this, equivalent forms are preferable.

Obviously, the longer the test the more reliable it is. The larger the sample of behavior you have, the more you are able to infer about the individual's ability in the area under consideration. Thus a 100 question exam is more reliable than a 1 question exam.

VIII. Summary

We have tried here to review and gain some perspective on testing. We have discussed:
(1) what is a test
(2) elementary statistical concepts necessary to understanding what test scores mean
(3) validity
(4) reliability.

Anyone using testing or test results in his work should explore these areas further.

We will now proceed to a test on the above material.
Appendix II

Instructions Before Administration of the Attitudinal Inventories
Instructions Before Administration
of the Attitudinal Inventories

For the beginning psychology students:

This is a part of a research project concerning how students learn. Please read the directions for each test, and answer the questions as best you can. Work carefully, but rapidly.

For the beginning education students:

This is part of the research we are doing this quarter concerning how students learn. Please read the directions for each test, and answer the questions as best you can. Work carefully, but rapidly.
Appendix III

Information Sheet Distributed to Subjects
Information Sheet

**Figure 1 - 2 Score Equivalents**

**Figure 2 - Percentage of Cases in S.D. Units**

**Figure 3 - Percentiles**
FIGURE 7 - STANFORD-BINET SCORES

FIGURE 8

FIGURE 9
Appendix IV

The Measurement Instruments

A. The Srole Anomie Scale
B. The Internal-External Locus of Control Scale
C. The Social Desirability Scale
D. The Myers-Briggs Type Indicator (Adaptation)
E. The Pre-Test
F. The Post Test
A. The Srole Anomie Scale

Below is the Srole Anomie Scale (Srole 1958) with directions as it was presented to the subjects. The underlined responses were scored as one point each toward the anomie.

PERSONAL ATTITUDES SCALE:

Listed below are a number of statements about personal attitudes. Read each item and decide whether it is true or false as you see it. Circle your choices.

T F 1. It's hardly fair to bring a child into the world with the way things look for the future.

T F 2. In spite of what some people say, the condition of the average man is getting worse, not better.

T F 3. These days a person doesn't really know whom he can count on.

T F 4. Most people in public office are not really interested in the problem of the average man.

T F 5. Most people don't really care what happens to the next fellow.

T F 6. To make money there are no right or wrong ways any more, only easy and hard ways.

T F 7. Nowadays a person has to live pretty much for today and let tomorrow take care of itself.
B. The Internal-External Locus of Control

Below is the Internal-External Locus of Control Scale with directions as it was presented to subjects. The underlined responses were each scored one point on the E scale.

SOCIAL REACTION INVENTORY

This is a questionnaire to find out the way in which certain important events in our society affect different people. Each item consists of a pair of alternatives lettered a or b. Please select the one statement of each pair (and only one) which you more strongly believe to be the case as far as you're concerned. Be sure to select the one you actually believe to be more true rather than the one you think you should choose or the one you would like to be true. This is a measure of personal belief; there are no right or wrong answers.

Please answer these items carefully but do not spend too much time on any one item. Be sure to find an answer for every choice.

In some instances you may discover that you believe both statements or neither one. In such cases, be sure to select the one you more strongly believe to be the case as far as you're concerned. Also try to respond to each item
independently when making your choice; do not be in­fluenced by your previous choices.

REMEMBER

Select that alternative which you **personally believe**
to be more true. Circle your choices.

I more strongly believe that:

1. a. Children get into trouble because their parents punish them too much.
   b. The trouble with most children nowadays is that their parents are too easy with them. (Filler item)

2. a. Many of the unhappy things in people's lives are partly due to bad luck.
   b. People's misfortunes result from the mistakes they make.

3. a. One of the major reasons why we have wars is because people don't take enough interest in politics.
   b. There will always be wars, no matter how hard people try to prevent them.

4. a. In the long run people get the respect they deserve in this world.
   b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

5. a. The idea that teachers are unfair to students is nonsense.
   b. Most students don't realize the extent to which their grades are influenced by accidental happenings.

6. a. Without the right breaks one cannot be an effective leader.
   b. Capable people who fail to become leaders have not taken advantage of their opportunities.

7. a. No matter how hard you try some people just don't like you.
   b. People who can't get others to like them, don't understand how to get along with others.
1. **more strongly believe that:**

8. a. Heredity plays the major role in determining one's personality.
   b. It is one's experiences in life which determine what they're like. (Filler item)

9. a. I have often found that what is going to happen will happen.
    b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

10. a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
    b. Many times exam questions tend to be so unrelated to course work, that studying is really useless.

11. a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
    b. Getting a good job depends mainly on being in the right place at the right time.

12. a. The average citizen can have an influence in government decisions.
    b. This world is run by the few people in power, and there is not much the little guy can do about it.

13. a. When I make plans, I am almost certain that I can make them work.
    b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

14. a. There are certain people who are just no good.
    b. There is some good in everybody. (Filler item)

15. a. In my case getting what I want has little or nothing to do with luck.
    b. Many times we might just as well decide what to do by flipping a coin.

16. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
    b. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.

17. a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.
    b. By taking an active part in political and social affairs the people can control world events.
I more strongly believe that:

18. a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
   b. There really is no such thing as "luck."

19. a. One should always be willing to admit his mistakes.
   b. It is usually best to cover up one's mistakes.
      (Filler item)

20. a. It is hard to know whether or not a person really likes you.
   b. How many friends you have depends upon how nice a person you are.

21. a. In the long run the bad things that happen to us are balanced by the good ones.
   b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

22. a. With enough effort we can wipe out political corruption.
   b. It is difficult for people to have much control over the things politicians do in office.

23. a. Sometimes I can't understand how teachers arrive at the grades they give.
   b. There is a direct connection between how hard I study and the grades I get.

24. a. A good leader expects people to decide for themselves what they should do.
   b. A good leader makes it clear to everybody what their jobs are. (Filler item)

25. a. Many times I feel that I have little influence over the things that happen to me.
   b. It is impossible for me to believe that chance or luck plays an important role in my life.

26. a. People are lonely because they don't try to be friendly.
   b. There's not much use in trying too hard to please people, if they like you, they like you.

27. a. There is too much emphasis on athletics in high school.
   b. Team sports are an excellent way to build character. (Filler item)
I more strongly believe that:

28. a. What happens to me is my own doing.
    b. Sometimes I feel that I don't have enough control over the direction my life is taking.

29. a. Most of the time I can't understand why politicians behave the way they do.
    b. In the long run the people are responsible for bad government on a national as well as on a local level.
C. The Social Desirability Scale

Below is the Marlowe-Crowne Social Desirability Scale with directions as it was presented to the subjects. The underlined responses each scored one point toward social desirability.

**PERSONAL REACTION INVENTORY:**

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is **true** or **false** as it pertains to you personally. Circle your choices.

T F 1. Before voting I thoroughly investigate the qualifications of all the candidates.

T F 2. I never hesitate to go out of my way to help someone in trouble.

T F 3. It is sometimes hard for me to go on with my work if I am not encouraged.

T F 4. I have never intensely disliked anyone.

T F 5. On occasion I have had doubts about my ability to succeed in life.

T F 6. I sometimes feel resentful when I don't get my way.

T F 7. I am always careful about my manner of dress.

T F 8. My table manners at home are as good as when I eat out in a restaurant.

T F 9. If I could get into a movie without paying and be sure I was not seen I would probably do it.

T F 10. On a few occasions, I have given up doing something because I thought too little of my ability.
11. I like to gossip at times.
12. There have been times when I felt like rebelling against people in authority even though I knew they were right.
13. No matter who I'm talking to, I'm always a good listener.
14. I can remember "playing sick" to get out of something.
15. There have been occasions when I took advantage of someone.
16. I'm always willing to admit it when I make a mistake.
17. I don't find it particularly difficult to get along with loud mouthed, obnoxious people.
18. I sometimes try to get even rather than forgive and forget.
19. When I don't know something I don't at all mind admitting it.
20. I am always courteous, even to people who are disagreeable.
21. At times I have really insisted on having things my own way.
22. There have been occasions when I felt like smashing things.
23. I would never think of letting someone else be punished for my wrong-doings.
24. I never resent being asked to return a favor.
25. I have never been irked when people expressed ideas very different from my own.
26. I never make a long trip without checking the safety of my car.
27. There have been times when I was quite jealous of the good fortune of others.
T F 28. I have almost never felt the urge to tell someone off.

T F 29. I am sometimes irritated by people who ask favors of me.

T F 30. I have never felt that I was punished without cause.

T F 31. I sometimes think when people have a misfortune they only got what they deserved.

T F 32. I have never deliberately said something that hurt someone's feelings.

T F 33. I always try to practice what I preach.
D. The Myers-Briggs Type Indicator

(Adaptation)

Below is the Type Indicator adapted from the Myers-Briggs Type Indicator with directions as it was presented to the subjects. Following the body of the inventory is the scoring key.

TYPE INDICATOR

This is a test to show which sides of your personality you have developed the most. The answer you choose to any question is neither "right" nor "wrong". It simply helps to point out what type of person you are, and therefore where your special strengths lie and what sort of work you will like to do. For each question, choose the answer which comes closest to how you usually feel or act. Circle your choices. If you find a question where you cannot choose don't mark both answers. Just skip the question and go on. This is the only inventory in which it is permissible to skip a question.

1. Does following a schedule
   (A) appeal to you
   (B) cramp you

2. Do you usually get on better with
   (A) imaginative people
   (B) realistic people
<table>
<thead>
<tr>
<th>Question</th>
<th>Option A</th>
<th>Option B</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Are you more careful about</td>
<td>(A) people's feelings</td>
<td>(B) their rights</td>
</tr>
<tr>
<td>4. As a guest, do you more enjoy</td>
<td>(A) joining in the talk of the group</td>
<td>(B) talking separately with people you know well</td>
</tr>
<tr>
<td>5. If you were asked on a Saturday morning what you were going to do</td>
<td>(A) be able to tell pretty well</td>
<td>(B) list twice as many things to do as any day can hold</td>
</tr>
<tr>
<td>6. In doing something which many other people do, does it appeal more</td>
<td>(A) to do it in the accepted way</td>
<td>(B) constant change</td>
</tr>
<tr>
<td>7. Do you</td>
<td>(A) rather prefer to do things at the last minute</td>
<td>(B) find it hard on the nerves</td>
</tr>
<tr>
<td>8. Do you</td>
<td>(A) show your feelings freely as you go along</td>
<td>(B) keep them to yourself</td>
</tr>
<tr>
<td>9. In reading for pleasure, do you</td>
<td>(A) enjoy odd or original ways of saying things</td>
<td>(B) wish writers would say exactly what they mean</td>
</tr>
<tr>
<td>10. At parties, do you</td>
<td>(A) sometimes get bored</td>
<td>(B) always have fun</td>
</tr>
<tr>
<td>11. Is it harder for you to adapt to</td>
<td>(A) routine</td>
<td>(B) constant change</td>
</tr>
<tr>
<td>12. When you have to meet strangers, do you find it</td>
<td>(A) pleasant, or at least easy</td>
<td>(B) something that takes a good deal of effort</td>
</tr>
<tr>
<td>13. Are you inclined</td>
<td>(A) to value sentiment above logic</td>
<td>(B) to value logic above sentiment</td>
</tr>
</tbody>
</table>
14. Do you like
(A) to arrange your dates and parties some distance ahead
(B) to be free to do whatever looks like fun at the time

15. Which of these two is the higher compliment
(A) he is a person of real feeling
(B) he is consistently reasonable

16. Are you
(A) easy to get to know
(B) hard to get to know

17. When you start a big project that is due in a week, do you
(A) take time to list the separate things to be done and the order of doing them
(B) plunge in

18. Do you admire more the person who is
(A) conventional enough never to make himself conspicuous
(B) too original and individual to care whether he is conspicuous or not

19. In your crowd, are you
(A) one of the last to hear what is going on
(B) full of news about everybody

20. Are you at your best
(A) when dealing with the unexpected
(B) when following a carefully worked-out plan

21. When you are in an embarrassing spot, do you usually
(A) change the subject
(B) turn it into a joke
(C) days later, think of what you should have said

22. Do you think that having a daily routine is
(A) a comfortable way of getting things done
(B) painful even when necessary

23. Are you naturally
(A) a "good mixer"
(B) rather quiet and reserved in company
24. Do you get more annoyed at  
(A) fancy theories  
(B) people who don't like theories  

30. In your daily work, do you (for this item only, if two are true mark both)  
(A) rather enjoy an emergency that makes you work against time  
(B) hate to work under pressure  

25. When you go somewhere for the day, would you rather  
(A) plan what you will do when  
(B) just go  

31. Is it higher praise to call someone  
(A) a man of vision  
(B) a man of common sense  

26. In the matter of friends, do you tend to seek  
(A) deep friendship with a very few people  
(B) broad friendship with many different people  

32. (A) firm-minded  
(B) warm-hearted  

27. Does the idea of making a list of what you should get done over a week-end  
(A) appeal to you  
(B) leave you cold  
(C) positively depress you  

33. (A) imaginative  
(B) matter-of-fact  

28. Would you rather  
(A) support the established methods of doing good  
(B) analyze what is still wrong and attack unsolved problems  

34. (A) systematic  
(B) spontaneous  

29. Would you judge yourself to be  
(A) more enthusiastic than the average person  

35. (A) theory  
(B) certainty  

36. (A) party  
(B) theater
37. (A) build  
   (B) invent
38. (A) analyze  
   (B) sympathize
39. (A) benefits  
   (B) blessings
40. (A) uncritical  
   (B) critical
41. (A) scheduled  
   (B) unplanned
42. (A) convincing  
   (B) touching
43. (A) reserved  
   (B) talkative
44. (A) statement  
   (B) concept
45. (A) soft  
   (B) hard
46. (A) production  
   (B) design
47. (A) forgive  
   (B) tolerate
48. (A) hearty  
   (B) quiet
49. (A) who  
   (B) what
50. (A) impulse  
   (B) decision
51. (A) speak  
   (B) write
52. (A) punctual  
   (B) leisurely
53. (A) sensible  
   (B) fascinating
54. (A) changing  
   (B) permanent
55. (A) determined  
   (B) devoted
56. (A) facts  
   (B) ideas
57. (A) compassion  
   (B) foresight
58. (A) concrete  
   (B) abstract
59. (A) justice  
   (B) mercy
60. (A) calm  
   (B) lively
61. (A) make  
   (B) create
62. (A) wary  
   (B) trustful
63. (A) orderly
   (B) easy-going

64. (A) gentle
   (B) firm

65. (A) foundation
   (B) spire

66. (A) quick
   (B) careful

67. (A) thinking
   (B) feeling

68. (A) theory
   (B) experience

69. (A) sociable
   (B) detached

70. (A) sign
   (B) symbol

71. (A) systematic
   (B) casual

72. (A) literal
   (B) figurative

73. (A) peacemaker
   (B) judge

74. (A) accept
   (B) alter

75. (A) agree
   (B) discuss

76. Do you find the more routine parts of your day
   (A) restful
   (B) boring

77. Can you
   (A) talk easily to almost anyone for as long as you have to
   (B) find a lot to say only to certain people or under certain conditions

78. If you were a teacher, would you rather teach
   (A) fact courses
   (B) courses involving theory

79. In your crowd, are you usually
   (A) one of the first to try a new thing
   (B) one of the last to fall into line

80. When there is a special job to be done, do you like
   (A) to organize it carefully before you start
   (B) to find out what is necessary as you go along
81. Do you think it is a worse fault
   (A) to show too much warmth
   (B) not to have warmth enough

82. At a party, do you like
   (A) to help get things going
   (B) to let the others have fun in their own way

83. Can the new people you meet tell what you are interested in
   (A) right away
   (B) only after they really get to know you

84. Do you think it more important to be able
   (A) to see the possibilities in a situation
   (B) to adjust to the facts as they are

85. In getting a job done, do you depend on
   (A) starting early, so as to finish with time to spare
   (B) the extra speed you develop at the last minute

86. Would you rather be considered
   (A) a practical person
   (B) an ingenious person

87. Would you rather work under someone who is
   (A) always kind
   (B) always fair

88. In a large group, do you more often
   (A) introduce others
   (B) get introduced

89. Would you rather have as a friend someone who
   (A) is always coming up with new ideas
   (B) has both feet on the ground

90. When it is settled well in advance that you will do a certain thing at a certain time, do you find it
   (A) nice to be able to plan accordingly
   (B) a little unpleasant to be tied down

91. When you think of some little thing you should do or buy, do you
   (A) often forget it until much later
(B) usually get it down on paper before it escapes you

(C) always carry through on it without reminders

92. Do you more often let

(A) your heart rule your head

(B) your head rule your heart

93. Do you think it is a worse fault to be

(A) unsympathetic

(B) unreasonable

94. Do you think the people close to you know how you feel

(A) about most things

(B) only when you have had some special reason to tell them

95. In your scheme of living, do you prefer to be

(A) original

(B) conventional
SCORING KEYS FOR ADAPTATION OF
MYERS - BRIGGS TYPE INDICATOR
CONTINUOUS SCORES

To facilitate scoring a special scale was devised.
The scoring method and conversion equations follow.
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<thead>
<tr>
<th>Item No.</th>
<th>Keyed Response and Points</th>
</tr>
</thead>
<tbody>
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**CONVERSION EQUATION**

\[ Y = 2X + 45 \]

where

\[ Y = \text{Score per Myers (1962)} \]
\[ X = \text{Adaptation Score} \]
<table>
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<td>93</td>
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<td></td>
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</table>

**CONVERSION EQUATION**

\[ Y = 2X + 39 \]

where

\[ Y = \text{Score per Myers (1962)} \]
\[ X = \text{Adaptation Score} \]
<table>
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<tr>
<th>Item No.</th>
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</table>

**CONVERSION EQUATION**

\[ Y = 2X + 39 \]

where

\[ Y = \text{Score per Myers (1962)} \]
\[ X = \text{Adaptation Score} \]
<table>
<thead>
<tr>
<th>SN</th>
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**CONVERSION EQUATION**

\[ Y = 2X + 33 \]

where \( Y \) = Score per Myers (1962)

\( X \) = Adaptation Score
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**CONVERSION EQUATION**

\[ Y = 2X + 47 \]

where

\[ Y = \text{Score per Myers (1962)} \]
\[ X = \text{Adaptation Score} \]
E. The Pre-Test

Below is the pre-test with directions as it was presented to the subjects. The underlined choices were keyed as correct.

Now that you have completed the attitude inventories, please answer to the best of your knowledge the following questions concerning psychological measurement constructs.

Answer every item. If you are unsure, guess.

Circle your choices.
1. Advocates of "culture fair" tests of mental ability can most justifiably criticize the Stanford-Binet because of its emphasis in measuring:

A. organization of ideas.
B. fluency of ideas.
C. verbal abilities.
D. innate abilities.

2. Scores on standardized intelligence tests are based on the assumption that all pupils:

A. have had some experience with such tests.
B. have had some formal schooling.
C. have had similar backgrounds of experience.
D. are unfamiliar with the test material.

3. Which one of the following scores appearing in a student's record would be most meaningful without further reference to the group?

A. 23 items correct in an English test of 40 items.
B. 30 items wrong in an algebra test of 50 items.
C. omitted ten items in each of the English and algebra tests.

4. In giving a standardized test a teacher allows too much time. This is most likely to adversely affect:

A. the reliability of the test.
B. the validity of the test.
C. interpretation in terms of norms.
D. the ranking of pupils.

5. The term objective, when used to label an educational test, describes:

A. a characteristic of the scoring process.
B. a typographic feature of the test.
C. the degree of standardization of the test.
D. the content limitations of the questions.
6. Sue answered correctly 25 out of 50 items on an arithmetic test. What interpretation can be made of Sue's performance on the test?

A. Sue placed at the 50th percentile.
B. Sue needs remedial work in arithmetic.
C. Sue knows about one-half of the material in arithmetic taught in her grade.
D. No interpretation of the score is possible on the basis of the information given.

7. The use of the normal curve as a basis for assigning school marks is most legitimate when

A. a standardized test is used.
B. all of the pupils have approximately the same I.Q.
C. the marks are to be assigned to a large and representative group of pupils.
D. the average pupil scores 85 on the test used.

8. Validity is determined by finding the correlation between scores on

A. the even numbered items on a test and the odd numbered items on that test.
B. one form of a test and another form of that same test.
C. a test and some independent criterion.
D. two administrations of the same test.

9. What is most wrong with the statement, "This test is valid."

A. The statement does not specify what the test is valid for.
B. The word "valid" is vague. A numerical coefficient should be given.
C. A test does not show validity or lack of it.
D. The statement is meaningless, since it does not specify the conditions of administration.

10. For determining reliability, for retesting doubtful cases, or for measuring growth, it is most useful to have

A. equivalent forms.
B. adequate forms.
C. objectivity and interpretability.
D. logical and empirical validity.
11. In order to compute a correlation coefficient between traits A and B, it is necessary to have

A. measure of trait A on the group of persons, and of trait B on another.
B. one group of persons, some who have both A and B, some with neither, and some with one but not the other.
C. two groups of persons, one which could be classified as A or not A, the other as B or not B.
D. measures of traits A and B on each person in one group.

12. The distributions shown differ in

A. skewness only.
B. variability only.
C. central tendency only.
D. both variability and central tendency.

13. In general, increasing the length of a test will make it more

A. valid.
B. reliable.
C. objective.
D. diagnostic.

14. John tells his mother that he made a score of 68 on his science test. Which type of information would best help his mother to understand the meaning of his score in terms of his achievement in science?

A. The test consisted of 90 questions.
B. Half of the class failed the test.
C. The mean score for the class was 65.
D. The highest score in the class was 83.

15. Which of the following is the point on the scale of measurement above which there are fifty per cent of the cases.

A. the mean.
B. the median.
C. the standard deviation.
D. the quartile deviation.
E. more than one of the above.
16. Which of the following is an example of a measure of "central tendency."

A. the mean.
B. the median.
C. the standard deviation.
D. the quartile deviation.
E. more than one of the above.

17. Which of the following is especially useful as an average where a distribution of test scores includes a number of extremely high scores or extremely low ones.

A. the mean.
B. the median.
C. the standard deviation.
D. the quartile deviation.
E. more than one of the above.

18. Which of the following can be used in comparing their performance on a test of mental ability if computed for two different groups.

A. the mean.
B. the median.
C. the standard deviation.
D. the quartile deviation.
E. more than one of the above.

19. Which of the following when computed from a frequency distribution, it is necessary at one stage to multiply by the number of units in a class interval.

A. the mean.
B. the median.
C. the standard deviation.
D. the quartile deviation.
E. more than one of the above.

20. Which of the following is represented by a distance of 10 T-score units, 2 stanine units and one z-score unit.

A. the mean.
B. the median.
C. the standard deviation.
D. the quartile deviation.
E. more than one of the above.
21. In the set of scores: 27, 50, 13, 5, 46, 34, 63, the median is closest to

A. 29
B. 34
C. 35.4
D. 36.5

22. The standard deviation of I.Q.'s on the Binet scale of a representative sample of white urban school children has been found to be about 16. This means that approximately 34% of the cases will have I.Q.'s between

A. 92 and 108
B. 84 and 116
C. 84 and 100
D. 100 and 132

23. Under a scattergram there is a notation that the coefficient of correlation is .06. This means that

A. most of the cases are plotted within a range of 6% above or below a sloping line in a diagram.
B. plus and minus 6% from the means includes about 68% of the cases.
C. there is a negligible correlation between the two variables.
D. most of the data plotted fall into a narrow band 6% wide.

24. A student's raw score is exactly in the middle of the range of raw scores assigned a stanine of 7. If his raw score were assigned a T-score, it would be numerically equal to

A. 30
B. 40
C. 60
D. 75

25. In a frequency distribution of 250 scores, the mean is reported as 78 and the median as 65. One would expect this distribution to be

A. positively skewed.
B. negatively skewed.
C. symmetrical.
D. normal.
26. Which of the following shows the highest degree of correlation?

A. .40
B. -.20
C. -.50
D. -.65

27. Which of the following includes approximately 68 percent of the cases when measured above and below the mean in a normal distribution.

A. the mean.
B. the median.
C. the standard deviation.
D. the quartile deviation.
E. more than one of the above.

28. Which of the following may be obtained by summing the scores and dividing by the total number of scores.

A. the mean.
B. the median.
C. the standard deviation.
D. the quartile deviation.
E. more than one of the above.

29. Which of the following is a point that is affected markedly by extremely high or low scores.

A. the mean.
B. the median.
C. the standard deviation.
D. the quartile deviation.
E. more than one of the above.

30. Which of the following is represented by a T-score of 50, a stanine of 5 and a z-score of 0.

A. the mean.
B. the median.
C. the standard deviation.
D. the quartile deviation.
E. more than one of the above.
F. The Post Test

Below is the post test as it was presented to the subjects. The underlined choices were keyed as correct.

Name ____________________________
(Please print)

Quarter and year entered Ohio State University__________

Sex  M   F__________
(Circle which)

Please answer every item.

Circle your choices.
1. Which of the following is represented by a T-score of 50, a stanine of 5 and a z-score of 0.

A. the mean.
B. the median.
C. the standard deviation.
D. the quartile deviation.
E. more than one of the above.

2. Which of the following is a point that is affected markedly by extremely high or low scores.

A. the mean.
B. the median.
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3. Which of the following may be obtained by summing the scores and dividing by the total number of scores.

A. the mean.
B. the median.
C. the standard deviation.
D. the quartile deviation.
E. more than one of the above.

4. Which of the following includes approximately 68 percent of the cases when measured above and below the mean in a normal distribution.

A. the mean.
B. the median.
C. the standard deviation.
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5. Which of the following shows the highest degree of correlation?

A. .40
B. -.20
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6. In a frequency distribution of 250 scores, the mean is reported as 78 and the median as 65. One would expect this distribution to be

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7. A student's raw score is exactly in the middle of the range of raw scores assigned a stanine of 7. If his raw score were assigned a T-score, it would be numerically equal to

A. 30
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8. Under a scattergram, there is a notation that the coefficient of correlation is .06. This means that

A. most of the cases are plotted within a range of 6% above or below a sloping line in the diagram.
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9. The standard deviation of I.Q.'s on the Binet scale of a representative sample of white urban school children has been found to be about 16. This means that approximately 34% of the cases will have I.Q.'s between

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10. In the set of scores: 27, 50, 13, 5, 46, 34, 63, the median is closest to

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11. Which of the following is represented by a distance of 10 T-score units, 2 stanine units and one z-score unit.

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   A. the mean.  
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   C. the standard deviation.  
   D. the quartile deviation.  
   E. more than one of the above.

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   A. the mean.  
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   E. more than one of the above.

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   A. the mean.  
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20. In order to compute a correlation coefficient between traits A and B, it is necessary to have

A. measure of trait A on the group of persons, and of trait B on another.
B. one group of persons, some who have both A and B, some with neither, and some with one but not the other.
C. two groups of persons, one which could be classified as A or not A, the other as B or not B.
D. measures of traits A and B on each person in one group.
21. For determining reliability, for retesting doubtful cases, or for measuring growth, it is most useful to have

A. equivalent forms.
B. adequate forms.
C. objectivity and interpretability.
D. logical and empirical validity.

22. What is most wrong with the statement, "This test is valid."

A. The statement does not specify what the test is valid for.
B. The word "valid" is vague. A numerical coefficient should be given.
C. A test does not show validity or lack of it.
D. The statement is meaningless, since it does not specify the conditions of administration.

23. Validity is determined by finding the correlation between scores on

A. the even numbered items on a test and the odd numbered items on that test.
B. one form of a test and another form of that same test.
C. a test and some independent criterion.
D. two administrations of the same test.

24. The use of the normal curve as a basis for assigning school marks is most legitimate when

A. a standardized test is used.
B. all of the pupils have approximately the same I.Q.
C. the marks are to be assigned to a large and representative group of pupils.
D. the average pupil scores 85 on the test used.

25. Sue answered correctly 25 out of 50 items on an arithmetic test. What interpretation can be made of Sue's performance on the test?

A. Sue placed at the 50th percentile.
B. Sue needs remedial work in arithmetic.
C. Sue knows about one-half of the material in arithmetic.
D. No interpretation of the score is possible on the basis of the information given.
26. The term objective, when used to label an educational test, describes

A. a characteristic of the scoring process.
B. a typographic feature of the test.
C. the degree of standardization of the test.
D. the content limitations of the questions.

27. In giving a standardized test a teacher allows too much time. This is most likely to adversely affect

A. the reliability of the test.
B. the validity of the test.
C. interpretation in terms of norms.
D. the ranking of pupils.

28. Which one of the following scores appearing in a student's record would be most meaningful without further references to the group?

A. 23 items correct in an English test of 40 items.
B. 30 items wrong in an algebra test of 50 items.
C. 100 words per minute in a typewriter test.
D. omitted ten items in each of the English and algebra tests.

29. Scores on standardized intelligence tests are based on the assumption that all pupils

A. have had some experience with such tests.
B. have had some formal schooling.
C. have had similar backgrounds of experience.
D. are unfamiliar with the test material.

30. Advocates of "culture fair" tests of mental ability can most justifiably criticize the Stanford-Binet because of its emphasis in measuring

A. organization of ideas.
B. fluency of ideas.
C. verbal abilities.
D. innate abilities.
Appendix V

Raw Data
Appendix V

The Raw Data Scores for all Subjects
The Raw Data Scores for all Subjects

N = 163

1. Subject Number - S#
2. Sex
3. American College Test Standard Composite Score - ACT
4. Pre-test on academic learning task - PRE
5. Post test on academic learning task - POST
6. Difference score between pre and post test - DIFF
7. Anomie
8. Internal-External Locus of Control Scale - IE
9. Social Desirability Scale - SD
10.-13. Myers-Briggs Scales
   10. Extroversion-Introversion - EI
   11. Sensing-Intuiting - SN
   12. Thinking-Feeling - TF
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