RELATIONSHIPS BETWEEN INTELLIGENCE AND PERSONALITY VARIABLES

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PREFACE

The traditional dichotomy between personality and intelligence has often been a subject of speculative interest to psychologists, but little research has been designed to investigate the problem directly, though much research has explored relationships between intelligence and personality variables. The primary purpose of this study was to find evidence indicating whether the use of this dichotomy is really meaningful, or whether, in fact, personality and intelligence are so closely related as to make such fractionation impossible. Of course, a final answer to such a comprehensive question cannot be found in a single study. However, the findings in this study give strong leads for further research toward a final answer.

Without the aid and cooperation of many people, this research could never have been done, and to these people, I would like to express my sincere appreciation.

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CHAPTER I

THE PROBLEM

Background of the Problem

Relationships between intelligence and personality variables have been investigated and commented on since the two concepts originated; indeed, such terms as "demented" and "insane" presuppose that personality anomalies are accompanied by a breakdown of intelligence. In practice, however, psychologists usually have treated intelligence and personality as a dichotomy. The principal purpose of this investigation was to examine relationships among intelligence variables and personality variables in order to find evidence concerning the feasibility of retaining this traditional dichotomy.

Much attention has been given to the theory of intelligence proposed by Charles Spearman (1927). Intelligence, according to Spearman, can best be explained in terms of a general factor, "g," underlying all intellectual activity, and a specific factor, "s," relevant to each specific task. An individual's success in each activity is dependent upon both his amount of "g" and his amount of "s" for the task at hand.

Based on the work of some of his students, including Garnett (1919), Spearman concluded that "g" and "s" could not account for all variance found in correlations between tests of "g" and ratings by

others, and proposed two additional general factors. These were "w," "...describable as purposive consistency, or even as self-control." (p. 359), and "c," an "...obverse aspect of (mental) inertia." (p. 59). These latter two factors Spearman subsumes under the general heading of "the law of conation," or ability to strive toward a goal. Saturated with "w" are such traits as cheerfulness, emotional oscillation, and liability to depression. Saturated with "c" are quickness, originality, and humor. Spearman seems to consider "w" as a general factor underlying some traits of personality functioning, and "c" as a general factor underlying some traits of creativity.

Although Spearman's notion of "g" and "s" has been often quoted, his "w" and "c" concepts have not enjoyed similar popularity, even though Spearman stated that many intellective traits could be explained only on the basis of combinations of general factors.

Stoddard (1943) also proposed that a definition of intelligence must include traits generally considered to be nonintellective. He makes this statement:

> A choice that swings the child away from the course of straight thinking is, in and of itself, an intellectual inferiority. The Coolidges who do not choose to run or the Ferdinands that do not choose to fight should not thereby be proclaimed as good runners or good fighters on the ground that, <u>if</u> they had run or fought, they would have done well. There is no such thing as a child who can solve a problem 'if he wants to,' unless over a reasonable sampling of time and situation he shows such intention. (p. 28).

Concentration and a resistance to emotional blockings are considered by Stoddard to be essential to intellectual functioning.

The point Stoddard attempts to make is that intelligence should be defined in terms of adaptive behavior, or as he calls it, "adaptiveness to a goal."

Porteus (1959), in his plea for ability tests which include a measure of planning ability, says:

> If we could only declare, with any measure of assurance, what a Binet, Wechsler-Bellevue, Porteus Maze, or Rorschach test score means in terms of social adjustment or adaptability, then psychometry would no longer depend on the shifting sands of teachers' judgments, cross-validation, examiners' intuitions, psychologists' fashions, popularity, and the like. (p. 11).

Most tests of intelligence, however, and most tests of personality functioning purport to measure only those traits of intelligence or personality which the authors designed the tests to measure, and give little or no consideration to possible contamination by other variables. There is mounting evidence that more consideration is now being given to these considerations. Wechsler (1949) comments:

> ...any and every test of intelligence measures something more, often a good deal more, than sheer intellectual ability---or any aspect of it, verbal, abstract, numerical, or even "g." Some of these other capacities, traits, etc., have been identified for some time and include, among other vectors, variables which have previously been called traits of temperament and personality... (p. 5).

Anastasia (1961) states that "...the traditional dichotomy between intellectual and nonintellectual factors seems to be gradually breaking down." (p. 353).

As yet, however, little concrete data are available to indicate just what relationships exist between these variables or what the nature of such relationships might be.

Pilot data preceding the present investigation have given indication that neuroticism as measured by Eysenck's Ranking Rorschach Test (Eysenck, 1947) correlates rather strongly and negatively with intelligence as measured by the Wide Range Vocabulary Test (Atwell and Wells, 1947). This finding aroused some interest in the question of

whether or not this finding might also be found with other Rorschach measures. Since the Ranking Rorschach purports to be a measure of neuroticism, the question also arose as to whether other tests of neuroticism might also correlate with intelligence. This study includes an investigation of these problems.

Since the publication of the Taylor Manifest Anxiety Scale (Taylor, 1953), the journals have been filled with articles related to it and to the concept of anxiety. Spence and Taylor (1951) propose that anxiety acts as a component of the generalized drive state of the organism; and as such, it should act as any other drive in learning situations. It would seem, on a logical basis, that one could expect a nonlinear relationship between anxiety test scores and performance on tests of intelligence. Those who are very low on the anxiety scale would be expected to have insufficient drive to perform well, but as anxiety (drive) increases, intelligence scores would also increase. This trend could be expected to continue up to the point where anxiety becomes a very strong force and competing responses to the anxiety itself inhibit performance on the intelligence test and scores begin to drop. One would, from the above argument, expect a quadratic relationship between these variables. Support for this position has been found in pilot data.

Users of the Rorschach Test have proposed that certain determinants give indication of the level of intellectual functioning. If this is true, then it should be expected that some relationship would be found between these determinants and non-projective measures of intelligence. The question again arises as to what the nature of these relationships might be; if, indeed, such relationships do exist. Data relevant

to this question are presented in this report.

A similar question arises as to the relationships between projective and non-projective measures of personality functioning. Although many studies have been done to investigate these relationships, there has been little agreement in the results. This may be seen from studies cited in Chapter II of this report. This study includes a consideration of this problem.

Edwards (1957) brought to light another complicating variable when he proposed that subjects' responses on personality scales might be contaminated by the tendency to respond to items on the basis of social desirability. The publication of his social desirability scale set off a battle which has been raging through the journals ever since. The question at issue is whether Edwards' scale is measuring social desirability, tendencies to acquiesce, tendencies to lie, or some other response tendency. Other scales have appeared which are proposed to be more "true" measures of social desirability. Although the controversy has not yet been resolved, it now seems clear that there do exist response tendencies which tend to influence test scores, and that it is important that these tendencies be either controlled or accounted for. Here, again, however, little has been done toward determining the nature of relationships existing between response tendencies and other variables.

Statement of the Problem

The preceding discussion brings to light a number of specific problems related to the general question concerning the traditional dichotomy between intelligence and personality. The principal question

under study here might be stated as follows: Is it really possible to separate human traits into independent parts, or are intelligence and personality functioning so integrated as to make such separation impossible or impractical?

To arrive at some evidence related to this general question, the following problem areas were investigated:

1) Interrelationships between measures of intelligence and measures of personality functioning.
2) Interrelationships among projective and non-projective measures of intelligence.
3) The linearity or nonlinearity of such relationships.
4) Relationships between projective and non-projective measures of personality functioning.
5) The effect of response tendencies as measured by social desirability scales on the above variables.

It is, of course, impossible in a single study to make a thorough investigation of all possible relationships between all measures of intelligence and all personality measures--or even all personality traits. In this study "personality" is limited to certain indices of anxiety, neuroticism, conformity, and social desirability. "Intelligence" is limited to measures of vocabulary and ideational fluency.

CHAPTER II

A REVIEW OF THE LITERATURE

This review will be divided into two general areas: 1) empirical evidence concerning the relationships between measures of intelligence and personality; and 2) empirical evidence concerning the relationships between various measures and dimensions of personality functioning. These studies and their findings will then be discussed in terms of the problems under investigation in this study.

Intelligence and Personality

Attempts to examine possible relations between measures of intelligence and the measures of personality under study here abound in the literature. Most of these studies have made use of measures of general intelligence and attempted to correlate these intelligence test scores with various measures of personality functioning. This literature will be examined separately by personality traits investigated. First, studies will be presented dealing with non-projective measures of personality; then, studies which have utilized Rorschach categories will be presented.

Intelligence and the Maudsley Personality Inventory Neuroticism Scale

Two studies have attempted to assess the relationship between intelligence and the Maudsley Personality Inventory neuroticism scale

(MPI-n) (Eysenck, 1956). Development of the MPI grew out of Eysenck's theory of personality (Eysenck, 1953). It is his belief that there are at least three "dimensions" of personality: Introversion-Extroversion, Neuroticism, and Psychoticism, and that these "dimensions" are independent of each other. The MPI was constructed, using item analysis and factor analysis of other scales, to measure the Introversion-Extroversion and Neuroticism "dimensions." Since the relationship between intelligence and the MPI-n was examined in this investigation, these studies are reported below.

Bendig (1958a), using 210 male undergraduate students, failed to find any significant relationship between MPI-n scores and either scores on the vocabulary section of the Cooperative School and College Ability Test (1958) or the American Council on Education's Psychological Examination for College Students (1954).

Lynn and Gordon (1961) found a significant Pearson r of .30 between the MPI-n and the Mill Hill Vocabulary scale and of -.27 between the MPI-n and Raven's Progressive Matrices. Their sample consisted of 60 male undergraduates.

It is difficult to conjecture what factors entered into the different results obtained in these studies. A strong clue is to be found in the fact that Lynn and Gordon discovered a curvilinear relationship between the MPI-n scale and the Matrices test. However, this does not account for the difference between results where vocabulary tests were used. This difference may be due to differences in difficulty level of the vocabulary tests used.

Intelligence and the Taylor Manifest Anxiety Scale

A number of studies have attempted to determine whether or not

a significant relationship exists between measures of intelligence and the Taylor Manifest Anxiety Scale (TMAS) (Taylor, 1953). The findings here seem to be confusing and inconsistent. A number of these studies indicate that a relationship exists and many more report negative findings. The present study also includes an investigation of this relationship.

Calvin, Koons, Bingham, and Fink (1955) administered the Wechsler-Bellevue and the TMAS to 51 students and obtained correlations ranging from -.29 with Vocabulary and Object Assembly to -.48 with Block Design. Correlation with Verbal I.Q. was -.39, with Performance I.Q. -.44, and with full I.Q. -.31. Although significant correlations were obtained with only six of the eleven subtests (Information, Digit Span, Arithmetic, Vocabulary, Block Design, and Object Assembly), all coefficients were in the negative direction except that obtained with picture arrangement.

Grice (1955) selected a random sample of 300 airman basic trainees at Lackland Air Force Base and administered the TMAS. From these subjects, he selected the 60 high and 60 low scorers. These subjects were administered the Air Force Clerical Aptitude Test which includes information, vocabulary, numerical operations, and perceptual factors. He found that the mean scores for high and low anxious groups differed by almost a standard deviation with the low anxious scoring higher on the aptitude test. The correlation between the two tests, using the entire sample was -.40.

Kerrick (1955) correlated the TMAS with several other measures using 128 Air Force trainees as subjects. She obtained significant correlations between the TMAS and the Air Force Qualification Test

(-.20), Mechanical Aptitude (-.32), Word Knowledge (-.40), Arithmetic Reasoning (-.27), and Comprehension (-.32).

Walker and Spence (1964) administered the TMAS and the Wechsler Adult Intelligence Scale Digit Symbol tests to 110 undergraduates. Half of the subjects were placed under stress conditions by telling them that the Digit Symbol test was being given as a result of TMAS scores on the recommendation of a faculty advisor. They were also told that their personality test scores would be given them after taking the Digit Symbol test. No stress was placed on the other half of the subjects. Correlation for the two tests for the non-stress group was a significant .26. For the stress group the correlation was a non-significant -.12.

Reiter (1964) found a significant r of .35 between the TMAS and Scholastic Aptitude Test verbal scores of 76 undergraduate students.

Spielberger and Katzenmeyer (1958) found that grade point averages were not related to TMAS scores for either low or high intelligence groups, but for the middle intelligence group the Pearson r (r = -.18) was significant. An F test for linearity of regression for the middle group was significant at the .001 level. He used 1,391 undergraduate students as subjects.

In a previous study Spielberger (1958), using 1,142 college students as subjects, found a correlation of 0 between TMAS scores and scores on the American Council on Education Psychological Examination for College Students (ACE) for the total sample. However, a subsample containing a sizable proportion of males with low ACE scores yielded a highly significant negative correlation between the two variables. Spielberger attributes the 0 correlation for the total sample to the

fact that selection procedures eliminated most of the low range of ACE scorers, and to the fact that the range for females was very severely restricted.

Kluch and Bendig (1955) failed to find a significant correlation between the TMAS and the ACE, although, here again, there was a tendency indicated in the negative direction. This study also found a zero correlation between TMAS scores and achievement.

Mayzner, Sersen, and Tresselt (1955) administered the TMAS and the Wechsler-Bellevue to 55 students in a "how to study" course. They obtained a non-significant r of .19. They also obtained a non-significant r of .14 between the TMAS and the ACE using 145 Freshmen as subjects. The finding in this study for the "how to study" group is interesting in the light of the results reported above for the Spielberger study, in that this study fails to support Spielberger's finding of a highly significant negative relationship between these two variables for low ACE scorers. The remaining difference between the two studies is that of sex, indicating that this may be the significant variable.

Sarason (1956) correlated TMAS and ACE scores of 719 Freshmen and found no significant relationship between them. He also failed to find a significant relationship between TMAS scores and grades.

Using 109 general psychology students as subjects, Johnston and Cross (1962) found no relation between the TMAS and the WAIS Digit Symbol test. They did find, however, in a copying task, that high TMAS scorers copied faster than did low scorers. This finding tends to support the drive theory underlying the TMAS.

Dana (1957) found no significant correlation between TMAS scores

and scores obtained on the Wechsler-Bellevue Intelligence Test. He used 100 normals and 100 neurotic patients as subjects.

A similar study was done by Trent (1957). Using 63 institutionalized delinquent boys as subjects, Trent found no relationship between TMAS scores and scores on the Wechsler-Bellevue.

In a factor analytic study Martin (1959) obtained data on the TMAS and 36 other variables including intelligence. He found the intelligence factor to be independent of the anxiety factor.

Goodstein and Farber (1957) found no significant relationship between TMAS scores and scores on the WAIS Digit Symbol test agreeing with the findings of Johnston and Cross, but contrasting to the findings of Calvin, et al., who reported a correlation of -.31 between the same two variables.

The contrasting results of these studies using the WAIS Digit Symbol test and those using the ACE test point up the fact that no conclusive statement can be made at this time concerning the true relationship or whether or not such a relationship exists between these variables.

Strong clues for direction in future research in this area may be found by careful inspection of the literature. Matarazzo, Ulett, and Saslow (1955) administered the TMAS and a stylus maze task to 101 undergraduate students. By inspection the relationship between TMAS scores and time in minutes to learn the maze to criterion was clearly quadratic in form. An analysis of variance was performed on the data with subjects grouped into seven TMAS groups. A significant F was obtained for the anxiety effect and t tests were performed between the means of anxiety groups. Although this is not generally

accepted as appropriate analysis (Winer, 1962), the results are interesting in that they do indicate a quadratic relationship.

Similar findings were reported by Spielberger and Katzenmeyer (1958) as cited above. The fact that no relationship was found for either high or low grade point groups with TMAS scores, but a highly significant r was found for the middle grade point group is indication of a quadratic relationship.

Broadhurst (1957) adds evidence from animal research that the relation between anxiety and ability may be a nonlinear function. He found by inducing anxiety drive in rats that high and low anxious animals were less efficient in a complex learning task than were those under moderate anxiety drive.

There are also indications in the literature that this nonlinearity may exist in other relationships under investigation here. Lynn and Gordon (1961) found a nonlinear function between the MPI-n and Raven's Progressive Matrices. Altus (1949) found that the regression of Rorschach M responses on intelligence as measured by both the Altus Measure of Verbal Aptitude and the Ohio Psychological Examination was nonlinear. Endler (1961) and Rosenthal (1964) both examined relationships between conformity and other measures of personality including anxiety and acquiescence and, although no test was made, indicated that nonlinearity appeared to be characteristic of the data.

Pilot data preceding the present investigation support the hypothesis of nonlinearity in that a clearly quadratic relationship was found between TMAS scores and scores on the Wide Range Vocabulary Test.

Intelligence and Conformity

Research into relationships existing between intelligence and conformity find similar results even though different measures are used in each study. This study also includes an investigation of this relationship but the measures used are different from any reported in the literature.

Nakamura (1958) found a significant negative correlation between the Concept Mastery Test of intelligence and conformity as measured by the Cruchfield method (Cruchfield, 1955) for men, but no relationship for women. The Cruchfield method consists of placing a group of subjects in an apparatus in such a manner that each knows that the others are there but cannot see them. Slides are presented on a screen in front of the subjects, and each subject must make judgments about them; for instance, select a line the same length as a standard. If a subject is not first to make a judgment he can tell by lights on the panel before him how other subjects before him have answered. Actually, the lights are being operated by the experimenter who sometimes gives wrong judgments to determine whether or not the subject will conform to what he thinks is the judgment of the other subjects.

DiVesta and Cox (1960) also used the Cruchfield method and the ACE test. They also found a small negative correlation.

Trent (1957) found similar results using different measuring instruments. He used the tendency to falsify on the TMAS as his measure of conformity and Wechsler-Bellevue scores as his measure of intelligence. The correlation was significant in the negative direction.

Both Nakamura and DiVesta and Cox found in the results of their studies cited above that sex was a significant variable in the relationships between conformity as measured by the Cruchfield method and intelligence. Borgatta (1962) has also sounded a warning of a need for examining the generality of structures within inventories for males and females separately. Therefore this study includes sex as a variable.

Intelligence and Social Desirability

The above study by Trent might better be considered as an investigation of the relationship between intelligence and social desirability or response tendency.

A study by Sarason (1959), however, failed to verify Trent's finding. Sarason used the Edwards Social Desirability Scale as his measure of social desirability and the ACE as his measure of intelligence. He failed to find any significant relationship. Brown (1958) also used the Edwards scale and found, using a complex learning task, that high scorers on the Edwards scale were significantly better on the learning task than were low scorers in the female group. However, no differences were found for the males, and no differences were found between males and females.

From these findings, it would seem that little can be said concerning these relationships. This study reports findings which may provide reasons for these discrepant results and evidence of the true relationships.

Ideational Fluency and Personality

Very few studies have been designed to investigate relationships between relatively pure factors of intelligence and personality measures, although this would seem to be a productive approach in that better experimental control should result in more conclusive results. For this reason, this study included a measure of ideational fluency.

Ideational fluency is defined as a "flow factor" of intelligence (Fruchter, 1948). It is "...an unrestricted and uncritical flow of ideas---similar to Cattell's 'surgency.'" (Taylor, 1947). It has been found to be an important factor in creative ability and thinking in several studies (Wilson, Guilford, and Christensen, 1954; Berger, Guilford, and Christensen, 1957; Hertzka, Guilford, Christensen, and Berger, 1954; Kettner, Guilford, and Christensen, 1959; and Sultan, 1962).

Sultan (1962) administered 40 tests of creativity and intelligence to 170 English grammar school students along with an ink blot test. Ideational fluency emerged as an independent factor, and neither total ink blot responses nor originality of ink blot responses loaded on this factor.

Denton and Taylor (1955) found that ideational fluency loaded on the same factor as thinking introversion and social extroversion, but made no attempt to interpret this finding.

Merrifield, Guilford, Christensen, and Frick (1961) made an intensive investigation of this area. Data were collected from 221 Naval Air Cadets, 208 Air Force Cadets, and 212 Coast Guard Academy

Cadets. Tests included 33 measures of intelligence and aptitude and 24 measures of motivation and temperament. These scores were intercorrelated and the resulting matrix was factor analyzed. Very little relationship was found between traits of creativity with traits of motivation and temperament. The authors stated, "In this highly intelligent, non-pathological population not more than six per cent of the variance of performance on fluency tests could be accounted for on the basis of any one non-aptitude score." (p. 71). Those traits which did correlate significantly with ideational fluency and their respective coefficients are reported in Table I.

Intelligence and the Rorschach

Many studies have been done in attempts to determine whether or not a significant relationship exists between responses scored in various Rorschach categories and measures of intelligence. These

TABLE I

CORRELATIONS BETWEEN IDEATIONAL FLUENCY AND TRAITS OF TEMPERAMENT
(From Merrifield, et al., 1961)

Trait	r
Impulsiveness	.22
Self-confidence	.20
Appreciation of originality	.16
Ascendance	.16
Logical thinking	.11
Neurotic tendency	-.14

studies have resulted in widely varying conclusions and very little agreement. A group Rorschach measure has been used in this study in an attempt to shed some new light on this problem. Among the categories most studied and most often proposed as possible measures of intelligence are W (responses based on the whole blot), F (responses judged as having close resemblance to the actual form of the blot), M (responses which contain or imply human movement), and R (the total number of responses given by the subject. Other categories have been suggested by some of the studies indicated below. This literature will be presented in two parts. The first studies will contain results indicating that a relationship between Rorschach responses and intelligence does exist; the second group of studies are in essential agreement that there is no such relationship.

Abrams (1955), using 400 mental patients as subjects, found significant correlations between full scale Wechsler-Bellevue I.Q. scores and Rorschach F, M, W, and R scores. From these results he constructed the following Rorschach scoring formula for intelligence:

$$X = \frac{2a + 17b + 9c + 2d}{10} + 76$$

Where: a = Rorschach F + %
b = Number of acceptable M's
c = Number of acceptable W's
d = Total number of R's
X = Estimated measure of intelligence equivalent to the Wechsler-Bellevue Full-Scale I.Q.

He obtained a correlation of .51 for this sample between his scoring formula and Wechsler-Bellevue I.Q. scores. Unfortunately, no cross-validation attempt was reported.

A factor analytic study by Consalvi, Conrad, and Canter (1957) included scores from 45 normal subjects on Raven's progressive Matrices,

the Wechsler-Bellevue Vocabulary subtest and the Rorschach Test. Of the four factors emerging from the analysis, one appeared to be most heavily loaded with intelligence and another with movement; however, M loaded on both factors. Rorschach productivity did not appear to be related to intelligence. Of course, with only 45 subjects in the study, it is quite probable that these experimenters were simply factoring error variance.

Levine and Spivack (1959) also used Wechsler-Bellevue I.Q. scores and Rorschach M responses in their study of four diagnostic groups (N = 587). All correlations were significant beyond the .01 level between intelligence scores and M responses.

Using the Wechsler-Bellevue verbal I.Q. and M responses, Sommer (1958) obtained a significant r from data on 123 mental patients.

In still another study using the Wechsler-Bellevue verbal score, Speigleman (1956) found significant correlations with M, W, and R responses. His subjects were 120 mental patients.

Stark (1962) proposed that M responses give a rough indication of a "foresight and planning" factor of intelligence. This suggestion was made on the basis of literature reviewed by Stark indicating relations between M and TAT length into future of stories, M and scores on a test of everyday planning propensity, and M and behavior in small face-to-face experimental groups described as "suggests action, presents a definite way or means of behavior." He also presents the logical argument that movement responses imply "before and after" states.

The following studies have presented findings contrary to those just stated.

Lotsof, Comrey, Bogartz, and Arnsfield (1958), using 72 children, factored a matrix of correlations obtained from the Rorschach test and the Wechsler Intelligence Scale for Children. The WISC subtests and the Rorschach categories loaded on different factors, indicating independence by each other.

In a study of Amitage, Greenberg, Pearl, Berger, and Daston (1955), 120 mental patients were given the Wechsler-Bellevue and the Rorschach. Sixteen significant correlations were found, all rather small. The six highest were used to obtain a multiple r of .36 with the Wechsler-Bellevue. Using these six categories, an attempt was made to predict I.Q. for an independent sample of 207 cases. The per cent of cases correctly placed within plus or minus 10 points of the obtained I.Q. was not significant. This would indicate that the error of prediction was greater than the standard deviation of the test, making valid prediction impossible.

Davies (1961) used a different approach to the problem. She obtained 70 subjects with I.Q.'s in a rectangular distribution from 40-49 to 100-109. The Rorschach was then given and a tape recording made. A transcription of verbatim responses was made from the recordings. Three post-doctoral psychologists were then asked to judge I.Q. from the recordings and then from the protocols. Estimates made from vocabulary used in the transcripts were superior to those made from the protocols, but neither could be used for valid prediction.

Using a single subject, a normal eight-year-old girl, Allen and Lichtenstein (1960) obtained test-retest data with the Stanford-Binet and the Rorschach. I.Q. scores were 130 and 129. The Rorschach scores varied greatly, and neither protocol gave indication of her superior intellectual level.

Also using subjects of high intelligence, this time 60 adults, Dreger (1960) failed to find any significant relation between Wonderlic Intelligence Test scores and either Rorschach M responses or TAT content categories.

Zubin (1954) in seven studies on creative vs non-creative writers, mathematical statisticians, and high school students, found no differences between creativity groups on Rorschach performance--even with Rorschach type tests designed to elicit movement.

The Group Rorschach and Intelligence

In two studies on the relationship between intelligence and the Munroe Group Rorschach, Altus (1949; 1958) found significant correlations between intelligence and M responses. Measures of intelligence used were the Altus Measure of Verbal Aptitude, the Ohio Psychological Examination, and the ACE.

Wysocki (1957) used a group form of the Rorschach scored by the Klopfer method, Raven's Progressive Matrices, and the S.P. Test 15, a British Army intelligence test. The data were analyzed separately for verbal and non-verbal intelligence for each sex. The sample consisted of 132 males and 85 females. Number of responses yielded the highest correlations ranging from .45 for non-verbal intelligence for women to .39 for non-verbal intelligence for men and verbal intelligence for women. W% correlated .33 with verbal intelligence for women and non-verbal intelligence for men and .24 with verbal intelligence for men. M% was found to correlate significantly with all categories ranging from .39 with non-verbal intelligence for women to .27 for both verbal and non-verbal intelligence for men.

F+% was correlated .36 with verbal intelligence for men. No other correlation with F+% was significant. A% was also correlated only with verbal intelligence for men (r = -.29), but other non-significant correlations were also in the negative direction.

Griffin (1958) had teachers and students rate subjects as creative and non-creative. She then administered the ACE test and the Levy Movement Blots to the subjects. No relation was found between Levy scores and either ratings for creativity or ACE scores.

Stone (1958) reports two studies indicating validity of the Structured-Objective Rorschach Test (SORT) for prediction of intelligence. In the first study 2,600 Freshmen at Brigham Young University were administered the SORT, and correlations were computed between SORT scores and grade point at the end of the Freshman year. The correlations obtained in this study are presented in Table II. Multiple correlations were then computed between the categories correlating most highly with grade point (F, F-, Fch, and P) and grade point, and between F-, P, and high school grade point and first year college grade point. The first of these yielded a multiple correlation coefficient of .641 and the second of .680. Unfortunately, no report is made of attempts to cross-validate these results on an independent sample.

In the second study, Stone collected supervisors' ratings of 412 employees in a steel plant, an aircraft factory, and a municipal fire department. Each subject was rated on each of the 20 traits which the SORT purports to measure. In 62.5% of the cases, there was essential agreement between SORT measures and supervisors' ratings. In 17.3% of the cases, the SORT measurement was lower

TABLE II

CORRELATIONS BETWEEN SORT SCORES AND GRADE POINT
(From Stone, 1958)

SORT Variable	r
W	.321
D	-.282
Dd	.094
S	.037
F	.416
F-	-.412
M	.110
FM	-.081
FC	.195
CF	-.136
Fch	.383
A	-.219
H	.325
P	.417
O	-.278

than supervisors' ratings, and in 20.2% of the cases, the SORT measurement was above supervisors' ratings.

Eysenck (1947) reports a correlation of .08 between his Ranking Rorschach Test (RR) and Raven's Progressive Matrices, and of .27 with the Mill Hill Vocabulary Test.

Relationships between Measures of Personality

The following studies have investigated possible relationships between measures of personality functioning. Some of the studies cited here have used measures not included in the present study, but are included because these measures purport to measure the same dimension of personality under investigation here. It may also be noted that some of the relationships reported in the present study are not represented in this review. This is due to the fact that no previous research could be found in the literature.

In this review examination will first be made of literature which has investigated relations between the Rorschach and non-projective measures of personality. In a separate section, examination will be made of literature which has investigated relations between various non-projective personality measures.

Social Desirability and the Rorschach

Very little research has been done to investigate the effect of response tendency variables on Rorschach responses; and what little research is available is inconclusive. This relationship has been investigated in this study.

Tutko (1964), using the Marlow and Crowne Social Desirability Scale (MC-SD) (Crowne and Marlowe, 1960) with a sample of 60 mental patients, found that Rorschach responses were strongly affected by the social desirability variable. Pena (1959), using the Edwards Social Desirability Scale (E-SD) with 30 mental patients, found a non-significant correlation of -.23. Pena obtained his E-SD data

from scoring from the MMPI records of the patients. The author would suggest that this procedure might well obtain different results than what might be obtained from direct administration of the E-SD. Both of the above studies may also be criticized on the basis that the use of small samples of mental patients will almost certainly result in range restriction.

Investigation of research dealing with the effect of social desirability on group Rorschach responses yields similar results. LeNoue, Spilka, VanDeCastle, and Prince (1961) failed to find any influence of social desirability on group Rorschach responses. The group Rorschach was one of their own construction.

Langer (1962a; 1962b), using the Gough Adjective Check List as his measure of social desirability, found the SORT P score to be strongly affected by social desirability, but W and Dd scores were not so affected.

Rorschach and TMAS Relationships

A number of studies have attempted to relate anxiety as measured by the questionnaire method to anxiety as measured by projective techniques. Most of these make use of the TMAS and the Rorschach as the measures of anxiety. Westrope (1953) divided her subjects into two groups on the basis of TMAS scores. She used college students as subjects with 24 subjects in each of the high and the low anxious groups, each group comprising 20% of the total sample. She found that total responses and shading were greater for the high anxious group. Shading (Fch) is, of course, the usual scoring category for anxiety. Ratings by judges differentiated successfully between the

two groups, and the RCT score obtained by the Elizur (1949) procedure also differentiated between groups.

Results obtained by Goodstein and Goldberger (1955) gave partial support to those obtained by Westrope. Using the same procedure with a smaller sample (N = 16 per group), they also found that anxious subjects gave more total responses and more RCT anxiety responses. They also found that anxious subjects had longer reaction times. However, the finding of fewer W responses for anxious subjects was not found by Westrope, and Westrope's finding of more shading responses by anxious subjects was not confirmed by Goodstein and Goldberger.

Schwartz and Kates (1957) used an even smaller sample (N = 12 per group) and only female subjects. They found confirmation for the finding of longer reaction times for anxious subjects, but also found higher F scores and lower M scores for the anxious group.

Further support for the Elizur scoring as a measure of anxiety was found by Goodstein (1954). Using 57 college students, he found a significant correlation of .38 between TMAS scores and the Elizur scoring. Between TMAS scores and total number of responses, however, he found a non-significant r of .18.

Waller (1960) obtained Rorschach protocols and TMAS scores from 60 psychiatric patients and found no significant correlation between TMAS scores and either shading or texture responses.

Wise (1957) found results contrasting with those of Waller and supporting the hypothesis that the shading response is indicative of anxiety. In this study, using 40 medical corpsmen in each the high and low TMAS groups, Wise found that shading did differentiate significantly between groups. Number of responses and number of

rejected plates also differentiated between TMAS groups. However, expert clinicians, using the whole protocol, made only 44% correct assignments to anxious and non-anxious groups. Holtzman (1954), using 64 subjects in each TMAS group found that only color responses successfully discriminated between groups.

Other studies have examined possible relations between TMAS scores and scores obtained from the SORT. Hammes and Osborne (1962) studied SORT scores for 38 low anxious and 31 high anxious subjects as defined by the TMAS. The only SORT scales to differentiate between groups were Dd with high anxious subjects scoring higher, and S with low anxious subjects scoring higher. Studies by Langer, Carlisle, and Hayes (1963a) and by Langer, Hayes, and Sharpe (1963b) found significant relationships between TMAS scores and both the H and the CF categories. No other relationships with TMAS scores were significant.

It is obvious from the above studies that relationships between Rorschach categories and TMAS scores remain very much an open question. One reason for this may be found in the subjective scoring procedures on the Rorschach test. Wide differences are also to be found in the samples used in the studies. This could account for some of the lack of agreement.

The Rorschach and Conformity

In the study cited above by Langer, Carlisle, and Hayes, an attempt was also made to assess relationships between SORT scores and conformity as measured by the Bernberg Human Relations Inventory. Significant relationships were found for the O category and for the Fch category. For the O factor, the mean was significantly higher

for the high conformity group than for the low conformity group--a rather puzzling finding since non-conformists should give more original responses according to Rorschach theory. For the Fch factor the mean for the low conformity group was higher than for the high conformity group. If Fch is actually a measure of anxiety as it is purported to be, this would mean that non-conformists are more anxious than conformists.

Eysenck's Ranking Rorschach Test (Eysenck, 1947) rests upon the assumption that a strong relationship exists between conforming behavior and neuroticism. Eysenck makes the following statement in presenting his scale: "Ultimately, what causes a response to be labeled 'neurotic' and another to be labeled 'normal' is precisely this quality of conforming." (p. 214). Since Eysenck feels that the neurotic will be non-conforming, the Langer, Carlisle, and Hayes study tends to support his position.

Social Desirability and the TMAS

Some studies by Sarason (1961; 1959) and by Adams and Kirby (1963) have found negative correlations between the TMAS and the E-SD. Though the authors do not mention the fact in their articles, these two scales are both derived from the MMPI and contain a great deal of item overlap with the overlapping items usually keyed in opposite directions. These results, then could easily be explained on this basis. Such negative correlations cannot be demonstrated unless the scales are made independent of each other.

It would be expected from a rational basis that social desirability and conformity would be highly correlated in the positive direction, but a study by Levy (1959) found a significant negative correlation

between scores on the E-SD and conformity as measured in the Cruchfield situation. A careful review of the literature failed to reveal any other investigation of this relationship.

Conformity and the TMAS

If conformity and social desirability are negatively correlated as the Levy study indicates, and if social desirability and TMAS scores are also negatively correlated as indicated by the above research, then it would be expected that conformity and TMAS scores would also be negatively correlated. The bulk of the literature concerned with this relationship fails to confirm this expectation. Rosenthal (1964) used the Asch (1956) situation to measure conformity and failed to find any significant relationship with the TMAS; however, the non-significant r was in the positive direction.

Meyers and Hohle (1962) found a small but significant correlation between the TMAS and conformity as measured by the Olmstead and Blake simulated group procedure (Olmstead and Blake, 1955). This correlation (r = .27) is small, but significant in the positive direction.

Mangan, Quartermain, and Vaughan (1959) divided subjects into two groups on the basis of high and low TMAS scores. Each group contained 12 subjects taken from a total N of 90. It was found that the high TMAS scorers yielded to group pressures more than did the low TMAS scorers, again indicating a positive relationship between conformity and TMAS scores.

DiVesta and Cox (1960) used the Cruchfield situation for conformity measurement and found a non-significant negative correlation with TMAS scores.

Indications are, then, that the direction of the relationship may well be a function of the measurement of conformity used, a negative relationship resulting from the Cruchfield measure and positive relationship resulting from other measures.

TMAS and the MPI-n

There is ample evidence that the MPI-n and the TMAS are closely related. All of this work has been done by Bendig (1957; 1958b; 1961; 1962; and 1963). All of these studies used large numbers of subjects (N's range from 141 to 210), and all are factor analytic studies except the 1957 study. The factor analytic studies, of course, include many other variables, but of interest here is the fact that correlations between the MPI-n and the TMAS are consistently high, ranging from .72 to .81. When factor analyzed, the TMAS and MPI-n consistently load on the same factor. Bendig calls this the "emotionality" factor.

Summary and Discussion of the Review

In reading the literature just cited, one is almost overwhelmed by the inconsistency of the findings. In almost none of the areas investigated can agreement be found as to the relationships existing among these variables.

Some possible reasons for this dearth of agreement may be seen through inspection of the measuring instruments used, the samples used, and the analysis techniques used.

Where different measures of intelligence are used in different studies, we must consider the equivalence of the two measures before we can interpret the differences found in the correlations, since

factor structures may vary from one intelligence test to another. For example, the ACE and the WAIS Digit Span tests probably are quite different in factor structure and could not be expected to correlate in the same degree with another variable. For this reason it would seem more profitable to investigate relationships between intelligence and personality in terms of pure factors of intelligence and personality as defined by the particular test being used.

Another possible reason for these conflicting results may be seen by examining the samples used in the studies. Some studies use only male psychiatric patients, some only female undergraduates, some only male military trainees, and others only introductory psychology students with no consideration given to possible differences existing between sexes, ages, ranges of ability, or other variables which could exert influence on the data. Sample sizes may also be seen to vary greatly. Some are so small as to make the results inconclusive.

Few of these studies have reported any attempt to test the assumptions underlying the statistical procedures used to analyze their data. Most studies make use of the Pearson Product-Moment correlation analysis; but for this analysis to be appropriate requires that the assumption of linearity be met. Many of those studies which have reported a test of this assumption report a nonlinear trend in the data as reported above. If this nonlinearity should be a true characteristic of the actual relationship between variables in the population, then those studies which have used linear analysis are meaningless, and the conflicting results obtained could be accounted for on this basis.

CHAPTER III

METHOD

Design

The experiment was designed with the expectation of procuring evidence which would lead to solutions of the problems stated at the end of Chapter I. To this end, both projective and non-projective measures were selected to obtain data on the following kinds of constructs: 1) intelligence, 2) anxiety, 3) neuroticism, 4) conformity, 5) social desirability. These constructs are defined only in terms of the measures used.

Data were obtained on all measures from all subjects, and scores were intercorrelated using the Pearson Product-Moment correlation (r) technique. The computation was carried out by use of the 1410 computer at Oklahoma State University.

When reliabilities are less than unity, it is advisable to make corrections for attenuation resulting from the error variance contained in test scores (Guilford, 1956). This procedure permits us to see what the correlation is between the true variance contained in the variables correlated, or what Block (1963) calls "conceptual equivalence" of measures.

A difficulty existing in the use of the correction for attenuation lies in the fact that there is no known method of computing the standard

error for a corrected coefficient and therefore, no way of testing the significance level.* In this study all coefficients which were meaningful were corrected for attenuation in order to obtain a better estimate of their conceptual equivalence. Although no meaningful test of the significance level of these coefficients can be made, the assumption can be made that the significance level will be no lower than that of the uncorrected coefficient.

The next step in the analysis was to test the data to determine whether or not significant deviations from linearity existed. The method was that recommended by Guilford (1956) using the correlation ratio (ETA) as an index of correlation for curved regression, and an F test for linearity of regression. This technique is based on an analysis of variance approach to test the difference between ETA and r. A significant F indicates that a curved regression will be the function of best fit.

ETA coefficients were computed between the non-projective measures of intelligence and certain other variables of particular interest to this study. These were the RR, MC-SD, E-SD, BCS, TMAS, MPI-n, and the SORT Th, St, Or, An, and AP scales. The SORT scales are measures of the traditional Rorschach W, F, O, Fch, and M categories.

Since ETAxy and ETAyx will not necessarily be the same unless correlation is perfect, both coefficients were computed.

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*Personal communication from B. F. Winer, Purdue University.

Subjects

All subjects were students at Oklahoma State University enrolled in courses in Introductory Psychology, Educational Psychology, or Education Orientation during the Summer of 1964. Although partial data were obtained on over 200 subjects, complete data were available on only 142 due to the necessity of repeated testing sessions. The sample consisted of 111 female and 31 male subjects. Due to the evidence cited in Chapter II concerning the sex variable, the effect of this variable was analyzed for in this experiment.

Tests

The tests used as measuring instruments in this study will be discussed in terms of the constructs which they purport to measure.

Intelligence

The author feels that the use of tests which measure relatively pure factors of intelligence will prove to be more productive than the use of tests of general intelligence in that less error variance will be correlated and results of different studies will be more directly comparable. The two non-projective measures of intelligence chosen for this study, then, are factor tests.

The Wide Range Vocabulary Test, Form C (WRVT) (Atwell and Wells, 1945) was chosen because the vocabulary factor correlates with general intelligence ($\underline{r}$ = about .80) (Wechsler, 1941) and because most vocabulary tests measure a pure factor (French, Ekstrom, and Price, 1963). The WRVT is a 100-item multiple choice vocabulary test with

items arranged in alphabetical order. Since no published reliability could be found, an item analysis was performed on the total sample of 195 cases obtained for the present study, and internal consistency reliability was computed using the KR-20 technique (Richardson and Kuder, 1939). The obtained coefficient was .87, indicating that the instrument is quite satisfactorily reliable. KR-20 is considered to be an accurate estimate of reliability (Guilford, 1956). Difficulty level of the test items was well distributed from p = 1.0 to p = .08. Sample items of the WRVT and instructions for its administration may be found in Appendix A.

The Things Categories Test (Cattell and Taylor, 1962) (TCT) is intended to be a measure of ideational fluency, well established as a factor of creativity as was pointed out in Chapter II. The TCT is administered in two parts, each presented on a single sheet of paper. The two parts together with a front cover sheet containing instructions and a practice exercise are stapled together to form a test booklet. Part 1 (TCT-1) requires the subject to write down all the things he can think of that are always round or that are round more often than any other shape. Part 2 (TCT-2) requires him to write down things which are blue. Each of the parts has a time limit of 3 minutes. The parts are scored separately, the score consisting of the number of correct things written down. The score referred to in this study as TCT-3 is the total of the two parts. Scoring is very lenient since the factor of ideational fluency refers to quantity of responses rather than quality.

The Structured-Objective Rorschach Test (SORT) (Stone, 1958) was chosen as the projective instrument to obtain measures of intelligence.

The SORT makes use of the same 10 ink blots as the traditional Rorschach test, but the blots are presented to a group of subjects at a time by projecting one blot at a time on a screen. Each subject is given a test booklet and an IBM answer sheet. The subject is asked to make 10 responses to each blot. Each of these responses must be selected from a group of 3 possible responses on the basis of which of the 3 he finds best represented by the blot or some part of the blot. Instructions to the subject and sample items may be found in Appendix A. Scoring of the SORT is based on traditional Rorschach technique, using Area, Determinants, and Content as scoring criteria. Appendix A contains a review of Rorschach scoring categories employed in scoring of the SORT.

In addition to the usual Rorschach scoring categories, Stone proposes that eight factors of intellectual functioning can be obtained from SORT scores. These factors, the Rorschach scoring category used for each, and the definition of each factor as given by Stone are as follows. Following each definition is the abbreviation of the factor as used in this report:

1) Theoretical (W) . . . facility for generalizing, capacity for abstraction (Th)
2) Practical (D) . . . facility for dealing with concrete detail (Pr)
3) Pedantic (Dd) . . . Facility for dealing with minute detail (Pe)
4) Induction (W:M) . . . capacity for inductive logic; ability to synthesize abstract principles (In) (W:M is the average of W and M)

5) Deduction (D:M) . . . capacity for deductive logic; ability to analyze (De)

6) Rigidity (S) . . . tendencies toward stubborn, cantankerous, resistant, fixed ideas (Ri)

7) Structuring (F) . . . contact with reality, perceptive awareness (St)

8) Concentration (F:F-) . . . ability to focus attention, to maintain concentrative focus (Co)

In addition to these eight measures proposed by Stone, the SORT also provides the following measures:

1) Activity Potential (M) . . . energy productivity (AP)
(M is most often proposed in the literature as a measure of intelligence from Rorschach scores)

2) Popular (P) . . . tendencies to perceive elements which are common (modal) to those most other persons perceive (Po)
(One might reasonably expect this factor to correlate negatively with creativity)

3) Original (O) . . . tendencies to perceive elements which are unique or uncommon (Or)
(One might reasonably expect this factor to correlate positively with creativity)

Anxiety

The SORT manual, in agreement with most Rorschach experts (Beck, 1944; Klopfer and Kelley, 1942) scores Fch responses in terms of anxiety (An). This, then, is used in this study as the projective measure of anxiety.

The non-projective measure of anxiety chosen for this study was the Taylor Manifest Anxiety Scale (TMAS) (Taylor, 1953). The TMAS consists of 50 items taken from the MMPI and judged by a group of five psychologists as overt admissions of feelings of anxiety. Reliability of this scale has been established at .82 in a test-retest situation with five months between testings (Taylor, 1953). This estimate was obtained using the 50 anxiety items embedded in 175 buffer items. In this study only 28 of the TMAS items were used due to item overlap with the E-SD scale. Reliability of the 28-item scale as used in this study was .74 as estimated by the KR-21 technique (Wikoff, 1965). Since KR-20 is an underestimate, the reliability of this scale appears to be satisfactory for research purposes.

Neuroticism

The Eysenck Ranking Rorschach Test (RR) (Eysenck, 1947) was selected as the projective measure of neuroticism largely due to the previously mentioned correlation with intelligence found in pilot data, and because of literature indicating that it has substantial reliability and validity (Eysenck, 1947; 1945). The RR, like the SORT, makes use of the standard Rorschach ink-blots in a group situation by projecting the blots on a screen. Nine possible responses are provided for each blot. The subject is requested to rank the nine responses on the basis of the degree to which the response is represented in the blot. Four of each set of nine responses are keyed as a neurotic response. The score is the sum of the ranks assigned to the neurotic responses. Therefore, a low score is indicative of high neuroticism.

In the course of planning the experiment, speculation arose as to

whether or not the RR was actually a projective technique--that is, whether or not the use of the blots actually contributed to the way the subject would rank the responses. In order to determine whether or not the blots were contributing to the manner of responding, the following procedure was carried out. Two classes in Education Orientation were selected (N = 62). In the first group, the RR was administered first with the blots, and then without the blots. In the second group, the two administrations were reversed in order so that presentation might be counterbalanced. It was found that the scores did differ under the two conditions of administration, and the assumption was made that the blots were effective. These data are presented in Table III. Although the means appear to differ but little (D = 2.3516), the variances are quite different. Variance for the "with blots" administration is 4.9874, and for the "without blots" administration the variance is 10.8684. Since the two administrations both used the same subjects, it was necessary to compute the significance of the difference between correlated rather than uncorrelated means. Correlation between the two sets of scores is .43 which is significant beyond the .01 level. The t value for the significance of the difference between means was 15.2503, indicating (for a sample of 62 cases) that these two sets of scores did arise from different populations. These pilot results indicated that the blots should be used in the major investigation. Instructions to the subjects for both conditions of administration may be found in Appendix A.

The non-projective measure of neuroticism chosen for the study was the Maudsley Personality Inventory neuroticism items (MPI-n) (Eysenck, 1956). This scale consists of 24 items, but only 23 were

used in this study. The omitted item was so similar to an item in the TMAS that it was assumed that the items were not independent of each other. Reliabilities for the MPI-n range from .70+ (Bartholomew and Marley, 1959) to .88 (Bendig, 1959). Further discussion of this scale including its underlying rationale has been presented in Chapter II.

TABLE III

PILOT DATA FROM ADMINISTRATION OF THE RANKING RORSCHACH TEST WITH AND WITHOUT RORSCHACH PLATES (N = 62)

	With Plates	Without Plates
Means	21.1468	23.3984
Variances	4.9874	10.8684
Standard errors	.2834	.4184

Standard error of the difference = .1542
t = 15.2503
Critical value of t (p = .001) = 3.460

Conformity

The SORT manual scores the average of O and P as conformity, defined as "...tendencies to respond to social pressures (mores) as opposed to personal eccentricity..." (p. 8). This O:P score is used in this study as the projective measure of conformity; however, attention is also paid to the O and P scores since it can reasonably be expected that they should show some relationship to conformity.

The Barron Independence of Judgment Scale (BCS) (Barron, 1953) was used as the non-projective measure of conformity. This scale

consists of 22 items scored in this study for conformity rather than independence. Reliability for the scale appears to be quite low. Wikoff (1965) reports a KR-21 reliability estimate of only .21 for the BCS. Even though KR-21 underestimates reliability, results using this scale, including such parts of the present study, are subject to very careful interpretation. There appears to be some cause to question the appropriateness of the KR-21 technique in estimating the reliability of personality measures. This technique requires that the assumption of equal item difficulty be met, but just what the concept of item difficulty means in the case of personality inventories is not clear. Certainly, if one considers item difficulty as proportion marking an item in a prescribed direction, this assumption would rarely be satisfied.

Social Desirability

The two social desirability scales used in the study were the Edwards Social Desirability Scale (E-SD) (Edwards, 1957) and the Marlowe-Crowne Social Desirability Scale (MC-SD) (Crowne and Marlowe, 1960). The controversy dealing with the social desirability hypothesis has been discussed in Chapter I.

In constructing the E-SD, Edwards selected items from the MMPI on the basis of heterogeneity of content and had judges rate them on the basis of social desirability. The resulting 79 items were reduced to the 39 which had the highest probability of endorsement. Split half reliability for the scale was .83. As was reported in Chapter II, 22 of the E-SD items are the same as items contained in the TMAS, and most of these overlapping items are keyed in opposite

directions for the two scales, thus causing a spurious correlation between them in the negative direction. In order to assure independence of the scales in examining their relationship to each other, the 22 overlapping items were eliminated from this study, leaving only 17 E-SD items. For this 17-item scale, Wikoff (1965) reports a KR-21 reliability coefficient of .44, again, an underestimation.

The authors of the MC-SD scale contend that the E-SD scale is contaminated by psychopathological variables. They selected their items on the basis of whether or not they reflect behaviors culturally acceptable but relatively unlikely to occur. The scale consists of 33 items, 30 of which are included in the present study. The test authors report KR-20 reliability of .88 for the scale. Wikoff (1965) reports KR-21 reliability of .76 for the 30-item version used in this study.

Administration of the Tests

Three meetings with each group of subjects were necessary in order to collect the data. This was done during regular class periods of 50 minutes each. During one session, the WRVT and the RR were administered; during another, the SORT and TCT were administered; and during another, all other measures were administered. The TMAS, MPI-n, BCS, E-SD, and MC-SD were administered in a combined inventory along with some other scales. This inventory, called the RSC, was constructed, administered, and scored by a fellow worker. Instructions for administration of the RSC scale are given in Appendix A. Answers were marked on an IBM answer sheet and scoring was done by machine at the Oklahoma State University Testing Bureau. Scoring was done in like manner on the SORT.

CHAPTER IV

RESULTS

The results of the statistical analysis of the data will be presented in this chapter. This material will be divided into two principal parts as follows: 1) the product moment correlational analysis and corrections for attenuation and 2) the ETA coefficients and tests for linearity.

Product-Moment Correlations and Corrections for Attenuation

The product-moment correlations obtained from the analysis will be presented in terms of the kinds of tests used. This is done in order that those correlations relevant to a conceptual area might be examined more conveniently.

Although there seems to be no way of testing the significance of a correlation coefficient after correction for attenuation, the corrected coefficients are presented here, and significance levels reported have been determined by the same means as the uncorrected coefficients. The reader is cautioned that these significance levels may not be accurate.

Non-projective Intelligence Measures

Correlations between non-projective measures of intelligence

and other measures used in this study are presented in Table IV.

The Wide Range Vocabulary Test (WRVT) was significantly correlated with four other measures--all at the .01 level and all in the negative direction. These measures were the Barron Independence of Judgment Scale (BCS), the Taylor Manifest Anxiety Scale (TMAS), and two scales of the Structured-Objective Rorschach Test (SORT). The SORT scales were the Pedantic (Pe) scale and the Structuring (St) scale. After correction was made for attenuation, three more correlations reached the level of .05 significance. These were the Ranking Rorschach Test (RR), which was negatively correlated with the WRVT (indicating a positive relationship); the Marlowe-Crowne Social Desirability Scale (MC-SD), which was positively correlated with the WRVT; and the SORT Activity Potential scale (AP), which was also positively related to the WRVT.

Seven significant r's were found between the TCT and other measures before correction was made for attenuation. After correction, six other r's were significant. The seven significant correlations before correction were between TCT-1 and two SORT scales, Popular (Po) and Anxiety (An), both at the .05 level and both in the negative direction; between TCT-2 and the RR, positive at the .05 level; between TCT-3 and the SORT An scale, negative at the .05 level; and between the parts of the TCT. These intercorrelations of the parts of the TCT were as follows: TCT-1 X TCT-2 = .41, TCT-1 X TCT-3 = .88, and TCT-2 X TCT-3 = .75. Of course, the only independent measures correlated here were the TCT-1 X TCT-2, since TCT-3 is the sum of the other parts. After correction was made for attentuation, the TCT-1 was found to be significantly negatively correlated with two other measures. They

TABLE IV

PRODUCT-MOMENT CORRELATIONS AMONG NON-PROJECTIVE INTELLIGENCE MEASURES AND OTHER MEASURES*†

Variable	WRVT	TCT-1	TCT-2	TCT-3
WRVT	1.00	.10	.07	.06
TCT-1	.10	1.00	.41**	.88**
TCT-2	.07	.41**	1.00	.75**
TCT-3	.06	.88**	.75**	1.00
RR	-.15 (-.18*)	.08	.17* (.19*)	.13
MC-SD	.15 (.18*)	-.14 (-.16*)	-.04	-.10
E-SD	.08	-.06	-.11 (-.17*)	-.06
BCS	-.34**(-.80**)	-.15 (-.33**)	-.08	-.14 (-.31**)
TMAS	-.22**(-.27**)	.02	.08	.05
MPI-n	-.13	.09	.05	.09
Sex	0	.01	-.06	-.02
Th	.08	-.11	-.06	-.09
Pr	.07	.06	.01	.02
Pe	-.30**(-.39**)	.06	.06	.10
In	.13	-.02	.04	.02
De	.12	.07	.05	.06
Ri	.01	.04	-.03	.05
St	-.32**(-.43**)	.05	.04	.05
Co	-.08	.06	.03	.06
Po	.04	-.18* (-.20*)	.07	-.15 (-.17*)
Or	0	.12	.03	.10
An	-.06	-.19* (-.22**)	-.13	-.19* (-.22**)
AP	.13 (.16*)	.12	.13	.15 (.17*)
Cf	.05	-.13	-.03	-.10

*Coefficients in parentheses have been corrected for attenuation

†Explanation of the abbreviations used here is given in Table IX

Critical value of r ($p = .01$) = .21

Critical value of r ($p = .05$) = .16

were the MC-SD at the .05 level and the BCS at the .01 level. The correlation between the TCT-1 and the SORT An scale was significant at the .01 level after correction. The correction for attenuation also raised the coefficient between TCT-2 and the E-SD to .05 significance level. This correlation was in the negative direction. Three more relationships were found to be significant between TCT-3 and other measures after correction was made, and one significance level was raised. The raised significance was the correlation between TCT-3 and the SORT An scale. The BCS was found to be negatively related to the TCT-3 scale at the .01 level, the SORT Po scale negatively related at the .05 level, and the SORT AP scale positively related at the .05 level.

It is important to keep in mind the low reliability found for the BCS in interpreting correlations with it. It is also important to keep in mind that the relationship between the RR and other variables is in the opposite direction of the sign of the correlation coefficient, since low scores on the RR are purported to be indicative of high neuroticism.

Ten measures, then, were found to be related to intelligence by linear analysis. All non-projective personality measures except the MPI-n were related to intelligence. Only three projective measures of intelligence were related to non-projective measures of intelligence.

Projective Intelligence Measures

Correlations between projective measures of intelligence and other measures are given in Tables V and VI. Since the parts of the

TABLE V

PRODUCT-MOMENT CORRELATIONS BETWEEN FOUR PROJECTIVE MEASURES OF INTELLIGENCE AND OTHER MEASURES*+

Variable	Theoretical (Th)	Practical (Pr)	Pedantic (Pe)	Induction (In)
WRVT	.08	.07	-.30**(-.39**)	.13
TCT-1	-.11	.06	.06	-.02
TCT-2	-.06	.01	.06	.04
TCT-3	-.09	.02	.10	.02
RR	-.15 (-.19*)	.25**(.32**)	-.14 (-.19*)	.12
MC-SD	-.05	.01	-.13 (-.18*)	-.07
E-SD	-.21**(-.36**)	.23**(.40**)	-.07	-.19* (-.31**)
BCS	.05	-.07	-.02	.02
TMAS	.11	-.15 (-.20*)	.11	.06
MPI-n	.13 (.16*)	-.19* (-.24**)	.08	.10
Sex	.05	-.09	-.06	-.13

Critical value for significance (p = .01) = .21
Critical value for significance (p = .05) = .16
*Coefficients in parentheses have been corrected for attenuation
+Explanation of the abbreviations used here is given in Table IX

SORT are not independent, these correlations are not given in this table (intercorrelations of parts of the SORT are given in Table IX).

Table V presents the correlations found between the SORT Theoretical (Th), Practical (Pr), Pedantic (Pe), and Induction (In) scales with other measures. The Th scale was found to be negatively related to the E-SD at the .01 level. After correction for attenuation, it was found to be related at the .05 level to the RR and the MPI-n, both relationships being positive. The Pr scale was related at the .01 level with the RR and E-SD. The relationships with the RR was negative, and with the E-SD the relationship was positive. At the .05 level, the Pr scale was negatively correlated with the MPI-n. After correction was made, the correlation with the TMAS was found to be significant at the .05 level. The relationship was negative. The Pe scale was negatively related to the WRVT at the .01 level. After correction two other correlations were found to be significant at the .01 level. These were the RR and the MC-SD, both correlations being in the negative direction. The In scale was related to only one other variable, the E-SD. This relationship was in the negative direction, and was significant at the .05 level before correction and the .01 level after correction was made.

Table VI contains correlation coefficients between the SORT Deduction (De), Rigidity (Ri), Structuring (St), Concentration (Co), and Activity Potential (AP) scales and all other variables from which they are independent. The De scale was negatively related to the RR and sex variables at the .01 level. After correction, it was also found to be related at the .05 level to the TMAS, the direction being negative. The Ri scale was strongly affected by the sex variable.

TABLE VI

PRODUCT-MOMENT CORRELATIONS BETWEEN FIVE PROJECTIVE MEASURES OF INTELLIGENCE AND OTHER MEASURES*+

Variable	Deduction	Rigidity	Structuring	Concentration	Activity Potential
WRVT	.12	.01	-.32**(-.43**)	-.08	.13 (.16*)
TCT-1	.07	.04	.05	.06	.12
TCT-2	.05	-.03	.04	.03	.13
TCT-3	.06	.05	.05	.06	.15 (.17*)
RR	.38**(.49**)	-.14 (-.19*)	.19* (.26**)	.13	.28**(.34**)
MC-SD	-.04	-.04	0	.10	-.13 (.17*)
E-SD	.07	.18* (.34**)	.13 (.24**)	.06	-.08
BCS	-.03	-.10 (-.28**)	-.15 (-.41**)	-.09	-.03
TMAS	-.12 (-.16*)	.04	-.06	-.05	-.09
MPI-n	-.07	.09	-.14 (-.19*)	-.06	.04
Sex	-.25**(-.29**)	.41**(.52**)	0	-.04	-.17* (-.19*)

Critical value for significance (p = .01) = .21
Critical value for significance (p = .05) = .16
*Coefficients in parentheses have been corrected for attenuation
+Explanation of the abbreviations used here is given in Table IX

Since the coefficient was in the positive direction, this would mean that males scored higher. The E-SD was positively related to the Ri scale at the .05 level before correction and at the .01 level after correction. After correction was made, the BCS was found to be negatively related to the Ri scale at the .01 level, and the RR was positively related at the .05 level. The St scale was negatively related to the WRVT well beyond the .01 level. After correction for attenuation, the E-SD was found to be positively related to the St scale beyond the .01 level. Also beyond the .01 level were the relations of the RR and BCS scales to the St scale, both relationships being negative in direction. The relationship with the MPI-n was found to be significant at the .05 level after correction, the direction being negative. The Co scale was not significantly related to any other variable. The AP scale was negatively related to the RR at the .01 level, and at the .05 level to the sex variable with the females scoring higher. After correction, three other variables were found to be positively related to the AP scale at the .05 level. They were the WRVT, the TCT-3, and the MC-SD.

Measures of Anxiety and Neuroticism

Table VII contains the correlations found between measures of anxiety and neuroticism and other variables in this study. Two of these measures are of the non-projective type and two are projective measures. The non-projective measures are the TMAS and the MPI-n and the projective measures are the RR and the SORT An scale (Rorschach Fch).

The TMAS was negatively related to three other measures at the .01 level. These were the WRVT, the MC-SD, and the E-SD. The relationships

TABLE VII

PRODUCT-MOMENT CORRELATIONS BETWEEN MEASURES OF ANXIETY AND NEUROTICISM AND OTHER MEASURES*+

		Non-projective		Projective	
Variable		TMAS	MPI-n	Ranking Rorschach	SORT Anxiety (Fch)
WRVT		-.22**(-.27**)	-.13	-.15 (-.18*)	-.06
TCT-1		.02	.09	.08	-.19* (-.22**)
TCT-2		.08	.05	.17* (.19*)	-.13
TCT-3		.05	.09	.12	-.19* (-.22**)
RR		-.07	-.08	1.00	-.28**(-.34**)
MC-SD		-.31**(-.41**)	-.35**(-.44**)	0	.18* (.24**)
E-SD		-.48**(-.84**)	-.55**(-.91**)	.02	0
BCS		.13 (.33**)	.13 (.31**)	-.09	.12 (.30**)
TMAS		1.00	.70**(.89**)	-.07	.03
MPI-n		.70**(.89**)	1.00	-.08	.02
Sex		-.08	-.13	-.10	.11
SORT	Th	.11	.13 (.16*)	-.15 (-.19*)	.46**
	Pr	-.15 (-.20*)	-.19* (-.24**)	.25**(.32**)	-.28**
	Pe	.11 (.16*)	.08	-.14 (-.19*)	-.34**
	In	.06	.10	.12	.16*
	De	-.12 (-.16*)	-.07	.38**(.49**)	-.35**
	Ri	.04	.09	-.14 (-.19*)	-.08
	St	-.06	-.14 (-.19*)	.19* (.26**)	-.44**
	Co	-.05	-.06	.13	-.20*
	Po	-.11	0	-.02	.40**
	Or	.05	.02	.03	-.23**
	An	.03	.02	-.28**(-.39**)	1.00
	AP	-.09	.04	-.28**(-.34**)	-.10
	Cf	-.07	-.03	.03	-.86**

Critical value for significance (p = .01) = .21
Critical value for significance (p = .05) = .16
*Coefficients in parentheses have been corrected for attenuation
+Explanation of the abbreviations used here is given in Table IX

with the social desirability measures were quite strong, particularly with the E-SD (r = -.84 after correction). The relationship with the MPI-n was also quite strong (r = .89 after correction). The BCS was found to be positively related to the TMAS at the .01 level after correction was made, but again, this correlation must be interpreted with care, considering the low reliability of the BCS. Three of the SORT scales were found to be significantly related to the TMAS after correction was made. These were the Pe, which was positively related, and the Pr and De scales, which were negatively related. All three of these were significant at the .05 level.

The MPI-n also appeared to be strongly affected by the social desirability variable. Both the MC-SD and the E-SD correlated well beyond the .01 level with the MPI-n, the direction being negative. The correlation with the E-SD (after correction) was -.91. The strong correlation with the TMAS has been mentioned above. After correction, the correlation with the BCS was significant at the .01 level, the direction being positive. Three correlations with SORT scales were significant. The Th scale was positively correlated at the .05 level, the Pr was negatively correlated at the .01 level, and the St scale was negatively related at the .05 level. The Th and St relationships were found after correction was made. The Pr relationship was raised from .05 to .01 by correction for attenuation.

As was mentioned before, relationships between the RR and SORT variables may be due to lack of independence, since both tests use the standard Rorschach ink blots projected on a screen. The reader is also cautioned to keep in mind that negative correlations with the RR indicate positive relationships and positive coefficients indicate

negative relationships due to the scoring procedure used with the RR. Two SORT scales were negatively correlated with the RR at the .01 level. They were the Pr and De scales. The St and AP scales were negatively correlated with the RR at the .01 level. The Th, Pe, and Ri scales were positively correlated with the RR at the .05 level. Of these the correlation with the Ri was raised to .01 significance by correction for attenuation. The other two coefficients were not significant before correction. As was reported above, the RR was also found to be related to the WRVT and the TCT-2.

The SORT An scale was found to be related to many other variables. Since the correlations with other parts of the SORT are due largely to lack of independence, they will not be discussed here. The negative relationship with the RR has been discussed above. Two other scales were found to be negatively related to the An scale at the .05 level before correction and the .01 level after correction. These are the TCT-1 and TCT-3. The MC-SD was positively related to the An scale at the .05 level before correction and the .01 level after correction. The BCS was positively related to the An scale at the .01 level after correction.

Measures of Conformity and Social Desirability

Most measures used in this study were related to the response tendency variables of conformity and social desirability. Intercorrelations among the response tendency variables were substantial, being well beyond the .01 level and in the positive direction. The exception to this was the SORT Conformity (Cf) scale, which was only related to other parts of the SORT and, after correction for attenuation,

at the .05 level with the MC-SD.

The MC-SD was also found to be negatively related at the .05 level (after correction for attenuation) with the SORT Or and AP scales. It was positively correlated with the SORT An scale at the .05 level before correction and at the .01 level after correction. Several coefficients were significant at the .05 level after correction. This procedure found positive relationships with the WRVT and the SORT Pe and Cf scales and negative relationships with the TCT-1 and the SORT Or and AP scales.

The E-SD was also found to be strongly related in the negative direction with the TMAS and the MPI-n scales. Also significant at the .01 level were a negative correlation with the SORT Th scale and a positive correlation with the Pr scale. Correlation with the In scale was significant at the .05 level before correction and at the .01 level after correction, the direction being negative. Correlations with the Ri and St scales were positive and significant at the .01 level after correction was made. Before correction, the Ri coefficient was significant at the .05 level. The St coefficient was not significant before correction.

The BCS appeared to be strongly related to intelligence. Again, reliability of the BCS seems to be quite low, making interpretation of these results difficult, but correlation with the WRVT was significant in the negative direction at the .01 level. After correction was made, significant negative correlations were found between the BCS and both TCT-1 and TCT-3, both at the .01 level. After correction for attenuation, the TMAS and MPI-n were found to be positively related at the .01 level to the BCS. Before correction was made the only SORT scale to correlate significantly with the BCS was the Po scale.

TABLE VIII

PRODUCT-MOMENT CORRELATIONS BETWEEN MEASURES OF CONFORMITY AND SOCIAL DESIRABILITY AND OTHER MEASURES*+

Variable	MC-SD	E-SD	BCS	SORT Conformity
WRVT	.15 (.18*)	.08	-.34**(-.80**)	.05
TCT-1	-.14 (-.16*)	-.06	-.15 (-.33**)	-.13
TCT-2	-.04	-.11	-.08	-.03
TCT-3	-.10	-.06	-.14 (-.33**)	-.10
RR	0	.02	-.09	.03
MC-SD	1.00	.31**(.54**)	.30**(.75**)	.13 (.17*)
E-SD	.31**(.54**)	1.00	.03	.04
BCS	.30**(.75**)	.03	1.00	.06
TMAS	-.31**(-.41**)	-.48**(-.84**)	.13 (.33**)	-.07
MPI-n	-.35**(-.44**)	-.55**(-.91**)	.13 (.31**)	-.03
Sex	-.06	.01	-.08	.05
SORT Th	-.05	-.21**(-.36**)	.05	.59**
SORT Pr	.01	.23**(.40**)	-.07	-.46**
SORT Pe	-.13 (.18*)	-.07	-.02	-.37**
SORT In	-.07	-.19* (-.31**)	.02	.55**
SORT De	-.04	.07	-.03	-.15
SORT Ri	-.04	.18* (.34**)	-.10 (-.28**)	.05
SORT St	0	.13 (.24**)	-.15 (-.41**)	-.36**
SORT Co	.10	.06	-.09	-.06
SORT Po	.07	.07	.18* (.43**)	.79**
SORT Or	-.15 (-.20*)	-.02	-.04	-.86**
SORT An	.18* (.24**)	0	.12 (.30**)	.31**
SORT AP	-.13 (-.17*)	-.08	-.03	.21**
SORT Cf	.13 (.17*)	.04	.06	

Critical value for significance (p = .01) = .21
Critical value for significance (p = .05) = .16
*Coefficients in parentheses have been corrected for attenuation
+Explanation of the abbreviations used here is given in Table IX

TABLE IX

ABBREVIATIONS USED IN THIS STUDY

Variable	Abbreviation
WRVT	Wide Range Vocabulary Test
TCT-1	Things Categories Test -- Part 1
TCT-2	Things Categories Test -- Part 2
TCT-3	Things Categories Test -- Part 3
RR	Ranking Rorschach Test
MC-SD	Marlowe-Crowne Social Desirability Scale
E-SD	Edwards Social Desirability Scale
BCS	Barron Independence of Judgment Scale
TMAS	Taylor Manifest Anxiety Scale
MPI-n	Maudsley Personality Inventory Neuroticism Items
SORT	Structured-Objective Rorschach Test
Th	Theoretical (Rorschach W)
Pr	Practical (Rorschach D)
Pe	Pedantic (Rorschach Dd)
In	Induction (Rorschach W:M)
De	Deduction (Rorschach D:M)
Ri	Rigidity (Rorschach S)
St	Structuring (Rorschach F)
Co	Concentration (Rorschach F-:F)
Po	Popular (Rorschach P)
Or	Original (Rorschach O)
An	Anxiety (Rorschach Fch)
AP	Activity Potential (Rorschach M)
Cf	Conformity (Rorschach O:P)

TABLE X

INTERCORRELATIONS AMONG SORT SCALES

Scale	Th	Pr	Pe	In	De	Ri	St	Co	Po	Or	An	AP	Cf
Th	1.00	-.79**	-.43**	.77**	-.34**	0	-.56**	-.22**	.68**	-.51**	.46**	.20*	.59**
Pr		1.00	-.08	-.55**	.59**	-.15	.44**	.17*	-.51**	.41**	-.28**	-.04	-.46**
Pe			1.00	-.47**	-.25**	.15	.24**	.06	-.45**	.31**	-.34**	-.23**	-.37**
In				1.00	.18**	-.13	-.49**	-.17*	.64**	-.40**	.16*	.69**	.55**
De					1.00	-.28**	.13	.03	-.12	.19*	-.35**	.64**	-.15
Ri						1.00	.31**	.25**	.05	.01	-.08	-.21**	.05
St							1.00	.69**	-.42**	.24**	-.44**	-.24**	-.36**
Co								1.00	-.13	-.06	-.20*	-.11	-.06
Po									1.00	-.58**	.40**	.26**	.79**
Or										1.00	-.23**	-.10	-.86**
An											1.00	-.26**	.31**
AP												1.00	.21**
Cf													1.00

Critical value for significance (p = .01) = .21
Critical value for significance (p = .05) = .16
Explanation of abbreviations used here is given in Table IX

TABLE XI

ETA, r, AND TESTS FOR LINEARITY OF REGRESSION*

Variable	WRVT					TCT				
	ETAxy	ETAyx	r	Fxy	Fyx	ETAxy	ETAyx	r	Fxy	Fyx
RR	.42	.28	-.15	2.19*	ns	.31	.31	.12	ns	ns
MC-SD	.44	.35	.15	2.73**	ns	.21	.32	-.10	ns	ns
E-SD	.22	.54	.08	ns	5.78**	.30	.28	-.06	ns	ns
BCS	.57	.58	-.34	3.27**	4.71**	.26	.24	-.14	ns	ns
TMAS	.43	.29	-.22	2.23*	ns	.28	.22	.05	ns	ns
MPI-n	.22	.22	.13	ns	ns	.22	.26	.09	ns	ns
Th	.31	.23	.08	ns	ns	.14	.24	-.09	ns	ns
St	.21	.33	-.32	ns	ns	.30	.20	.05	ns	ns
Or	.22	.25	0	ns	ns	.25	.31	.10	ns	ns
An	.35	.24	-.06	2.20*	ns	.36	.27	-.19	ns	ns
AP	.33	.29	.13	ns	ns	.21	.36	.15	ns	ns

*Explanation of the abbreviations used here is given in Table IX
Note: "x" denotes non-projective intelligence; "y" denotes measure correlated with it
Critical value of F at the .01 level = 2.55
Critical value of F at the .05 level = 1.95

This coefficient was positive and significant at the .05 level. After correction, this relationship was found to be significant at the .01 level as was the correlation with the An scale. Also significant at the .01 level, but in the negative direction were the corrected coefficients with the De and Ri scales.

ETA Coefficients and Tests of Nonlinearity

Table XI contains the values found for ETAxy, ETAyx, r, and F for comparisons of ETAxy with r and ETAyx with r. It will be noted that of all the non-projective measures of personality, only the MPI-n fails to show curved regression; and of all the projective measures, only An and the RR show curved regression with the WRVT. However, no curved regression is shown between the TCT and any other variable.

The reader is cautioned to keep in mind the fact that ETA is signless. No direction of correlation or shape of curved function is indicated by this statistic--only the strength of relationship of variables where curved regression prevails.

CHAPTER V

DISCUSSION

In this section an attempt will be made to interpret the results of this study in terms of the problem areas stated at the end of Chapter I. Following this will be a discussion of a more general nature. For convenience these problem areas are repeated below:

1) Interrelationships between measures of intelligence and measures of personality functioning.
2) Interrelationships among projective and non-projective measures of intelligence.
3) The linearity or nonlinearity of such relationships.
4) Relationships between projective and non-projective measures of personality functioning.
5) The effect of response tendencies as measured by social desirability and conformity scales on the above variables.

The First Problem Area

Results relevant to the first problem area have been summarized in Table XII. It appears that all of the non-projective measures of personality and response tendency except the MPI-n and all of the projective measures of personality except Or and Cf were significantly related to verbal intelligence as measured by the WRVT. Ideational fluency as measured by the TCT, on the other hand, seems to have been

TABLE XII

SIGNIFICANT RELATIONSHIPS BETWEEN INTELLIGENCE AND PERSONALITY MEASURES

Measure	WRVT	TCT
RR	.42 (ETA)**	.29 (r)**
MC-SD	.44 (ETA)**	
E-SD	.54 (ETA)**	
BCS	.58 (ETA)**-.36 (r)**++	
TMAS	.43 (ETA)**-.26 (r)**+	
Pe	-.39 (r)**	
St	-.43 (r)**	
An	.35 (ETA)**	-.34 (r)**
Po		-.31 (r)**

**Significant at the .01 level
+ Difference between ETA and r is significant at the .05 level
++Difference between ETA and R is significant at the .01 level
Explanation of abbreviations used here is given in Table IX

related only to projective measures of personality--the RR, An, and Po scales. In no case were the correlations large; probably no more than about 20% of the variance was accounted for in any case. However, they are large enough to be disquieting. When one thinks he is measuring some personality trait and actually 20% of the variance in the test scores is accountable for by intelligence, the test results can be very misleading. We must also remember that this study incorporates only two factors of intelligence. Two personality measures (RR and An) were found to be related to both factors. It is entirely possible that other factors of intelligence may also correlate with some of these personality measures, and thus account for an even greater percentage of the variance.

At the present writing it would seem that neither personality inventories nor projective techniques are entirely free from contamination by the intelligence variable. Neither can it be said that intelligence tests are free from contamination by personality variables; but then, perhaps the assumption that the two are separable is incorrect. We are, after all, applying a measuring instrument to an integrated individual who responds as an integrated whole. To hope, for example, that his anxiety and his intelligence will respond independently of each other is probably indicative of unrealistic optimism. Certainly, the results of this study indicate that this is the case. Further, it may be that there is no such thing as anxiety or neuroticism or tendencies to answer in a social desirable direction existing independently from intelligence; or of intelligence existing independently from personality traits. Perhaps the fractionation of the individual into component parts is not really possible, and has been created for the

convenience of psychologists unequipped to cope with the integrated human personality.

The Second Problem Area

There was virtually no support for the contention that intelligence could be measured by projective means. The only correlations found were between the WRVT and the Pe and St scales before correction for attenuation and between the AP scale and both the WRVT and TCT-3 after correction. All of these except the correlations with the AP scale were in the negative direction, and all were so small as to make prediction impossible. If these projective scales are measuring intelligence, then they must be measuring factors independent of the factors measured by the WRVT and TCT. It was stated earlier that it could reasonably be expected that the Or scale would correlate positively with creativity and that the Po scale should correlate negatively with it. Some support for this was found in the small correlation between the TCT and Po scales. However, this correlation, again, was too small for valid prediction. Of the standard Rorschach categories most often mentioned in the literature as measures of intelligence (M, F, and W), only F correlated significantly with the WRVT before correction for attenuation, and that correlation was negative. M was correlated with the WRVT after correction, but the coefficient (r = .16) was very small. It appears that better prediction of intelligence could be made from non-projective measures of personality than from projective measures of intelligence.

The Third Problem Area

Probably the most important finding in this study is that of the nonlinear relationships among variables. It would seem that the well-worn practice of assuming linear relationships among variables without making any check of the assumption is an unwarranted one. This finding may well account for the great disparity of findings in the literature dealing with relationships between intelligence and personality variables. This is particularly true if the best fitting function should happen to be quadratic; because in such a case no significant difference is apt to be found by comparing high and low scoring groups on one variable in terms of their performance on another variable. The difference is to be found by comparing the middle scoring group with the two extremes. Though no attempt was made to fit functions to the data in this study, pilot data with the WRVT and TMAS have given clear indication that a quadratic relationship does exist between these variables.

It is tentatively suggested that the true relationship between intelligence and personality functioning may follow the general shape of the normal curve. It would be reasonable to expect that those who are best adjusted in personality functioning would score highest on tests of intelligence. Bits of evidence supporting such a hypothesis are common knowledge among psychologists. Studies of gifted children give clear indication that they are superior in adjustment. Lower intelligence is found in mental and penal institutions than in the general population. There is high incidence of psychotic and neurotic symptoms among the mentally retarded. Again, we have a

quadratic relationship if we consider that both high and low scores on most personality measures are considered as indicative of maladjustment. Confirmation or rejection of this hypothesis must wait further research.

The Fourth Problem Area

It seems rather apparent from the results of this study that the projective and non-projective measures which purport to measure the same things do not do so. The TMAS and SORT An scales, the MPI-n and RR, and the BCS and Cf scales all failed to correlate significantly. Significant correlation was found in the negative direction between the RR and An scales. Due to the scoring direction of the RR, this would indicate a positive relationship, but relationship appears to be slight and could be due to a lack of independence since both scales use the Rorschach ink-blots. There was also a very low positive correlation between the BCS and the SORT Po scales, indicating that these scales may indeed be measuring some of the same variance. The unreliability of the BCS makes interpretation difficult here, but it may be that those who conform (according to BCS scores) also give more popular responses on the Rorschach. It is suggested that the conformity variable is one which needs further research. It would seem to this author that this may be one of the broad, important variables from which important predictions of behavior might be made. However, better means of measuring it are needed. The Asch and Cruchfield methods may provide adequate measures, but they are not economical enough to be of much use except in experimental situations.

The Fifth Problem Area

There seems to be little doubt of the existence of a curvilinear relationship between intelligence and the tendency to respond in the socially desirable direction as measured by both the MC-SD and the E-SD. Without knowledge of the shape of the function of best fit or the direction of the correlation (this information is not provided by ETA since both directions can exist in the same function) interpretation of this result is difficult. However, this relationship in conjunction with the finding of high negative correlations between the SD scales and the TMAS and MPI-n does permit some speculation. Obviously, there is considerable interdependence among these variables. The shape of the function best fitting the regression of SD on intelligence may be conjectured through the following reasoning: If the shape of the function between intelligence and anxiety is quadratic, as pilot data indicate, and the shape of the relationship between anxiety and SD is linear, as results of this study indicate, then the function between intelligence and SD must also be quadratic and similar to the function between intelligence and anxiety. Since the correlation between SD and anxiety is negative, we can make the following statements: The highly anxious tend to give few socially desirable responses. The low anxious tend to give many socially desirable responses. Both of these groups are of relatively low intelligence. The middle anxious give a moderate number of socially desirable responses and are of high intelligence. No implication has been made here concerning causation, and no statement of causation can be made on the basis of present knowledge. Variation in one of

the variables may cause the variation in the other two, variation in all three may be caused by variation in some fourth variable as yet unidentified, or all the variation may be caused by interaction among the variables. Further research should be devised to solve this problem.

Several of the SORT indices also appear to be subject to contamination by the SD variable. Of these, only the An scale purports to measure a personality variable. Interpretation of these results is difficult when other results cast doubt on just what these scales really measure. At the present time, we can only observe that this relationship exists and await further research to clarify the meaning.

General Discussion

At the end of Chapter I, this question was posed: Is it really possible to separate human traits into independent parts, or are intelligence and personality functioning so integrated as to make such separation impossible or impractical? This is the subject which will be discussed in this section.

Certainly the staggering complexity of the interrelationships among variables under investigation have been brought out in this study, and it would seem that the entire notion of construct validity must come under new scrutiny. It would seem that in order to call a test a measure of, for example, anxiety, we must either redefine the construct to include factors of intelligence and social desirability, or we must admit that the test measures constructs other than anxiety--that is, the test is not factorially pure. Further, due to the lack of linearity among some of the variables involved in the measurements

from a single instrument, interpretation of the test results must be made in the light of functioning of traits other than the one which we are purporting to measure. When we consider that each of the measures under study here may be influenced by traits not included, and we then consider the vast number of traits identifiable in the human personality, the problem of sorting out and interpreting all possible relationships becomes so vast as to arouse the question of whether or not its solution is within the realm of possibility. The only method apparent to the writer of arriving at construct validity is through factorial purity; but this will require that the test be tested for both linear and nonlinear correlation with every possible human trait. This, of course, approaches the impossible.

If it should prove to be possible to devise tests which were truly factorially pure and valid for measuring a construct, the question arises as to the value of such a test. Would such a test be worth the overwhelming task of construction? What would one do with such a test score after it is obtained? It must then be considered in the light of scores on other pure tests. We then construct profiles and begin to put back together what we have worked so painstakingly to take apart. Otherwise, how can we make predictions of the behavior of an integrated organism?

These considerations tend to force a retreat to the relatively safe haven of operationism and predictive validity. If the construct is defined in terms of scores on a particular measuring instrument, and validity of the instrument can be shown by its ability to predict behavior, the value of the instrument is immune to criticism. Of real value to the work of the test user is a measure which will allow

good prediction in a practical situation. What the test is "really" measuring is unimportant so long as prediction is accurate. If a measure called "academic aptitude" is capable of prediction of success in academic achievement, does it really matter whether the test measures intelligence, motivation, prior achievement, skin pigmentation or whatever? It would seem to this writer that reliable prediction is the only important criterion.

From this point of view, the answer to the question posed earlier must be negative. Fractionation of human traits into the traditional dichotomy of intelligence and personality and further fractionation of these two into their component parts is probably artificial, probably impossible, and of doubtful value anyway.

CHAPTER VI

SUMMARY AND CONCLUSIONS

This study was designed to explore some basic relationships among measures of intelligence and measures of personality functioning. Based upon the literature and upon theoretical and rational considerations, the following five problem areas were investigated: 1) interrelationships between measures of intelligence and measures of personality functioning, 2) interrelationships among projective and non-projective measures of intelligence, 3) the linearity or nonlinearity of such relationships, 4) relationships between projective and non-projective measures of personality functioning, and 5) the effect of response tendencies as measured by social desirability and conformity scales on the above variables.

The following method was employed in an attempt to arrive at evidence related to the questions stated above. Scores were obtained on each of 142 subjects on each of the following measures: 1) the Wide Range Vocabulary Test, 2) the Things Categories Test, 3) the Marlowe-Crowne Social Desirability Scale, 4) the Edwards Social Desirability Scale, 5) the Barron Independence of Judgment Scale, 6) the Taylor Manifest Anxiety Scale, 7) neuroticism items from the Maudsley Personality Inventory, 8) the Ranking Rorschach Test, and 9) the Structured-Objective Rorschach Test which includes 11 measures purporting to measure factors of intelligence, one measure of anxiety,

and one measure of conformity.

These scores were intercorrelated by the Pearson Product-Moment technique, and correlations were corrected for attenuation. Following this analysis, ETA coefficients were computed to determine the strength of nonlinear correlation and an F test of the difference between ETA and r was made. When a significant F resulted from this test, it was concluded that the relationship was curvilinear.

Results of the statistical treatment of the data yielded the following conclusions: 1) Since most of the personality measures were significantly correlated with one or the other of the measures of intelligence, either in a linear or nonlinear fashion, it was concluded that even relatively pure factors of intelligence are related to personality variables, and that most measures of personality functioning are contaminated by the intelligence variable. 2) Since projective measures of intelligence failed to correlate to any great degree with non-projective measures of intelligence, it was concluded that projective techniques are inappropriate as estimators of intellectual level. 3) The finding considered by the writer as the most important was that of nonlinearity among verbal ability and measures of personality functioning. From this finding it was concluded that the disparity of findings in the literature are due, at least in part, to the use of analyses assuming linear relationships between variables. 4) Since projective and non-projective measures of anxiety, conformity, and neuroticism failed to correlate with each other, it was concluded that if these measures are measuring the same constructs as their names would imply, then they must be measuring different aspects of them. 5) It was found that the social desirability variable has a nonlinear relationship with

intelligence and a linear relationship with anxiety and neuroticism as measured by the TMAS and the MPI-n. Since anxiety also has a non-linear relationship with intelligence, it was suggested that these variables are all interdependent and that only through future research can statements of causation be made.

The discussion section contains several suggestions for further research and presents some theoretical considerations questioning the notion of construct validity, the practice of attempting to fractionate human traits, and the value of factorially pure measures--if such measures could ever be devised. It is suggested that broad general measures for purposes of valid prediction are the kind of measures needed.

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APPENDIX A

INSTRUCTIONS AND SAMPLE ITEMS FOR SCALES

Wide Range Vocabulary Test

Distribute the tests and instruct the subjects to fill in the space at the top of the page. Then say, "In this test you are to underline the word at the right which will best complete the sentence. To illustrate: 'A street is a--field, hill, road, stream, path.' Which one of these words tells what a street is? (Pause, to let examinees respond.) 'Road' tells what a street is. A line should be drawn under 'road' to show that it is the correct answer. Now do the others in this way. If you are not sure, guess. When you have finished the first page, turn over the test and go right ahead."

The RSC

General Instructions

This inventory consists of two parts. Read the instructions given before each part and then answer the numbered statements.

You are to mark your answers only on the separate answer sheets provided. In marking your answers use only the special pencil provided. Be sure that the number of the statement agrees with the number of the answer sheet. Make your marks heavy and black. Erase completely any answer you wish to change. Do not make any marks on this booklet.

Work quickly and do not ponder too long about the exact shade of meaning of each question. There are no right or wrong answers, and no trick questions.

Instructions for Part I

Read each statement below and decide whether it is true as applied to you or false as applied to you. If a statement is TRUE or MOSTLY TRUE as applied to you, blacken between the lines in the column headed 1.

If a statement is FALSE or NOT USUALLY TRUE as applied to you, blacken between the lines in the column headed 2. If a statement does not apply to you or it is something that you don't know about, make no mark on your answer sheet. Remember to give your OWN opinion. Do not leave any blank spaces if you can avoid it.

Instructions for Part II

Please answer each of the following questions "Yes" or "No." If you simply cannot make up your mind, answer "?".

To indicate that your answer is "Yes," completely blacken the space between the lines under column 1 on your answer sheet. To indicate "?" as your answer, blacken the space under column 2. To indicate "No" as your answer, blacken the space between the lines under column 3.

Remember to answer each question.

Sample Item from the Edwards Social Desirability Scale

When in a group of people I have trouble thinking of the right things to talk about. (Keyed false)

Sample Item from the Marlowe-Crowne Social Desirability Scale

I am always courteous, even to people who are disagreeable. (Keyed true)

Sample Item from the Taylor Manifest Anxiety Scale

I am often afraid that I am going to blush. (Keyed true)

Sample Item from the Barron Independence of Judgment Scale

What the youth needs most is strict discipline, rugged determinism, and the will to work and fight for family and country. (Keyed true)

Sample Item from the Maudsley Personality Inventory N Scale

Are you often troubled with feelings of guilt? (Keyed Yes)

The Things Categories Test - Fi-3

This is a test to see how many things you can think of that are alike in some way.

Below are two examples of things that are always red or that are red more often than any other color. Look at these examples. Then go ahead and write in the blanks more things that are always red or that are red more often than any other color. You may use one word or several words to describe each thing.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Your score will be the number of correct things that you write.

You will have 3 minutes for each of the two parts of this test. When you have finished Part 1, STOP. Please do not go on to Part 2 until you are asked to do so.

DO NOT TURN THIS PAGE UNTIL ASKED TO DO SO.

The Ranking Rorschach Test

Sample Item

Blot One

( ) An army or navy emblem
( ) Mud and dirt
( ) A bat
( ) Two people
( ) A pelvis
( ) An X-ray picture
( ) Pinchers of a crab
( ) A dirty mess
( ) Part of my body

Directions When Blots Are Used

Please put your name in the space marked "name" at the top of your paper.

Now listen carefully. I am going to show some ink blots on the screen. These blots really do not represent anything in particular, but people do see things in the blots, just as people see things in clouds; and different people see different things. You are to look at the blots and then at a list of possible things to be seen. You will notice that there are nine of these things which might be seen in the blot in each list--one list of nine possible answers for each blot. Notice that the blots are numbered across the answer sheet rather than being numbered down the sheet. You are to write a 1 in front of the answer which seems to you to be most like the ink blot, a 2 in front of the answer which seems to you to be second most like the ink blot, and so on down to 9 for the response which seems least like the blot. In other words, you are to rank the responses from one to nine--one for the response most like the blot down to nine for the response least like the blot. Please mark every answer. Your paper cannot be scored if you leave out any of the possible answers. Do not give any two answers in the same list the same number. When you finish, every list should contain all the numbers from one through nine with no number repeated in any one list.

Work rapidly. Your first impulse is the one we want, and you will have only a brief amount of time for each blot. Please make no comments and please do not consult with each other.

Are there any questions? All right, here is blot number one.

(Make no further comment except to give the blot number as it is shown, and make sure all have finished each blot before showing the next.)

Directions When Blots Are Not Used

Please put your name in the space marked "name" at the top of your answer sheet.

Now listen carefully. I would like for you to imagine that you are in an art museum. This paper lists the subject matter of pictures being shown in the museum, just as they are listed on cards on a bulletin board. Notice that there are ten cards with nine pictures listed on each card. You are trying to decide which pictures you would like to look at in the limited time available to you. Now, I would like for you to rank these pictures in the order of your preference. In each list of nine pictures, put a one before the picture you would most like to look at, a two in front of the picture you would consider your second choice, and so on down to nine for the picture you would least like to look at. Do this for each card of nine pictures, ranking them from one for your first choice to nine for your last choice.

Please work rapidly. Your first impulse is the one we want. Please make no comments after you have started working. There are no right or wrong answers--we are interested in your personal preferences.

Are there any questions? Please begin.

The Structured-Objective
Rorschach Test

Directions for Administration

SAY: Look at the part of your answer sheet that has name, organization, city, etc. printed on it. Fill in your own name, occupation, and so on. Also circle either M or F in the corner.

Give examinees time to record these data. Check to see that all desired information is entered.

SAY: Open your booklet to the Instructions to Examinees on page 1. Read these instructions silently while I read them aloud: "You will see a series of ten ink blots, one at a time, projected on a screen. These blots really do not represent anything in particular. However, people do see certain things in the blots; and different people see different things. You are to look at the blot and then at a list of possible things to be seen. You will notice that the things you might see are arranged in groups of three and are numbered. With each group of three you are to do two things: First, choose the one of the three items which you think is most clearly represented by the blot or by some part of the blot. Second, look at the number of that choice and blacken in the dotted lines opposite that number on the

answer sheet under the heading marked "Blot No. 1," "Blot No. 2," etc.

"Proceed to the next group of three items and follow the same directions. Do this for all ten groups of three referring to each blot. When the examiner projects a new blot, you will follow the same directions as above, which are:

1. Select the one response from each group of three items that you think is best represented by the blot or some part of the blot.
2. Note the number of your choice.
3. Blacken in the dotted lines opposite that number on the answer sheet.
4. Continue on the next group of three and follow the same procedure.

"Make no marks of any kind in the booklet. The examiner will announce the number of each blot and the first number in the booklet which corresponds to it. Be sure that you are looking at the proper place in the booklet and marking in the proper place on the answer sheet.

"There are no right or wrong answers to this test. If you do decide to change an answer, though, erase your mark thoroughly and blacken in the dotted lines opposite your new choice. Be sure to make one choice from each group of three items. If you see none of the three things listed, select the one most like what you do see. If you see more than one, select the one that is best represented. Work as rapidly as you can and do not spend too much time on any one group; your first impressions will probably be best in a test like this."

After reading these directions,

SAY: Are there any questions?

Answer any questions; then

SAY: You will have about two minutes for each blot. This will be sufficient for you to record your first impressions. I will tell you when one minute has passed, which is half the time for viewing each blot.

Here is the first blot. (Turn on projector exposing Blot No. 1.) Please begin.

Check to see that all examinees are working properly.

At the end of one minute,

SAY: You have one minute left for this blot.

At the end of the second minute, ask everyone to finish as quickly as possible. When all are finished,

SAY: Now turn to the next page in your booklet. (Pause for a moment.) I am now showing Blot No. 2. (Expose Blot No. 2.) The first item for this blot is number 31. Start recording your choices at the top of the second column on your answer sheet. Please begin.

The procedure for administration of the remainder of the test is identical to what has just been presented. The blot is presented and the blot number identified for the examinees. The examinees are also told the first item number for the new blot. The end of the first minute is announced, and at the end of the second minute, the examinees are asked to finish as quickly as possible.

Sample Item from the Structured-Objective Rorschach Test

BLOT NO. 1

1. Airplane
2. Elk's horns
3. Anvil

4. Bell
5. Bear's head
6. Coat of arms

7. Squashed bug
8. Clouds
9. Halloween lantern

10. Feet
11. Statue
12. Leaf

13. Pelvis
14. Crab's claws
15. Male organs

16. Hourglass
17. Birds fighting
18. X-ray of bony structure

19. Bat
20. Mountains
21. Nude Woman

22. Lobster
23. Witches flying on brooms
24. Relief map

25. Mask
26. Buddha sitting
27. Dog's head

28. Wings of Murcury
29. Fossil on stone
30. Scarab

APPENDIX B

SCORING CATEGORIES FOR THE STRUCTURED-OBJECTIVE RORSCHACH TEST

Letters in parentheses following the SORT name of the scoring category represent the traditional Rorschach category. Abbreviations used for these categories in this study are given in parentheses following the definitions.

A. Intellectual Functioning
   1. Theoretical (W). . .facility for generalizing, capacity for abstraction (Th)
   2. Practical (D). . .facility for dealing with concrete detail (Pr)
   3. Pedantic (Dd). . .facility for dealing with minute detail (Pe)
   4. Induction (W:M). . .capacity for inductive logic; ability to synthesize, to abstract principles (W:M is the average of W and M) (In)
   5. Deduction (D:M). . .capacity for deductive logic; ability of analyze (De)
   6. Rigidity (S). . .tendencies toward stubborn, cantankerous, resistant, fixed ideas (Ri)
   7. Structuring (F). . .contact with reality, perceptive awareness (St)
   8. Concentration (F-:F). . .ability to focus attention, to maintain concentrative focus (Co)

B. Reductives
   (reduction in intellectual efficiency due to any of the following)
   (These measures were not used in this study.)
   1. Low Generalization (low W)
   2. Perfectionism (high Dd)
   3. Poor Control (high F-)
   4. High Anxiety (high Fch)
   5. Compulsivity (high S, F, and D)

C. Interests
   (These measures were not used in this study.)
   1. Range (H:P::A). . .breadth or constriction of interests.
   2. Human Relationships (H). . .tendencies to perceive human elements

D. Responsiveness
   1. Popular (P). . .tendencies to perceive elements which are common (modal) to those most other persons perceive (Po)
   2. Original (O). . .tendencies to perceive elements which are unique or uncommon (Or)

E. Temperament

1. Persistence (S). . .doggedness, stick-to-itiveness, one-tracking (not included except as Rigidity)
2. Aggressiveness (F:M). . .mature self-control and social control permitting ascendance with the accepted ethics of society (not included)
3. Social Responsibility (FC:M). . .acceptance of one's role in society (not included)
4. Cooperation (CF:FC). . .adaptability to social environment, social responsiveness (not included)
5. Tact (FM::FC:M). . .balance (quality) of social perception and of inner emotional control (not included)
6. Confidence (FM:M). . .feelings of prestige (from inferiority to confidence), level of aspiration (not included)
7. Consistency of Behavior (F::S:Fch). . .stability of behavior (not included)
8. Anxiety (Fch). . .tendencies toward worry, over-sensitiveness and extensiveness toward self-concern (An)
9. Moodiness (F-:FM::F:M). . .tendencies toward fluctuations of feeling-tone from elation to depression (not included)
10. Activity Potential (M). . .energy productivity (AP)
11. Impulsiveness (F-:F). . .tendencies toward poor self-control (not included)
12. Flexibility (M::FC:CF). . .ability to adapt readily from one type of situation to another (not included)
13. Conformity (O:P). . .tendencies to respond to social pressures (mores) as opposed to personal eccentricity (Cf)

VITA

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