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THE USE OF A LINEAR DISCRIMINANT FUNCTION OF MINNESOTA MULTIPHASIC PERSONALITY INVENTORY SCORES IN THE CLASSIFICATION OF PSYCHOTIC AND NON-PSYCHOTIC MEXICAN-AMERICAN PSYCHIATRIC PATIENTS

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THE USE OF A LINEAR DISCRIMINANT FUNCTION OF MINNESOTA MULTIPHASIC PERSONALITY INVENTORY SCORES IN THE CLASSIFICATION OF PSYCHOTIC AND NON-PSYCHOTIC MEXICAN-AMERICAN PSYCHIATRIC PATIENTS

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TABLE OF CONTENTS

LIST OF TABLES

Table | Page

LIST OF FIGURES

THE USE OF A LINEAR DISCRIMINANT FUNCTION OF MINNESOTA MULTIPHASIC PERSONALITY INVENTORY SCORES IN THE CLASSIFICATION OF PSYCHOTIC AND NON-PSYCHOTIC MEXICAN-AMERICAN PSYCHIATRIC PATIENTS

CHAPTER I

INTRODUCTION

Although the MMPI was originally advanced as a specialized aid to psychiatric diagnosis and evaluation, it is now true that the test has been subjected to a multitude of validity studies and is widely used in many different regions of the United States with a large variety of individuals (Dahlstrom & Welsh, 1963). Of particular interest to this widespread use is that in spite of early recommendations by one of its constructors (Hathaway, 1946) few studies have undertaken the tasks of cross validating the K scale on different populations of normals, and/or developing region-specific K scale values for use with local clienteles or specific sub-populations which display some differences from the population on which the MMPI was standardized. The weights of the K scale which are added to various

clinical scales were determined empirically on selected cases in a psychiatric setting at the University of Minnesota. These corrections improved the operation of the scales and have continued to serve as effective supressors of non-valid variance in these scales. Yet, in spite of Hathaway's awareness of the need for regional K scale values, few studies have undertaken the task of increasing the external validity of the MMPI by obtaining the maximally effective K weights for use on different populations. Early work on cross validating the K scale (Schmidt, 1948; Wiener, 1948; H. F. Hunt, 1948) did not prove very fruitful in adding more efficiency to the diagnostic process and this appears to have caused the actual decline of these studies. However, Dahlstrom & Welsh (1963) have pointed out that these studies were conducted in the wrong kind of setting and suggested that properly designed studies of the same kind should be undertaken. Early studies (R. E. Smith, 1955; Goodstein, 1954; Black, 1953) comparing overall MMPI performance on different regions of the country did not support the hypothesis that sub-cultural variations arising within regions of this country affect the replies to the MMPI sufficiently to require special local norms. These studies compared college samples drawn from various parts of the country, and prisoners in state institutions located on both coasts and in Northern and Southern states. On the other hand, recent preliminary work by Gorman (1965) has shown that in spite of the larger

sample sizes required and the inherent errors characteristic of many case history items, significant improvement in clinical accuracy can be achieved by introducing demographic data as moderator variables for MMPI pattern interpretation. The notion of moderator variables is based on the assumption that the validity of a test for a given criterion may vary among subgroups differing in personality characteristics. A moderator variable is some characteristic of persons that makes it possible to modify the categorical assignment of different individuals with a given instrument. For example, in many instances, sex, socioeconomic level and other demographic variables are known as moderator variables since they moderate the validity of specific tests (Saunders, 1956).

Serious concerns have also been voiced that instruments like the MMPI are sensitive to biases arising from minority group status or educational deficiences, therefore requiring different norms for individuals who display these characteristics (Brayfield, 1965). It could be argued that nowhere has this issue more relevance that in situations where the MMPI is used with members of cultural subgroups quite different from Minnesota normals. The first study relevant along these lines was carried out by Arthur (1944), and though she found some differences between Anglo and Indian 12th grade students, the scales she employed were largely preliminary versions of the existing clinical scales and therefore little direct comparison with

present day norms can be made.

Subsequent studies (Calden, 1959; Panton, 1959; M. G. Caldwell, 1954; Fry, 1949) were concerned with examining differences between Caucasian and Negro subjects on the MMPI. Although most of these studies reported significant differences between the two ethnic groups, some investigators (Dahlstrom & Welsh, 1963) have questioned the results on methodological grounds and presented the interpretation that the reported differences could probably be explained by differences in socioeconomic variables.

Although this area of research was not very fruitful for a period of years, later studies (Harrison & Kass, 1967; Butcher, Ball, & Ray, 1964) found significant differences between Caucasian and Negro samples after controlling for some educational and socioeconomic differences. In fact, a remarkable amount of data has been accumulating (see Lanyon, 1968) all indicating differences in MMPI performance among groups displaying specific behavior patterns, and of differing demographic characteristics. It is, in fact, becoming more evident that significant improvement in clinical accuracy can be achieved by introducing these demographic data as moderator variables for MMPI pattern interpretation (Dahlstrom, 1969; Lanyon, 1968).

It is not surprising then, that in this age in which clinical psychology is developing towards dealing more with the poor and

alienated minorities (I. I. Goldberg, 1969) that the question of differences between Negro and Caucasian subjects is getting increasing attention in the MMPI literature (Dahlstrom, 1969). Similarly, one of the selected topics and recognized trends at the Sixth Annual Symposium on Recent Developments In The Use Of The MMPI (Cutcher, 1971) was the development of special norms for different sub-cultures.

Statement of Problem

In view of the previous discussion, it seems that it would be of theoretical and practical interest to investigate differences between Mexican-American and Anglo-American psychiatric patients on the MMPI and to derive, if justified, a MMPI-based method for relatively fast screening of psychiatric Mexican-American patients. From the psychometric point of view a comparison between the Anglo-American and the Mexican-American psychiatric groups will provide some partial answers to questions concerning external validity of the MMPI. Whether or not the cultural differences between these two groups is associated with differences in MMPI performance is certainly an important question in deciding the validity of the MMPI when used with a population of Mexican-American psychiatric patients.

It should be noted that although Mexican-Americans constitute the second largest minority group in the United States and thousands of them are annually referred, diagnosed, and treated in

private and public facilities for emotional problems (Jaco, 1960), no clinical instrument has, to this date, been systematically validated or developed for this group. An informal inquiry conducted by the researcher revealed that in the State of Texas, most Mexican-Americans are referred to the major state facilities (i.e., state hospitals) or major private agencies (e.g., University of Texas Medical Branch) that provide psychiatric and psychological services where they are administered the same standard psychological battery of tests as is usually administered to Anglo-American patients. This battery includes not only the WAIS and the Rorschach but also the MMPI. Also found in the inquiry was that some of the agencies mentioned above have at least one staff member who, who by virtue of his experience in diagnosing and treating Mexican-American psychiatric patients, claims to have inferred the specific test response correlates of different diagnostic categories for such population. In other words, these experienced diagnosticians claim to have developed, subjectively and relatively unsystematically their own norms on different tests for the population of Mexican-American psychiatric patients. At least two of these diagnosticians claim that they were able to interpret MMPI profiles of Mexican-American psychiatric patients. Each acknowledged major differences between their rules for interpreting MMPI profiles of Mexican-American and Anglo-American patients. Thus it seems that some knowledge about the MMPI in respect to

Mexican-American psychiatric patients will offer useful information in terms of the current theoretical issue concerning the importance of moderator variables on MMPI interpretation. It will also provide some useful information in terms of the validity of the MMPI for a particular cultural group which is supposedly a part of the larger dominant culture on which the MMPI was developed. In addition, it will be a contribution in the further development of the MMPI by examining how the test works for a specific population and therefore, serving as the inevitable first step in adjusting the instrument to that population. Equally important is the consideration that specific MMPI differences between Mexican-American and Anglo-American patients (if any) would serve as basic guidelines indicating what directions could be taken for the adjustment procedures. In summary, if MMPI differences between Mexican-American and Anglo-American psychiatric patients are found, this finding would justify taking a first step in using the MMPI for satisfying an emergent need for having relatively fast diagnostic tools that can be employed in gross, but important classification procedures with a population for which psychologists have not yet developed appropriate diagnostic tools.

Stimulated by the new trends in community mental health, one investigation (Munoz, Tuason, & Dick, 1970) found evidence of the special importance of fast and precise diagnostic formulations

when dealing with psychiatric patients in a community-oriented clinic. It appears, in fact, that in the event that the MMPI proves to be sensitive to cultural biases of the Mexican-American psychiatric population, the development of a MMPI-based actuarial method for discriminating psychotic from non-psychotic Mexican-American patients would be of great immediate value until valid norms could be developed for such population.

Purpose of Study

There has been only one study (Reilley & Knight, 1970) where MMPI differences between some Mexican-American sub-groups and other cultural groups have been investigated. Yet, in spite of the MMPI clinical heritage there have been no systematic attempts to investigate differences on the MMPI between Mexican-American and Anglo-American psychiatric patients. Similarly, no psychodiagnostic instrument has been systematically studied with a population of Mexican-American psychiatric patients to provide an adequate tool even for gross classification purposes with such patients.

The purpose of this study was two-fold. The first aspect of the present investigation assessed differences in MMPI performance between one group of Mexican-American, and one group of Anglo-American, clinically heterogeneous psychiatric patients. The second aspect of this study was partially justified by the results of the first, and consisted of an attempt to develop a Linear Discrim-

inant Function for adequate classification of Mexican-American patients into psychotics or non-psychotics according to a previously defined criteria. In addition, this derived function was cross-validated on a different sample and its effectiveness was determined.

It was decided that determining whether or not Mexican-American and Anglo-American patients perform differently on the MMPI would, first of all, provide some empirically based answers as to the legitimacy of interpreting MMPI profiles of Mexican-American patients in the same fashion as the MMPI profiles of Anglo-American patients are interpreted. The fact that definitely different value systems exist between the two groups (Fabrega, Swartz & Wallace, 1968; Diaz-Guerrero, 1964) would suggest that some differences on MMPI performance would be found. Comparisons of psychotic Mexican-American and Anglo-American patients (Pokorny & Overall, 1970) revealed certain differences in symptomatology between the two groups as well as a larger number of deviant responses on several tasks for the Mexican-American group (Fabrega, 1968). Although the present investigation also included non-psychotic psychiatric patients, some MMPI differences were still expected. It was decided that if no differences were established between the two groups, the external validity of the MMPI would be enhanced. In such event, diagnosticians who work with the Mexican-American psychiatric population would have fewer reasons for questioning the legitimacy of

interpreting the Mexican-American patient's profiles in the same fashion as they interpret the Anglo-American patient's profiles. This aspect in itself was conceptualized as a step forward in providing practicing diagnosticians with a relatively solid basis for using one clinical instrument with the Mexican-American population. It was also decided that if differences between the two groups were established, the inference that MMPI profiles of Mexican-American patients cannot be legitimately interpreted in the same fashion as the Anglo-American patient's profiles are interpreted would be supported on empirical grounds. Furthermore, if this is so, a highly needed strategy for quick classification of Mexican-American patients into psychotics or non-psychotics would be developed and cross-validated. This strategy consisted of applying a statistical method (Linear Discriminant Function) to the MMPI data in order to develop a relatively simple way to classify Mexican-American patients into psychotic or non-psychotic. Such strategy was conceived as having immense value for gross but fast screening in this population which has a considerable incidence of emotional problems but no diagnostic tools available. Significant findings of this study would also add some clarification about the contribution of cultural factors to MMPI validity.

Research Questions

Aspect I

The following questions (to be answered on the basis of the subject's MMPI raw score performance) were investigated.

1. Are there any significant differences on MMPI performance associated with differences in cultural group membership between Mexican-American and Anglo-American psychiatric patients?

In view of the general nature of question (1), three specific and, therefore, empirically testable questions were derived in order to provide an answer to such question.

The three specific questions were:

1.1 To what extent do the MMPI scores of a combined group of Mexican-American psychiatric patients differ from those of a combined group of Anglo-American psychiatric patients?

1.2 To what extent do the MMPI scores of a group of Mexican-American psychotic psychiatric patients differ from those of a group of Anglo-American psychotic psychiatric patients?

1.3 To what extent do the MMPI scores of a group of Mexican-American non-psychotic psychiatric patients differ from those of a group of Anglo-American non-psychotic psychiatric patients?

In order to ascertain whether or not a Linear Discriminant Function would be minimally effective in discriminating the psychotic and the non-psychotic Mexican-American patient groups, the following

question was asked:

2. Are there any significant differences on MMPI performance associated with gross differences in psychopathology between psychotic and non-psychotic Mexican-American psychiatric patients?

Aspect II

The following question was raised on the basis of the Mexican-American subject's MMPI performance.

1. To what extent can Mexican-American psychiatric patients be classified correctly as either psychotic or non-psychotic on the basis of their MMPI performance using a Linear Discriminant Function?

Limitations of the Study

One limitation of the study is that the psychiatric patient samples might not be representative of the broad range of psychiatric disorders within each cultural group. In addition, specific disorders within the larger categories "psychotic" and "non-psychotic" might be unevenly distributed on the two cultural samples. The reason for not equalizing each cultural group in terms of specific disorders, is basically the numerical restriction of the pool of Mexican-American patients from which the sample was drawn.

A second limitation is that the S's diagnostic classification was not systematically cross-validated through the conventionally ob-

jective (quantitative) procedure of finding a high degree of agreement among three or more independent judges. Although the procedures that were followed in this study, in fact, constitute a form of cross-validating the criterion, some contamination between the first two judges was possible. This, however, did not apply to the other judge.

A third limitation which directly applied to the second aspect of this study, is that there might not have been a representative balance of men and women in the Mexican-American sub-samples on which the Linear Discriminant Function was developed and cross-validated. It must be noted that although both men and women were included in the sample, no attempt to equal representation was made. For this reason, the frequency of men and women on each Mexican-American sub-sample was observed and the results of the study interpreted within the limits imposed by this restricting factor.

A fourth limitation also applying to the second aspect of this study is that the cut off point which was selected for making optimum use of the Linear Discriminant Function was different from the one that would have been selected had the actual proportion of psychotics and non-psychotics in the larger Mexican-American population been used as a base rate. The present study selected base rate values of 0.5 for each psychiatric group in order to comply with the actual proportion of psychotics and non-psychotics in the cross-validation

sample. This technical limitation must be considered unavoidable by this type of study. At the same time, there is no reason (or much effort involved) for not establishing cut off points appropriate for each setting where the formula derived here is used.

Summary

The purpose of this study was (1) to examine the difference on MMPI performance between Mexican-American and Anglo-American psychiatric patients, and (2) to develop a formula (Linear Discriminant Function) for adequate classification of the MMPI profiles of Mexican-American patients into psychotic or non-psychotic. The reason for the study is the contemporary problem of unavailability of psychodiagnostic instruments adequately adjusted for use with this significantly large population of Mexican-American psychiatric patients. It is also of some theoretical interest to partially and remotely determine to what extent is the MMPI valid with Mexican-American psychiatric patients and whether or not cultural differences between two segments of the larger American culture are associated with different MMPI performance by emotionally disturbed members of each segment. Although this study has several limitations, it is believed that significant findings would aid in the efforts to add some knowledge about the MMPI and to provide more effective mental health services to the Mexican-American population.

CHAPTER I I

REVIEW OF THE LITERATURE

In this chapter, the literature pertinent to this study is reviewed. The review of the literature is divided into two sections: (1) MMPI studies and (2) Mexican-American studies.

MMPI

Work on the MMPI was initiated in the late 1930's as a result of a perceived need in clinical research and practice for "an objective instrument for the multiphasic assessment of personality by means of profile scales" (Hathaway, 1960). Hathaway & McKinley (1951, 1940) built scales from the responses of patients who were classified according to the current clinical practice, based on a modified Kraepelinian system. In the preliminary work more than one thousand statements were compiled from psychiatric examination forms, psychiatric textbooks, and previously published attitude and personality scales, as well as from the authors' clinical experience. Items for each scale of the MMPI were selected by contrasting the responses of non-psychiatric subjects with those of patients in a particular diagnostic category. In these analyses more than 1500

non-psychiatric subjects were used, the main group consisting of 724 visitors to the University of Minnesota Hospitals. Other groups included 265 normal clients from the University Minnesota Testing Bureau, 265 local WPA workers, and 254 medical patients from the general wards of the University of Minnesota Hospitals. More than 800 carefully studied psychiatric patients constituted the clinical pool.

The MMPI represents the apex of research and detailed test construction in the area of adjustment inventories (Nunnally, 1959). Face validity was not a concern in the construction of the instrument as is often the case with other inventories. As mentioned above, the scales were originally used to measure nine kinds of mental illness and were developed on an empirical basis by criterion keying.

A large group of items was administered initially to several hundred normal persons and to groups of mental hospital patients whose symptoms matched one of the nine kinds of mental illness. Item analyses were undertaken to find the scoring key for each illness scale which would best differentiate the patient of one type from normals and from other types of patients. In addition to the nine mental illness scales available in the MMPI, four so-called "validity scales" are used. These provide some information about the test-taking attitude of the subject and the relative honesty with which his responses are made. In the above and following para-

graphs, descriptions of the original clinical concepts are provided together with descriptive notes on the interpretation of the scales. For the former information this description has drawn heavily on the writings of Nunnally (1959) and Lanyon (1968). The interpretive notes below have been based largely on Dahlstrom & Welsh (1963) and adapted from Lanyon (1968).

Cannot Say Score (?). This consists of the number items marked in the "cannot say" category. The interpretation is that if a person has a high question score, the scale score for different kinds of illness appear lower than they should be. If a person has as many as 130 "cannot say" responses, the individual's test record is assumed to be invalid.

The Lie Scale (L). This consists of 15 items concerning socially desirable actions which few people could truthfully endorse (too good to be true). The assumption is that an individual who endorses numerous items of this kind is falsifying the inventory.

The Validity Score (F). This consists of 64 items which are endorsed infrequently by normal subjects. They concern a hodgepodge of symptoms which are not likely to occur in any one mental illness. The interpretation is that a person who endorses a number of these items is careless or does not understand the test instructions.

The Correction Score (K). This scale was derived after the original development of the test as a correction scale or "suppressor variable" for improving discriminations of the clinical scales by taking into consideration different degrees of test-taking defensiveness or frankness. Various fractions of the K scale are added to the raw scores for several of the clinical scales to improve their discrimination.

The authors recognized that the K weights given in the manual might not be optimal for populations other than their own and subsequent work (Hulburn, 1963) has tended to substantiate this prediction. However, the vast majority of research and clinical data available on the MMPI refers to

the K-corrected form using the original K weights. It must be noted that although the primary function of the K scale is to increase the discriminating power of the clinical scales, it can be interpreted in its own right as a validity scale and also as a personality scale. The K score may be considered to reflect test-taking attitudes of a more subtle nature than the L scale.

Scale 1. Hypochondriasis (Hs). Hypochondriasis was defined as "abnormal psychoneurotic concern over bodily health." High scores on the Hs scale are unduly concerned about their physical health, tending to claim symptoms for which no clear organic basis can be found, and to exaggerate the importance of any organic malfunctioning which they do have.

Scale 2. Depression (D). This scale was developed to measure symptomatic depression, the author's term for patients showing "a clinically recognizable, general frame of mind characterized by poor morale, lack of hope in the future, and dissatisfaction with the patient's own status generally".

Scale 3. Hysteria (Hy). The Hy scale was intended as an aid in the clinical diagnosis of hysteria. The criterion patients either had been diagnosed "psychoneurosis, hysteria," or had been observed to have hysterical components in their disturbance. An elevated score suggests a tendency toward some particular somatic complaint or symptom, particularly when under psychological stress, with a simultaneous tendency to claim superior social adjustment.

Scale 4. Psychopathic Deviate (Pd). The criterion patients were those diagnosed psychopathic personality, asocial and amoral type. Elevation on the Pd scale suggest non-conformity and a rejection of normal social conventions. Prisons and delinquent groups, as expected from the derivation of the scale, show marked elevations. The scale was developed to reflect the concept of "psychopathic deviancy", which refers to people who are unable to form satisfactory emotional relationships or to appreciate the feelings of others and who cannot anticipate the consequences of their own behavior.

Scale 5. Masculinity-Feminity (Mf). The definition of this

concept posed problems which were not satisfactorily resolved. High scores on the Mf scale are designed to indicate feminine interests in men and masculine interests in women.

Scale 6. Paranoia (Pa). The criterion patients were those judged to have paranoid symptoms, although the diagnostic label of paranoia was rarely applied. Their symptoms included ideas of reference, feelings of persecution, and grandiose self-concepts; or, more mildly suspiciousness, rigidity, and excessive personal sensitivity.

Scale 7. Psychasthenia (Pt). The term psychasthenia, now obsolete, was applied to individuals with compulsions, obsessions, unreasonable fears, and excessive doubts. The Pt scale is perhaps the best single MMPI indicator of general anxiety. High scorers tend to suffer from excessive doubts, to ruminate at length, and to have pervasive feelings of guilt and insecurity.

Scale 8. Schizophrenia (Sc). Criterion patients for the Sc scale were those diagnosed to have schizophrenia in one or another of its various sub-types. Many schizophrenics do not score high on the scale, although there is evidence that most persons with a T score of 75 or above show some schizoid thinking.

Scale 9. Hypomania (Ma). The term hypomania was employed to describe the milder degrees of manic excitement typically occurring in manic-depressive psychosis (elated but unstable mood, restless, over-optimistic, and easily distractible.

Scale 0. Social Introversion (Si). Although not one of the original clinical scales, the Si scale (Drake, 1946) appears on the MMPI profile form and is widely used. High scores on the Si scale tend to be introverted, shy, and socially inept, and prefer to avoid social activity.

The author's hope that additional scales would be constructed has been realized. A total of about 213 scales, indexes, and special procedures are listed by Dahlstrom & Welsh (1960). During its more than 25 years, the MMPI has occasioned a large number of

studies. Publications have appeared as journal articles, monographs, and books. A bibliography completed in 1959 (Dahlstrom & Welsh, 1960), contains about 1100 titles and about 800 publications have appeared since (Butcher, 1969). Dahlstrom & Welsh's Handbook (1963) is still an authoritative text that deals with problems of administration and interpretation, presents systematically and in great detail the empirical findings and, in the process discusses a wide range of issues in personality assessment. Much of that material is not especially relevant to the present investigation, and therefore is beyond the scope of this review.

The MMPI was originally meant to assist the diagnostician to identify certain psychiatric syndromes by means of individual, empirically derived scales. In other words, the instrument was essentially designed as an actuarial device for predicting psychiatric diagnosis on the basis of scores on separate scales. However, for this purpose the instrument proved unsatisfactory (Anastasi, 1954) because scores on the separate scales were found not to discriminate among diagnostic groups in subsequent research and doubt existed as to the value, in any case, of predicting such ambiguous and theoretically vague entities as psychiatric classifications (Shontz, 1965). Because of this failure, it was suggested that profile information might be more useful than single scores for general research and clinical purposes. In other words, a trend was developed to-

ward using the MMPI in such a way as to take into account the entire profile, validity as well as clinical scales, in making a variety of clinical inferences, most of these not directly concerned with formal nosology. Most of the significant research to date has been concerned with the basic MMPI psychogram approached as a pattern.

Different methods have been employed in extracting relevant information from the MMPI profile, and a diversity of variables have been explored in relation to the test. Dahlstrom & Welsh (1963) have classified these methods into three general kinds, linear, non-linear, and typological. These three approaches have been advanced for reducing the multivariate test data into more manageable form. The linear and non-linear approaches are both quantitative summaries with continuous score variation. The typological methods, on the other hand, group the data in discontinuous form. The linear methods are those where an unidimentional scale or an unidimentional combination or scales, capable of predicting a specified criterion, are derived solely by means of linear procedures. Non-linear methods are those where the MMPI data is integrated by means of non-linear procedures and then combined into scales that yield continuous score distribution. Most of these methods are based on simple "signs" furnished by the relative elevation of each scale in the profile. The frequency with which any one scale exceeds each of the other scales in the profile is tabulated for each criterion group.

Then the magnitude of the differences between these frequencies is evaluated by means of statistical tests of the significance of differences in proportions. Those scale pairs which stand up under statistical tests constitute signs to be used in differentiating groups. Finally, typological methods are those where different empirically derived rules are developed and used in order to classify each profile into one of several categories. All these methods have proved to be useful and successful in making the most out of MMPI profile information for the solution of different diagnostic problems.

Studies using a linear model have been mostly concerned with the derivation of special scales for a particular area of application or problem. Also, a large number of unidimensional combinations of basic MMPI scales have been published as special indices for specific attributes not covered by an existing scale. In addition, Dahlstrom & Wahler (1955), and Rempel (1958) have shown that the method of analysis by Linear Discriminant Function (Fisher, 1936) can be employed on basic MMPI variables to yield solutions that stand up under cross-validation to a satisfactory degree. However, although specific methods from each of the three general approaches have been successful to a relative extent, there has been a great deal of controversy among workers in this area (Goldberg, 1969; Taulbee & Sisson, 1957; Peterson, 1954) as to what approach is better as well as to which specific method within a major approach

is the best one. Nowhere is this issue more controversial than in regard to the problem of differentiating psychotic from neurotic MMPI profiles by using one of the several actuarial methods available. Such intense controversy reflects the tremendous practical value which many workers see in the ability to make this kind of discrimination. In most clinical settings, Meehl & Dahlstrom (1960) have pointed out, this ability is conceived as part of the psychologists' role.

For more than twenty years several investigators (Lykken & Rose, 1963; Sines & Silver, 1963; Meehl & Dahlstrom, 1960; Winter & Salcines, 1958; Taulbee & Sisson, 1957; Peterson, 1954; Sanderson, 1952; Sullivan & Welsh, 1952; Meehl, 1946) have presented different methods for classifying psychotic from neurotic patients on the basis of their MMPI profiles. One of the earliest discussions on this problem (Meehl, 1955), predicted that the relationship between MMPI scores and the psychosis versus neurosis diagnostic classification should be highly configural in nature, and therefore no linear combination of MMPI scores should be able to differentiate psychotic from neurotic patients as accurately as either experienced clinicians or configural, actuarial techniques. Highly contradictory findings have been reported since Meehl (1959) provided some evidence suggesting that Fisher's Linear Discriminant Function could be inferior to methods based on configural relationships. He

argued that the Linear Discriminant Function was not sensitive to highly important, non-linear type of information. Affleck & Garfield (1960) applied Peterson's signs (Peterson, 1954) to 152 psychiatric patients of diverse diagnosis. The results revealed many more false positives and appeared less promising than a previous study (Winter & Salcines, 1958). They concluded at that time that the problem of differentiating the group of personality disorders from psychotics on the basis of MMPI profiles apparently remained unsolved. Yet, Winter & Stortroen (1963) compared ten different indices supposedly sensitive to psychosis. They found that the five simplest (linear) indices which are most clearly tied with clinical practice were most effective in detecting psychotic patients. These indices were the F scale, Peterson's signs, Sc score, mean of Pa + Pt + Sc and the number of clinical scales where T = 70. The complex and highly developed Meehl-Dahlstrom rules were ineffective in this situation.

In order to provide more consistent answers to this problem, Goldberg (1965) conducted a highly complex study evaluating the effectiveness of major methods for differentiating psychotics from neurotics on the MMPI. He used as his basic data the 861 MMPI profiles from which Meehl & Dahlstrom (1960) had developed their configural rules for differentiating psychotics from neurotics. For each profile, 29 clinical judges made diagnostic judgments along a

neurotic-psychotic continuum. The accuracy of these clinical judgments was compared with that achieved by each of the 11 MMPI scales scores, 8 scale ranks, 54 diagnostic signs and rules, 35 profile components, 19 linear regression analysis, 2 configural regression models and numerous acturial tables. The accuracy of the judges and the actuarial indices was analyzed for each of the seven samples obtained, for the set of samples for which criterion contamination was least likely, and for the total sample of 861 cases. A number of relatively simple acturial indices turned out to be more accurate than the best diagnostician. More importantly, the results of this study reversed some conclusions from previous analysis of the same data and showed that a simple linear combination of five scale scores (L + Pa + Sc - Hy - Pt) was more accurate than configural models including the Meehl-Dahlstrom rules. In a later study, L. R. Goldberg (1969) summarized the findings from ten years of research on this problem and compared the efficiency of some methods (Hoffman, 1968; Gilberstadt & Duker, 1965; Ghiselli, 1963; Ronsenblatt, 1958; Saunders, 1956) recently developed for differentiating psychotic from neurotic MMPI profiles. After reporting his results, he concluded that while the search for configural actuarial procedures has led to a moderator variable (Saunders, 1956), neither clinical experts, moderate regression analysis, profile typologies, the Perception Alogarithm, density estimation procedures, Bayesian

techniques, nor sequential analysis when cross-validated have been able to improve on a simple linear function (L + Pa + Sc - Hy - Pt). Another recent study (Goldstein & Linden, 1969) reports the efficiency of multivariate procedures for MMPI grouping techniques. Specifically, this study presents some evidence indicating the superior efficiency of correlational cluster procedures over factor analysis and distance measures followed by hierarchical grouping.

In spite of much effort and study regarding the issue of classifying psychotics and neurotics on the MMPI, no major agreement has been attained as to what approach or method performs more efficiently. From a rather molar level it appears that two main viewpoints have developed among researchers on this area. One viewpoint stresses the importance of configural rules on the assumption that no linear combination of MMPI scores should be able to maximally differentiate psychotic from neurotic patients. The other viewpoint stresses the fact that while configural rules are liable to extract more relevant variance than linear combinations, they result in greater shrinkage upon cross-validation, and, therefore, are less efficient. Meanwhile, new "cookbooks" (Owen, 1970) keep appearing in the literature and the number of MMPI studies where multivariate procedures are employed (Overall, 1971a; Melrose, Stroebel & Glueck, 1970; Goldstein & Linden, 1969; Kendell, 1969) are seemingly increasing. These studies show evidence of efficient

classification of psychiatric groups by various types of multivariate statistical procedures. One investigator (Overall, 1971b) adopts the position that both viewpoints mentioned above have in fact highly valid arguments. However, he suggests that by using the procedure of Linear Discriminant Function, it is possible to incorporate the advantages of configural and linear methods into a single procedure. He points out that the Linear Discriminant Function (a linear method) has both, the advantages of linear methods and the flexibility of incorporating non-linear information derived from configural rules. In other words, this position calls for a sequential combination of linear and configural data by means of a statistical technique. It is suggested that such combination would provide a predictive formula, capable of higher classification efficiency than any of the linear or configural methods used separately.

On the basis of the foregoing discussion, it appears that so far no particular method for discriminating psychotic from non-psychotic MMPI profiles is clearly superior than any other. It appears, at this point, that several actuarial methods could be utilized for research purposes with a similar degree of justification. The present investigation will adopt a slightly conservative position and utilize a Linear Discriminant Function for purposes of classifying MMPI profiles of psychotic and non-psychotic Mexican-American psychiatric patients. It is hoped that future studies will develop ef-

fective configural rules for the same classification problem. Non-linear information obtained from these studies should then be incorporated into the formula that will be developed in the present investigation.

Since the present study will compare mean MMPI group profiles of two culturally different samples of psychiatric patients, a review of the MMPI literature concerning background variables seems pertinent. It is expected that all the background variables which are liable to affect MMPI performance of the comparison groups will be identified and taken into consideration while formulating the design of this study.

Lanyon (1968) presents a summary of the literature on MMPI group mean profile comparisons where some of the effects of background variables on MMPI performance are briefly discussed. The most obvious background factor having significant influence on MMPI test behavior is the sex of the subject. Hathaway & Briggs (1957) offer clear support for this stand and present a convincing argument for the necessity of furnishing different T-scores for males and females.

Age differences account for several distinct though minor variations in MMPI profiles. For example, normal adolescents tend to score slightly higher than average on the Pd scale and also on Sc and Ma (Calden & Hokanson, 1959; Panton, 1959). The scores of

elderly Ss show a slight increase on some scales (Calden & Hokanson, 1959) and the findings of one study (Wauck, 1950) suggests that the scores of schizophrenic patients tend to increase with age. Gynther & Shimkunas (1966) evaluated the effects of age on MMPI scores with intelligence controlled. They found that T-scores on scales 4, 6, 8 and 9 are affected by age, scores on L and F by intelligence, and scores on F by both variables.

Studies dealing with the effects of intelligence on MMPI performance have not yielded consistent results. According to Dahlstrom & Welsh (1960), the contributions of intellectual differences to MMPI performance are very complex, mainly because there is no way to separate the effects of intellectual differences per se from the effects of differences in socioeconomic status. Applezweig (1953) showed that F is negatively correlated to intelligence with a high ability group of high school and college S's ranging in age from 16 to 42. Although no study has yet analyzed the unique contribution of intelligence on MMPI performance, Gynther & Shimkunas (1965), have shown that F scores are in fact affected by intelligence. In a more recent study (Gynther & Shimkunas, 1966), a significant relationship between scores on scales L and F and intelligence was further established.

The specific effects of educational level on MMPI performance are still not clearly established beyond the general suggestion

that some relationship does in fact exists. Gough (1954) and Brehm (1954) examined a group of S's before they reached college age, and then followed them to determine which ones went to college and what happened to them in terms of MMPI differences in performance. The most consistent correlations between educational level and the basic MMPI scales are those involving the F and K scales, and scale 5 among males. Dahlstrom & Welsh (1963) and Lanyon (1968) point out that the current evidence indicates some definite effects of educational level on MMPI performance, but it is difficult to state precisely the nature and extent of this influence.

As Dahlstrom & Welsh (1963) have indicated, the results of studies on socioeconomic status and MMPI performance have shown that this background variable has an important bearing on the way Ss respond to the test. Although Lanyon (1968) observed that the relevant data is scanty, and that there are no consistent differences on MMPI scores for different levels of socioeconomic status, there is in fact some relationship between the two variables. Several studies (DeVries, 1966; Butcher, Ball, & Ray, 1964; McDonald & Gynther, 1963; Monachesi, 1953) substantiate these conclusions.

Other studies have been conducted with the MMPI attempting to examine the possible effect of such background variables as religion, occupational status, marital status, and ethnic origin. Specific differences on MMPI performance associated with different levels of

these variables have not been established yet (Lanyon, 1968). Some studies have indicated that these variables have in fact some effect on MMPI performance. For example, Vaughan (1965) studied the MMPI profile of two groups composed of similar Ss of different religious affiliation. He found some differences between Catholic and Protestant college freshmen. On the other hand, DeVries (1966) in a study with 600 psychiatric patients found no MMPI score differences in his sample attributable to religious affiliation. Yet, he found that five variables, namely education, occupation, marital status, age, and number of hospital admissions, as well as psychiatric diagnosis influenced MMPI responses.

Differences on MMPI responses due to ethnic factors will be reviewed in the next section. It is sufficient to mention, at this point, that in at least one well designed study (Harrison & Kass, 1967) MMPI differences have been found between Negro and Caucasian females. As a summary of this section on the effects of background variables on MMPI performance, the following observations can be made. Although at least one study for each variable has provided evidence of the effect of all demographic variables on MMPI performance, and most of the studies do not show consistent results, the most substantiated relationships were those between MMPI and sex, age, IQ, educational level, socioeconomic level, religion, and ethnicity.

Relatively few MMPI studies have reported comparisons of Caucasian and Non-Caucasian Americans. Although the first study of this sort (Arthur, 1944) was carried out on a select group of twelfth grade American Indians, most ethnic comparisons of the MMPI have focused on Caucasian and Negro Americans. Fry (1944) compared Caucasian and Negro prisoners from one of the Pennsylvania correctional institutions and found that Negros scored slightly (and insignificantly) lower than Caucasian prisoners on all the clinical scales except scale 9. In other comparisons of Negro and Caucasian prisoners (Panton, 1959; M. G. Caldwell, 1954), V. A. psychiatric patients (Calden, 1959), high school students (Ball, 1960), medical patients (Hokanson & Caldwell, 1960) significant differences were also found between the two groups. Dahlstrom & Welsh (1960), pointed out that the full significance of these studies is difficult to assess because none of them was to provide representative samples of the racial groups in this country. They concluded that the findings of all these studies are the sort that could be expected from known effects of socioeconomic inequities. Attempting to avoid some of these shortcomings, Miller, Wertz, & Counts (1961) compared Negro and Caucasian samples where the Ss did not differ in age, employment status, or education. After finding that most of the variance was associated with affiliation to the particular kind of institution they came from prison, T. B. hospital or mental hygiene clinic and very

little with membership in a racial group. They concluded that social factors such as occupational status and education rather than race determine most of the variance in MMPI scores. In a different study (McDonald & Gynther, 1963) it was attempted to find out if Negro and Caucasian students perform differently on the MMPI with socioeconomic status controlled. The findings revealed significant differences in eight scales pointing to the conclusion that such differences were related to the ethnic factor. Another investigation (Butcher, Ball & Ray, 1964) studied Negro and Caucasian college students by matching two groups on variables such as age, sex, education, institutional differences, and socioeconomic level. Two major comparisons, one between non-matched racial groups and one between matched groups were undertaken. Both socioeconomic level and other sub-cultural factors were found to influence MMPI characteristics. The findings presented by this study seems to clarify the inconsistent findings in this area, and appear to be congruent with the results of subsequent studies (Erdberg, 1969; Harrison & Kass, 1967).

Several comparisons on MMPI mean group profiles between American samples and samples from another culture have been conducted. Such studies include comparisons among Australian and American college students (Taft, 1957), German and American students (Saundberg, 1956), Italian and Americans of both sex (Rasen & Rizzo, 1961; 1961a), Mexican and American priests (Velazquez, 1970).

The MMPI has been translated into fifteen languages, and in some of these different versions have been prepared. Three of the best translations have been recently evaluated (Glatt, 1969) and found to be relatively poor. Yet, most translations have been constantly generating a variety of studies on many different areas. For example, Mitsukuni (1969) has refined a delinquency scale on the Japanese version of the MMPI. This study reports that such scale is capable of screening delinquents and discriminating the degree of delinquency for some segments of the Japanese population.

In spite of these developments abroad and a number of studies on Negro-Caucasian differences on the MMPI, a review of the literature reveals only one study (Reilly & Knight, 1970) especially designed to compare the performance on the MMPI between Anglo-American and Mexican-American subjects. This study was interested in determining whether any MMPI differences existed between college students from the two cultural groups. The MMPI was administered to a total of 136 students at a Southwestern University and a two-by-two sex-race factorial analysis of variance was used to analyze the data. A total of seven significant differences out of 36 comparisons were found between the two groups. It was found that females on each group scored higher than males on the D and Si scales. Mexican-American Ss scored higher than Anglo-American Ss on the L scale and the reverse was the case on the Pa scale. Some signifi-

cant differences were also obtained on the sex-race interaction.

Mexican-American Psychiatric Patients

The existing literature regarding the normal population of Mexican-Americans reveal that a considerable amount of anthropological, sociological and socio-psychological studies have been conducted over the last 20 years. Some of these studies (Rubel, 1966; Diaz-Guerrero, 1964; Madsen, 1964; Saunders, 1954; Kibble, 1946) have attempted to isolate and understand some of the unique cultural patterns of this sub-culture. These workers have drawn attention to what appears to be a passive coping style in Mexican-Americans and to their tendency to "endure" life as compared to the Anglo-Americans who seem more active, and who tend to emphasize mastery. Mexican-Americans stress overt deference to authority; in the home, respect is afforded to older relatives and in general, the extended family is important and is believed to offer psychological support and protection. Role prescriptions in each of the two sex's conception of masculinity and feminity are very different. In the Anglo community, Mexican-Americans tend to appear emotionally withdrawn and isolated even to neighbors who are from similar background. Other studies in which the focus of analysis is more at the psychological level, (Littlefield, 1968; Diaz-Guerrero, 1965; Sherif & Sherif, 1964; Christi & Garcia, 1951), have paid some attention to this population in their attempts to cross-validate hypothesis derived from various personality

and socio-psychological theories. More recent studies involving non-psychiatric Mexican-American Ss have displayed less interest in theoretical cross-validations and more concern with the peculiarities of different psychological phenomena in the Mexican-American population. This observation is suggested by the increasing number of investigations in which different aspects of the Mexican-American sub-culture are investigated at the psychological level of analysis. Examples of this are recent studies of delinquency (Rusk, 1969), socialization methods (Hill, 1969), and children's school achievement (Gillmann, 1969) in the Mexican-American sub-culture.

Relatively few studies involving Mexican-American psychiatric patients have been reported in the literature and most of these have appeared during the last ten years. One of the first studies (Jaco, 1960), was an epidemological investigation which focused on the rate of treated psychotic illness of each ethnic group in the State of Texas during a two-year period. It was found at that time that the incidence figure for the Mexican-Americans was lower than the incidence for both the Caucasian and the Negro group. This finding led to the interpretation that Mexican-Americans suffer from less psychotic illness than the other two groups. On this basis, the investigator expressed the belief that the existence of cultural pattern of warm, supportive, extended family with strong values of mutual acceptance, care, and responsibility tended to protect Mexican-Americans against

the development of major mental illness. An equally tenable hypothesis, namely that Mexican-Americans show greater tolerance of deviant psychotic behavior in the home and thus are likely to delay or postpone hospitalization was also considered. Stimulated by these interpretations, Wignall & Lawrence (1967) studied Mexican-American Colorado residents and attempted to ascertain whether or not such group used mental health facilities differently than non-Mexican-Americans. The results indicate that Mexican-Americans make less use of state mental health facilities, and this difference was interpreted as the end product of economic and social discrimination. Previous findings of significant differences between Mexican-Americans and Anglo-Americans in response to psychotherapy led Karno (1966) to the hypothesis that the true incidence of mental illness among Mexican-Americans was much higher than was suggested by their use of mental health institutions. In order to account for the paradoxical discrepancy between the suspected much higher incidence of psychosis in the Mexican-American population, Karno & Edgerton (1969) designed a study where both the perception, definitions, and responses to mental illness as well as the incidence of such phenomena among Mexican-Americans from two California communities was examined by means of ethnographic field studies and quantitative survey data. The results of this study suggest that the underutilization of psychiatric facilities by Mexican-Americans is not to be accounted for by a lesser

incidence of mental illness or by the fact that they share a cultural tradition which causes them to perceive and define mental illness in significantly different ways than Anglo-Americans. The data indicates that a large number of Mexican-Americans in Los Angeles seek treatment for obviously psychiatric disorders from family physicians. The under-representation of Mexican-Americans in psychiatric treatment was accounted for by complex socio-cultural factors such as the language barrier, the significant mental health role of the very active family physician, the self-esteem reducing nature of agency-client contact experienced by Mexican-Americans, and the marked lack of mental health facilities in the Mexican-American community itself. It was finally concluded that the under-representation of Mexican-Americans in psychiatric treatment was not highly influenced by factors such as folk medicine, folk-psychotherapy, and "Mexican culture" in general. A later study, (Edgerton, Karno, & Fernandez, 1970) shows that for most urban Mexican-Americans, the preferred treatment resource for mental illness is the general physician and not the curandero (folk medicine healers). This finding confirms the hypothesis that the reported under-representation of Mexican-Americans in psychiatric treatment is not due to the widespread practice of folk psychiatry.

In studies dealing with the characteristics of Mexican-American psychiatric patients, Stoker (1965) compared Anglo-American

and Mexican-American patients of different ages and different degree of disturbance. He found that Mexican-American boys were more hostile and aggressive, tending to express their anger, either directly or in a passive-agressive manner. The Mexican-American girls evidenced a symptomatic picture which was suggestive of an agitated depression. The findings on the adult sample supported the findings on the child sample. Both child and adult Mexican-American samples in that the latter cultural group displayed more disturbance in interpersonal relationships. Kole (1966) found some differences in the number and kind of medical and psychiatric symptoms between Anglo-American and Mexican-American psychiatric patients. He found that women reported significantly more symptoms than men, psychiatric patients more than medical patients and Mexican-American psychiatric patients more than Anglo-American psychiatric patients. He also found that in comparison to the Anglo-American psychiatric patients, the Mexican-American psychiatric patients reported a strikingly higher incidence of feelings of personal inadequacy, hypersensitivity, and hostility. Meadow and Stoker (1965) analyzed case files on 120 Mexican-American and 120 Anglo-American hospitalized psychiatric patients. The analysis of this study indicates that Mexican-American females are more affectively disturbed and catatonic than their Anglo-American counterpart. Mexican-American men were found to be more alcoholic and assaultive than Anglo-American men, resembling Mex-

ican-American women in having a greater predominance of catatonic symptomatology. Anglo-American men and women were found to have a greater number of paranoid delusions than the Mexican-American groups. Another finding of this study is that behaviors reported by the hospital personnel were moderately correlated with behaviors independently described by family members of both groups. This suggested a common core of agreement between the members of the two cultural groups in perception of pathological behavior.

In a study dealing with cross cultural differences in psychopathological manifestations (Stoker, Zurcher, & Fox, 1969), 25 Mexican-American females and 25 Anglo-American female patients were compared in terms of diagnosis. The results show a relatively higher frequency of character disorders for the Anglo-American Ss and a relatively higher frequency of neurotic disorders for the Mexican-American S's. Anglo-Americans show more anxiety, guilt, and have fewer friends. However, Mexican-Americans have four times as many somatic complaints, a finding that is in line with some of Kole's (1966) findings.

In an attempt to specify the clinical correlates of ethnicity for hospitalized schizophrenic patients, Fabrega, Swartz, and Wallace (1968) evaluated a sample of 180 Anglo-American, 42 Negro-American, and 19 Mexican-American schizophrenic patients under three types of conditions. The three conditions were: randon; social class held

constant; individuals carefully matched on age, sex, estimated IQ, number of previous hospitalizations and when possible, years of education. All S's were evaluated under each of the three conditions. The clinical indices included a psychiatric rating scale of manifest symptomatology, nurses' judgments of the patient's ward behavior viewed from the social appropriateness and organization standpoint, and a measure of personality organization based on responses to a group administered projective psychological test. Although the projective data consisted of a derived psychometric index which was not previously standardized for either the Negro or the Mexican-American population, no differences on this index were found among the three groups. On the basis of the other two measures employed in this study, it was shown that the Mexican-American Ss were more regressed, chronic, and disorganized, emitting a larger number of deviant behaviors than the other two groups. These differences were greater in the first two conditions and diminished when the S's were matched. However, statistically significant differences on the four dimensions were still present after the matching was executed. On the basis of much larger samples, Pokorny and Overall (1970) also showed that Mexican-American institutionalized patients display a larger degree of disorganization than Anglo-or Negro-American patients. As part of a large scale survey of the patient population of the Texas State Mental Hospital System, these investigators studied

the relationship of psychopathology to age, ethnicity (Mexican-American versus Anglo-American), education, and marital status. In terms of the descriptive psychiatric symptoms that constituted the basic data, the scores of the Mexican-American patients tended to be substantially higher than the other two groups of patients in five of the eight symptom factors investigated. The five factors on which the Mexican-American patients scored significantly higher than the other two ethnic groups are, mental disorganization, mental distortion, withdrawal-retardation, motor distortion, and depression. It must be noted that the complex statistical model utilized in this investigation made it possible to partial out the effects associated with differences in education, mental status, age, sex. Therefore, it was concluded that the differences mentioned above were associated with the ethnic-cultural factor over and above the influence of the other background variables.

Summary

In summary, it was noted that background variables are associated with group differences in MMPI performance. Studies have shown that significant group differences in one or more MMPI scales have been associated with group differences in sex (Aarason, 1958; Drake, 1953), age (Calden & Kokanson, 1959), intelligence (Gynther & Shimkunas, 1966; Applezweick, 1953), educational level (Brehn, 1954), socioeconomic status (DeVries, 1966; McDonald & Gynther,

1963; Monachesi, 1953), and religion (Vaughan, 1965). Other findings show that the MMPI is sensitive to biases associated with some differences in cultural group membership with the larger American culture (Reilley & Knight, 1970; Erdberg, 1969; Harrison & Katz, 1967; Butcher, Ball & Ray, 1964). It was also noted that although several MMPI comparisons have been conducted between members of the American culture and other cultures (Rosen & Rizzo, 1961), only one study (Reilly & Knight, 1970) has examined MMPI differences between Anglo-American and Mexican-American Ss. No studies have been conducted in which Mexican-American psychiatric patients and Anglo-American psychiatric patients are compared on MMPI performance. Furthermore, no psychometric instrument of potential clinical value have been standardized on a population of Mexican-American psychiatric patients.

It was noted that the practical value of discriminating psychotics from neurotics has been stressed in the literature (Meehl & Dahlstrom, 1960). Although the MMPI has been carefully researched for this purpose and several methods have been proposed (Goldberg, 1965), no one method for discriminating psychotic from neurotic MMPI profiles is undoubtedly superior to any other. It was found that several acturial methods could be employed with equal justification for this purpose. However, the present study will adopt a conservative position and utilize a Linear Discriminant Function for the

classification of Mexican-American psychiatric patients. Overall (1971a) pointed out that this method has the power of linear methods as well as the flexibility of incorporating non-linear, actuarial information.

It was noted that Mexican-Americans tend to be under-represented in public mental health facilities (Jaco, 1960), but rather than indicating a smaller incidence of mental illness in this population, it reflects the influence of complex socio-cultural factors, such as a language barrier and the mental health role of the active family physician (Karno, 1966). Other studies indicated that although Anglo-Americans and Mexican-Americans have a common core of agreement in perception of pathological behavior (Meadow & Stoker, 1965), institutionalized Mexican-American psychiatric patients display a greater degree of psychopathology than their Anglo-American or Negro-American counterparts (Pokorny & Overall, 1970; Fabrega, Swartz, & Wallace, 1968).

CHAPTER III

DESIGN AND STATISTICAL METHODOLOGY

This study was composed of two major aspects. The first aspect examined the mean MMPI profile differences between groups of Anglo and Mexican-American psychiatric patients by means of two different statistical models. One model allowed MMPI differences between the two cultural groups to be examined without questioning the independent or interaction effects of other demographic variables upon these differences. The other more complex statistical model allowed MMPI mean profile differences attributable to the cultural variable alone to be examined in order to determine the significance of this variable when the other background variables are partialled out.

The second aspect of this study was limited to the Mexican-American sample. First, a formula which maximizes the chances of correctly classifying Mexican-American psychotic and non-psychotic psychiatric patients on the basis of the MMPI was derived. Second, cross-validation procedures were followed in order to test the actual effectiveness of the derived formula on a different sample.

Sample

The total sample employed in this study was obtained by sequentially selecting 600 psychiatric patients representing referrals to the Department of Psychology at the University of Texas Medical Branch located at Galveston, Texas. These patients were all referred for diagnostic testing and were administered the standard psychometric battery employed at the Medical Branch, including the WAIS, the Rorschach, the D-A-P-, a Word Association Test, the Bender, the Wechsler-Memory Scale, the Sentence Completion Test, and the MMPI. With a few exceptions, all the tests were administered to each patient on the same day, usually within two to five days of his admittance to the hospital for psychiatric reasons. The tests were administered either by a Ph. D. clinical psychologist with 10 or more years of experience, or by a doctoral level intern in clinical psychology with some experience in test administration and interpretation. In the case of the intern, the official clinical diagnosis was obtained through consultation with a Ph. D. clinical psychologist. It is important to mention at this point that although the MMPI is administered to all referred patients as part of the standard battery used at the Division of Psychology, the MMPI performance of Mexican-American patients is not used to arrive at these patients' official diagnosis. In other words, due to the staff's conviction that Mexican-American patients perform different from Anglo-American patients on the MMPI,

the official diagnosis of all Ss in the Mexican-American sample was not affected or contaminated by their performance on the MMPI. The patient population from which the subjects were selected is composed of approximately 50,000 individuals whose records have been filed in the department over the years. The strategy of this study called for sequentially drawing from the files records of the most recently tested patients until a total of 200 Anglos (100 psychotics and 100 non-psychotics) and 400 Mexican-American (200 psychotics and 200 non-psychotics) patients which met the requirements of the study were drawn. Excluded from the sample were patients on whom all the desired psychometric, demographic, and socio-cultural data could not be obtained, patients under 18 years of age, patients who were neither Anglo or Mexican-American (i.e., Asiatics, Negroes, Latin-Americans, etc.), a few patients with incomplete test batteries, patients on whom there was a lack of agreement between the two independent diagnosticians in regard to the psychotic versus non-psychotic diagnosis (see section on diagnostic cross-validation), patients of known or strongly suspected mental deficiency, organic brain damage (including psychotics), acute physical illness, or almost pure psychopathic personality, and patients whose MMPI profiles were suspected of being invalid because their validity scales showed a "?" > 60, L > 70, or F > 80. The sampling procedures began with those patients tested on the last day of August, 1971, and

proceeded backward in time. The two cells corresponding to the 200 Anglo patients (100 psychotics and 100 non-psychotics) were filled with patients who had been tested not earlier than January, 1970. The two cells corresponding to the 400 Mexican-Americans (200 psychotics and 200 non-psychotics) were filled with patients who had been tested not earlier than January, 1966. This difference reflects the smaller ratio of Mexican-American referrals in comparison to the larger per cent of Anglo patients who are referred for testing.

Procedure

The researcher started drawing eligible subjects into the two major samples beginning with all the referrals tested on August 30, 1971, and proceeded backward in time considering every subject in the sequence until 200 Anglos (100 psychotics and 100 non-psychotics) and 400 Mexican-American (200 psychotics and 200 non-psychotics) were drawn. From the hospital records, data was obtained on each subject with respect to the following variables: religious affiliation, father's occupation (and husband's occupation in the case of female housewives), IQ, official clinical diagnosis, last name, cultural background (Anglo, Negro, or Mexican-American), and their raw scores on the 10 MMPI scales and 3 validity scales.

Diagnosis cross-validation. As an additional methodological control, procedures for data collection on each individual S were conducted in a particular sequence. For each S, background data was

collected first. Then, the researcher examined the S's psychometric data (except the MMPI) and on this basis, a psychosis versus non-psychosis diagnostic decision was made. The official diagnosis was then observed for the first time. A S was accepted for inclusion in the sample only if his official diagnosis was congruent with the researcher's independent diagnosis along the psychosis versus non-psychosis dimension. If a S met this, as well as other requirements mentioned before, his MMPI data was then observed and recorded. In case of disagreement in regards to the psychotic versus non-psychotic decision, the S was disregarded and the researcher continued the sequential search from the files.

The basic data of the present study consisted of each S's total MMPI raw scores on each of the 10 clinical scales (Hs, D, Hy, Pd, MF, Pa, Pt, Sc, Ma, and Si) and the three validity scales (L, F, and K). All the needed information was recorded on a data form (See Appendix A) with each S assigned a unique ID number. The background data with respect to each variable was coded for statistical purposes.

The specific internal values chosen for partitioning each variable into different categories were selected on the basis of past, relevant studies. All the background variables were obtained and incorporated into the study because of their known effects on MMPI performance (culture and clinical diagnosis, on the other hand were

of absolute necessity for answering one or more of the research questions). Since there was no basis to assume that all the background variables were randomly distributed in the two major cultural samples, it was decided to impose some statistical controls on these variables in order to test the hypothesis that significant differences between the two groups could be attributable to the unique effects of the cultural factor. The one level or category of each background variable to which each S belonged was determined for all Ss on each of the relevant demographic variables (sex, age, marital status, culture, social class, education, religious affiliation, IQ) as well as his membership in one of the two major diagnostic categories. The number of categories and/or levels and specific interval values on each variable is presented below and accompanied, when necessary, by a brief discussion. There are also two categories for the cultural variable, namely, Mexican-American and Anglo-American. The age variable was partitioned into four different intervals representing four levels (from low to high) of age. These levels are 20 or younger, 21-30, 31-40, 41-50, and 51 or older.

The social class variable was partitioned into four different intervals (1, 2, 3, and 4) representing four different levels (from high to low) of social class or status. There appears to be a consensus by workers in the area of social stratification to the effect that "occupation" represents the best single index of class position.

Since this datum could readily be obtained for the Ss participating in this study, a classification scheme (Schneider & Lynsegaard, 1953) was employed as the basis for estimating social class position. With respect to persons not directly employed (i.e., students) their classification was based upon marital or familial association. For example, in dealing with housewives not employed outside the home, their husband's occupation was taken as the best index for classification into class position. In cases of unsettled young adults of either sex, their class position was estimated on the basis of their parents' occupation. Schneider and Lysegaard's scale was applied to each S in order to classify them with regard to the social class factor on the basis of the four occupational classes derived by the scale. Four occupational classes (and therefore four estimated social class levels) are derived by this scale in terms of the degree of supervisory power over "lower" occupations and independence of supervisory control from "higher" occupations.

There were four different levels for the education variable. These levels are eight or less, 9-11, 12, and 13 or more (completed years of formal education, including trade or technical school).

The religious affiliation variable was conceptualized as subsumming a total of three different categories. These categories were Protestant, Catholic, and None or Other. It should be mentioned in this context that a large scale survey of the patient popula-

tion from which the samples were drawn (Roessle, 1960) found significantly small samples associated with most Fundamentalist and Protestant denominations in this population. With this in mind, 13 denominations (Assembly of God, Baptist, Church of Christ, Church of God, Full Gospel Church, Jehovah's Witnesses, Nazarene Church, Pentecostal, Seventh day Adventist, Episcopal, Lutheran, Methodist, and Presbyterian) were combined into a single, Protestant category.

The IQ or intelligence variable was partitioned into four different intervals representing four levels (from low to high) of IQ. These levels are 70-89, 90-110 111-119, and 120 or higher.

Finally, the clinical diagnosis variable was conceptualized as subsumming a total of two major categories. These two categories are psychotic disorders and non-psychotic disorders.

A detailed description of the sample in terms of all the variables included in this investigation can be found in Appendix B. Frequency tables showing distributions of all Ss, all Mexican-American Ss, all Anglo-American Ss, Mexican-American psychotics, Mexican-American non-psychotics, Anglo-American psychotics and Anglo-American non-psychotics data sheets are presented on the basis of all variables included in this study. Similarly, in Appendix C frequency tables are presented showing the distribution of all the psychotic Ss and all the non-psychotic Ss on the basis of specific clinical sub-categories and cultural group membership.

Statistical Treatment

Aspect I. In order to answer the three questions regarding cultural differences on the MMPI and one question regarding differences between psychotic and non-psychotic Mexican-American patients, two different strategies were followed. One strategy consisted of conducting *t*-test comparisons for each MMPI scale between the two groups under consideration at a particular point. This approach yielded the type of data that was readily compared with the results of previous studies within the area of cultural comparisons of the MMPI. This was, in fact, the only reason for conducting the *t*-test comparisons in this investigation. This approach, although very popular in answering the questions asked by this and similar studies, assumes random distribution of all background variables in the two comparison groups. Questionable satisfaction of such an assumption creates serious doubts about the legitimacy of attributing to the ethnic factor whatever differences are found between the comparison groups. For this reason, an additional strategy was followed in order to answer the four research questions presented by the first aspect of this study. This second approach or design consists of conducting a complex, multiple classification analysis of variance to answer the four research questions. While the first approach examined the relevance of the cultural factor disregarding all other variables, the second approach (least squares analysis) partialled out the

effects of all the other background variables in order to examine the independent effects of the cultural factor over and above the effects that might be attributable to the other variables. This type of analysis appears to be very important where background variables are themselves substantially related and one wants to know whether the data supports the unique importance of a particular variable independent of the effects of the others. Detailed discussion of the least squares method can be found in an article by Overall and Spiegel (1969).

Following the first strategy described above, the following t-test comparisons were conducted in conjunction with the four specific questions posed by Aspect I.

(1.1) A total of 13 t-test comparisons of MMPI group mean scores were conducted by comparing on each scale the mean raw score of all the Anglo sample (100 psychotics and 100 non-psychotics) and the mean raw score of all the Mexican sample (200 psychotics and 200 non-psychotics).

(1.2) A total of 13 t-test comparisons of MMPI group mean scores were conducted by comparing on each scale the mean raw score of all psychotics in the Anglo sample (N=100) and all the psychotics in the Mexican sample (N=200).

(1.3) A total of 13 t-test comparisons of MMPI group mean scores were conducted by comparing on each scale the mean raw

score of all the non-psychotics in the Anglo sample (N=100) and all the non-psychotics in the Mexican sample (N=200).

(2) A total of 13 t-test comparisons of MMPI group mean scores were conducted by comparing on each scale the mean raw score of all the psychotics in the Mexican sample (N=200) and all the non-psychotics in the same cultural sample (N=200).

Since a total of 52 t-test comparisons were conducted, the minimum for the determination of a significant finding was set at the .01 level.

Following the complex analysis of variance the same basic comparisons were made, but this time the least square analysis of variance was used. The results of this analysis were taken as the decisive criteria for answering the questions under consideration. The method of least squares was exceptionally useful for the present investigation in terms of its ability to correct statistically for the contributing effects of relevant background variables. This correction partials out the effects of one particular variable over and above the effects of other variables. For the first three major analyses it partialled out the effects of the cultural factor and in the fourth analysis it partialled out the effects of the psychopathology factor in the culturally homogeneous group.

In order to provide answers to the three specific questions derived from the first general question, the method of least squares

was utilized for testing the independent effects of the cultural factor on the two diagnostically heterogeneous samples, on the two psychotic samples and on the two non-psychotic samples. The least square method was used with the following groups in the following fashion:

(1.1) A total of 13 least squares analyses of MMPI scores of two culturally different samples (400 Mexican-Americans and 200 Anglo-Americans) were conducted in order to determine the independent effects of the cultural factor on each scale of the MMPI for a group of heterogeneous psychiatric patients (300 psychotics and 300 non-psychotics).

(1.2) A total of 13 least squares analyses of MMPI scores of two culturally different samples (200 Mexican-Americans and 100 Anglo-Americans) were conducted in order to determine the independent effects of the cultural factor on each scale of the MMPI for a group of psychotic patients (N=300).

(1.3) A total of 13 least squares analyses of MMPI scores of two culturally different samples (200 Mexican-Americans and 100 Anglo-Americans) were conducted in order to determine the independent effects of the cultural factor on each scale of the MMPI for a group of non-psychotic patients (N=300).

It was decided that the general question of significant differences on MMPI performance associated with differences in cultural group membership would be answered positively, (and, therefore,

partially justify the goal of Aspect II) if at least one statistically significant F ratio was found in each of the three sets of least squares analyses conducted in the first aspect of this study. The minimum for the determination of a significant finding was set at the .01 level.

In order to answer the second question concerning MMPI differences between psychotic and non-psychotic Mexican-American patients a final set of least squares analyses was conducted in the following fashion:

(2) A total of 13 least squares analyses of MMPI scores of two psychopathologically heterogeneous groups (200 psychotics and 200 non-psychotics) were conducted in order to determine the independent effects of the psychopathology factor on each scale of the MMPI for a group of Mexican-American patients (N=400).

It was decided that the specific question of significant differences on MMPI performance between psychotic and non-psychotic Mexican-American patients would be answered positively, (and, therefore, partially justify the goal of Aspect II) if the psychopathology factor proved to be statistically significant in at least one of the 13 least square analyses conducted. The minimum for the determination of a significant finding was set at the .01 level.

Aspect II. The main goal of this aspect and basic goal of the present investigation was to apply statistical procedures, namely, Fisher's Linear Discriminant Function (LDF) to the solution of a

problem involving the classification of Mexican-American psychiatric patients on the basis of the MMPI. The LDF was employed to yield an optimum combination of MMPI weighted scores for differentiation of psychotic and non-psychotic Mexican-American patients.

The strategy employed in this part of the study called for cross-validation procedures. For this reason, two groups (A and B) were formed from the total Mexican-American sample composed of 200 psychotics and 200 non-psychotics. By random procedures one half of the psychotic patients were assigned to group A (forming group A_1 N=100) and the other half to group B (forming group B_1 N=100). Similar procedures were employed with the non-psychotic patients (N=200) forming groups A_2 and B_2. These procedures yielded two major groups A and B each one composed of 100 psychotics (A_1 and B_1) and 100 non-psychotics (A_2 and B_2).

Group A was used for developing the LDF and group B was set aside for cross-validation purposes. The basic MMPI data for all Ss in group A was analyzed and the LDF was derived. In order to select a cut off point which effectively separated both the psychotic (A_1) and the non-psychotic (A_2) group in terms of the obtained weights for each MMPI scale, the Maximum Likehood Method (Overall & Klett, 1972) was employed taking base rate values into consideration. Since both the derivation and the cross-validation sample were such that half of their members belonged to the psychotic sub-group and the

other half to the non-psychotic sub-group, base rate values of $\pi_1 = 0.5$ and $\pi_2 = 0.5$ were used for sub-group A_1 and A_2 respectively. After establishing the cut off point, LDF scores for sample A were presented graphically. The proportion of misclassifications as well as the total estimated error were computed by appropriate formulas (Overall & Klett, 1972).

In order to assess the actual efficiency of the LDF, cross-validation procedures were undertaken. Using the LDF weights obtained for group A, LDF scores for each S was classified as either psychotic or non-psychotic depending on whether his score was above or below the previously derived cut off point. The proportion of correct classification by the LDF was obtained and the statistical significance of the proportion of classification improvement over chance was then determined.

CHAPTER IV

RESULTS

In this chapter the results of Aspect I and Aspect II of this investigation are presented. First, the responses of the two major groups of psychiatric patients (200 Anglo-Americans and 400 Mexican-Americans) and of four sub-groups (200 Mexican-American psychotics, 200 Mexican-American non-psychotics, 100 Anglo-American psychotics and 100 Anglo-American non-psychotics) on the 13 MMPI scales are compared and analyzed. Second, the LDF coefficients that maximally separate a group of Mexican-American psychotics (N=100) and a group of Mexican-American non-psychotics (N=100) are presented as well as the tested efficiency of these coefficients when used on an independent sample (N=200) for cross-validation purposes.

ASPECT I

One purpose of the present study (general question 1) was to investigate whether or not there are any significant differences on MMPI performance associated with differences in cultural group membership between Mexican-American and Anglo-American psychiatric patients. In order to investigate this question, the MMPI re-

sponse of two major groups and four sub-groups were compared on each of the 13 MMPI scales by a complex analysis of variance model (Overall & Spiegel, 1969). By using the model, the difference attributable to the cultural factor alone was partialled out in order to determine the significance of this variable over and above the difference that might be attributable to other background variables. In addition, the same comparisons were undertaken using Fisher's t-statistic since previous studies of this nature have employed such procedure. The results of the complex analysis, however, were the only criteria used for answering the research question of Aspect I. The t-test comparisons were only conducted for supplementary purposes.

In view of the general nature of question 1, three specific and empirically testable questions (1.1, 1.2, and 1.3) were derived in order to arrive at an empirically based answer to such a question. Each of these specific questions entailed 13 least square analysis between two different groups or sub-groups representing one analysis for each MMPI scale. Question 1.1 was answered by conducting a total of 13 least squares analyses of MMPI scores of 400 Mexican-American and 200 Anglo-American heterogeneous psychiatric patients (psychotic and non-psychotic). Question 1.2 was answered by conducting a total of 13 least squares analyses of MMPI scores of 200 Mexican-American and 100 Anglo-American psychotic patients.

Question 1.3 was answered by conducting a total of 13 least squares analyses of 200 Mexican-American, 100 Anglo-American non-psychotic patients. The first set of 13 least squares analyses (summarized in Table 1) revealed that the cultural factor was significant ($p < .01$) on the F, Pd, Mf, and Si scales.

(1) It was found that the mean score for Mexican-Americans was significantly higher than the mean score for Anglo-Americans on the Pd scale and significantly lower on the F, Mf and Si scales. The second set of 13 least squares analyses (summarized in Table 2) revealed that the cultural factor was significant ($p < .01$) on the F, Pd, and Si scales.

(2) It was found that the mean score for Mexican-Americans was significantly higher than the mean score for Anglo-Americans on the Pd scale and significantly lower on the F and Si scales. The third set of 13 least squares analyses (summarized in Table 3) revealed that the cultural factor was significant ($p < .01$) on the Mf and Si scales.

(3) It was found that the mean score for Mexican-Americans was significantly lower than the mean score for Anglo-Americans on the Mf and the Si scale. The significant F values shown in Tables 1, 2, and 3 indicates in each case a difference on MMPI performance between two groups of psychiatric patients attributable to the unique contribution of the cultural factor over and above the differences at-

tributable to other background variables. As shown in Tables 1, 2, and 3 below, the analyses revealed that the ethnic factor in and by itself was significant on more than one MMPI scale in each of the three sets of 13 least squares analyses conducted. In Appendix D, complete analysis of variance summary tables for each least squares analysis conducted are presented. These tables show F values associated with the cultural variable as well as F values associated with all the other variables included in the analysis.

Although the results of the least squares analyses presented in Tables 1, 2, and 3 were used as the only criteria for answering general question 1 of Aspect I of this investigation, three sets of 13 t-test comparisons were also conducted with the same comparison groups. Table 4 shows the mean MMPI score, standard deviation, and t values on each of the 13 scales for the group of Mexican-American (N=400) and the group of Anglo-Americans (N=200) heterogeneous psychiatric patients. Significant mean differences ($p < .01$) between the two cultural groups were revealed on the L, Mf, and Si scales.

Table 5 shows the mean score, standard deviation and t values on each of the 13 MMPI scales for the group of Mexican-Americans (N=200) and the group of Anglo-American (N=100) psychotic patients. Significant mean differences ($p < .01$) between the two cultural groups were revealed on the L, Pd, and Si scales.

TABLE I .

LEAST SQUARES ANALYSIS OF VARIANCE FOR THE CULTURAL FACTOR ON THE 13 MMPI SCALES FOR TWO MAJOR GROUPS OF HETEROGENEOUS PSYCHIATRIC PATIENTS (400 Mexican-Americans and 200 Anglo-Americans)

Scale	Source	df	MS	F	P
L	Culture	1	0.2460	0.044	NS
	Error	580	5.4688		
F	Culture	1	158.9907	6.71	<.01
	Error	580	23.9450		
K	Culture	1	6.1467	0.253	NS
	Error	580	24.2278		
Hs	Culture	1	74.4990	2.203	NS
	Error	580	33.8033		
D	Culture	1	58.8476	1.122	NS
	Error	580	52.4443		
Hy	Culture	1	0.6948	0.017	NS
	Error	580	39.7857		
Pd	Culture	1	179.4765	7.484	<.01
	Error	580	23.9785		
Mf	Culture	1	299.0352	11.064	<.01
	Error	580	27.0260		
Pa	Culture	1	10.6110	0.490	NS
	Error	580	21.6541		
Pt	Culture	1	90.9541	1.623	NS
	Error	580	56.0395		
Sc	Culture	1	0.0117	0.000	NS
	Error	580	88.1567		
Ma	Culture	1	0.6035	0.023	NS
	Error	580	26.1393		
Si	Culture	1	1553.0236	14.007	<.01
	Error	580	110.8697		

LEAST SQUARES ANALYSIS OF VARIANCE FOR THE CULTURAL FACTOR
ON THE 13 MMPI SCALES FOR TWO GROUPS
(200 Mexican-Americans and 100 Anglo-Americans)
of Psychotic Patients

Scale	Source	df	MS	F	P
L	Culture	1	1.3640	0.284	NS
	Error	281	4.7980		
F	Culture	1	198.3462	7.756	<.01
	Error	281	25.5703		
K	Culture	1	30.1086	1.711	NS
	Error	281	17.5958		
Hs	Culture	1	6.2443	0.212	NS
	Error	281	29.4387		
D	Culture	1	168.8305	2.987	NS
	Error	281	56.5212		
Hy	Culture	1	98.0317	2.823	NS
	Error	281	34.7155		
Pd	Culture	1	345.5249	15.667	<.01
	Error	281	22.0530		
Mf	Culture	1	31.0683	1.323	NS
	Error	281	23.4790		
Pa	Culture	1	8.1740	0.378	NS
	Error	281	29.5919		
Pt	Culture	1	75.5688	1.276	NS
	Error	281	59.2073		
Sc	Culture	1	9.3906	0.113	NS
	Error	281	82.6278		
Ma	Culture	1	20.8911	0.803	NS
	Error	281	25.9888		
Si	Culture	1	1480.0607	13.225	<.01
	Error	281	111.9126		

TABLE 3

LEAST SQUARES ANALYSIS OF VARIANCE FOR THE CULTURAL FACTOR ON THE 13 MMPI SCALES FOR TWO GROUPS (200 Mexican-Americans and 100 Anglo-Americans) of Non-psychotic Patients

Scale	Source	df	MS	F	P
L	Culture	1	0.4112	0.073	NS
	Error	281	5.6185		
F	Culture	1	0.0517	0.001	NS
	Error	281	40.2992		
K	Culture	1	23.4512	0.808	NS
	Error	281	29.0101		
Hs	Culture	1	39.6064	1.151	NS
	Error	281	34.4066		
D	Culture	1	2.9462	0.072	NS
	Error	281	40.5513		
Hy	Culture	1	27.8496	0.702	NS
	Error	281	39.6271		
Pd	Culture	1	1.0405	0.043	NS
	Error	281	23.8794		
Mf	Culture	1	352.4766	12.590	<.01
	Error	281	27.9951		
Pa	Culture	1	3.3487	0.175	NS
	Error	281	19.1137		
Pt	Culture	1	20.4819	0.423	NS
	Error	281	48.3859		
Sc	Culture	1	42.0263	0.496	NS
	Error	281	84.6168		
Ma	Culture	1	18.0063	0.776	NS
	Error	281	23.1826		
Si	Culture	1	375.2871	4.115	<.01
	Error	281	91.1911		

TABLE 4.

MEAN MMPI SCORE, STANDARD DEVIATION AND t VALUES ON 13 MMPI SCALES FOR TWO GROUPS (400 Mexican-Americans and 200 Anglo-Americans) of Heterogeneous Psychiatric Patients

Scale	X (MA)	S.D.	X (AA)	S.D.	t(df=598)	P
L	4.377	2.513	3.740	2.381	3.0342	<.01
F	10.765	4.978	10.835	8.395	0.1278	NS
K	11.782	5.179	11.895	4.776	0.2643	NS
Hs	18.792	6.143	18.530	6.679	0.4659	NS
D	29.185	7.477	28.925	8.027	0.3825	NS
Hy	27.942	6.541	27,225	7.051	1.2032	NS
Pd	29.757	5.585	28.975	5.945	1.5503	NS
Mf	30.735	7.483	33.555	7.344	4.4058	<.01
Pa	14.440	4.998	13.880	4.683	1.3497	NS
Pt	36.702	8.006	36.070	7.890	0.9210	NS
Sc	38.612	10.061	37.665	11.269	1.0440	NS
Ma	22.702	5.334	22.585	5.375	0.2530	NS
Si	28.325	10.805	34.735	11.843	6.4318	<.01

TABLE 5.

MEAN MMPI SCORE, STANDARD DEVIATION AND t VALUES ON 13 MMPI SCALES FOR TWO GROUPS (200 Mexican-Americans and 100 Anglo-Americans) of Psychotic Patients

Scale	X (MA)	S.D.	X (AA)	$S.D._a$	t(df=298)	P
L	4.620	2.588	3.440	2.310	4.003	<.01
F	11.550	5.373	12.280	6.394	1.0397	NS
K	11.915	4.536	10.980	4.465	1.7005	NS
D	18.345	5.005	18.140	6.677	0.2980	NS
Hs	30.540	7.486	29.650	8.681	0.9194	NS
Hy	28.435	5.694	26.790	7.359	2.1330	NS
Pd	32.240	4.843	30.000	5.974	3.4860	<.01
Mf	32.880	6.732	34.290	6.382	1.7708	NS
Pa	15.375	5.126	15.000	5.027	0.6050	NS
Pt	38.440	8.334	37.900	7.721	0.5559	NS
Sc	41.900	9.717	41.210	10.493	0.5501	NS
Ma	23.035	5.412	24.060	5.293	1.5692	NS
Si	28.875	11.546	35.940	12.108	4.8376	<.01

TABLE 6.

MEAN MMPI SCORE, STANDARD DEVIATION AND *t* VALUES ON 13 MMPI SCALES FOR TWO GROUPS (200 Mexican-Americans and 100 Anglo-Americans) of Non-psychotic Patients

Scale	X MA)	S.D.	X (AA)	S.D.	t(df=298)	P
L	4.135	2.417	4.040	2.424	0.3202	NS
F	9.980	4.425	9.390	9.827	0.7167	NS
K	11.650	5.758	12.810	4.923	1.7235	NS
Hs	19.240	7.086	18.920	6.691	0.3827	NS
D	27.830	7.235	28.200	7.287	0.4155	NS
Hy	27.450	7.271	27.660	6.737	0.2477	NS
Pd	27.275	5.168	27.950	5.765	0.9888	NS
Mf	28.590	7.596	32.820	8.160	4.3297	<.01
Pa	13.505	4.695	12.760	4.035	1.3556	NS
Pt	34.965	7.280	34.240	7.666	0.7851	NS
Sc	35.325	9.317	34.120	10.945	0.9950	NS
Ma	22.370	5.247	21.110	5.067	2.0061	
Si	27.775	10.007	33.530	11.506	4.4627	<.01

Table 6 shows the mean score, standard deviation, and *t* values on each of the 13 MMPI scales for the group of Mexican-Americans (N=200) and the group of Anglo-Americans (N=100) non-psychotic patients. Significant differences ($p < .01$) between the two cultural groups were revealed on the Mf, and Si scales.

Another purpose of the present investigation was to ascertain whether or not there are any significant differences on MMPI performance between a group of Mexican-American psychotic and a group of Mexican-American non-psychotic psychiatric patients. In order to investigate this question, the MMPI responses of two groups of Mexican-American patients (200 psychotics and 200 non-psychotics) were compared on each of the 13 MMPI scales by the method of least squares analysis. By using this method the difference between the two groups attributable to the psychopathology factor alone (being either psychotic or non-psychotic) was partialled out in order to determine the significance of this variable over and above the difference that might be attributable to other variables.

The 13 least squares analyses (summarized in Table 7) revealed that the psychopathology factor was significant ($p < .01$) on the F, D, Hy, Pd, Mf, Pa, Pt, and Sc scales. The analyses revealed that the psychopathology factor in and by itself was significant on more than one MMPI scale.

Although the results of the 13 least squares analyses pre-

sented above were used as the only criteria for answering general question 1 of Aspect I of this investigation, 13 t-test comparisons were also conducted with the same comparison groups (200 psychotic and 200 non-psychotic Mexican-American psychiatric patients). Table 8 shows the mean MMPI score, standard deviation and t values on each of the 13 MMPI scales for the group of psychotic (N=200) and the group of non-psychotic (N=200) Mexican-American psychiatric patients. Significant mean differences ($p < .01$) between the two groups were revealed on the F, D, Pd, Mf, Pa, Pt, and Sc scales.

TABLE 7.

LEAST SQUARES ANALYSIS OF VARIANCE FOR THE PSYCHOPATHOLOGY FACTOR ON THE 13 MMPI SCALES FOR TWO GROUPS (200 Psychotics and 200 Non-psychotics) of Mexican-American Psychiatric Patients

Scale	Source	df	MS	F	P
L	Psy. Class	1	26.8808	5.229	NS
	Error	381	5.1405		
F	Psy. Class	1	139.3349	8.000	<.01
	Error	381	17.4160		
K	Psy. Class	1	7.0656	0.296	NS
	Error	381	23.8485		
Hs	Psy. Class	1	34.8398	1.226	NS
	Error	381	28.4105		
D	Psy. Class	1	556.7052	12.575	<.01
	Error	381	44.2686		
Hy	Psy. Class	1	297.7559	8.778	<.01
	Error	381	33.9187		
Pd	Psy. Class	1	1602.5930	85.407	<.01
	Error	381	18.7640		
Mf	Psy. Class	1	1253.2111	59.721	<.01
	Error	381	20.9841		
Pa	Psy. Class	1	181.5476	8.471	<.01
	Error	381	21.4301		
Pt	Psy. Class	1	850.2852	16.834	<.01
	Error	381	50.5085		
Sc	Psy. Class	1	2634.4282	36.170	<.01
	Error	381	72.8332		
Ma	Psy. Class	1	23.8432	0.940	NS
	Error	381	25.3450		
Si	Psy. Class	1	216.2910	2.487	NS
	Error	381	86.9649		

TABLE 8.

MEAN MMPI SCORES, STANDARD DEVIATION AND t VALUES ON 13 MMPI SCALES FOR TWO GROUPS (200 Psychotics and 200 Non-psychotics) of Mexican-American Psychiatric Patients

Scale	$X_{(P)}$	S.D.	$X_{(NP)}$	S.D.	t(df=398)	P
L	4.620	2.588	4.135	2.417	1.9365	NS
F	11.550	5.373	9.980	4.425	3.1895	<.01
K	11.915	4.536	11.650	5.758	0.512	NS
Hs	18.345	5.005	19.240	7.086	1.4588	NS
D	30.540	7.486	27.830	7.235	3.6810	<.01
Hy	28.435	5.694	27.450	7.271	1.5081	NS
Pd	32.240	4.843	27.275	5.168	9.9128	<.01
Mf	32.880	6.732	28.590	7.596	5.9770	<.01
Pa	15.375	5.126	13.505	4.695	3.8038	<.01
Pt	38.440	8.334	34.965	7.280	4.4408	<.01
Sc	41.900	9.717	35.325	9.317	6.9069	<.01
Ma	23.035	5.412	22.370	5.247	1.2473	NS
Si	28.875	11.546	27.775	10.007	1.0180	NS

ASPECT II

The purpose of Aspect II of the present investigation was to arrive at a LDF of MMPI scores that maximally separates Mexican-American psychotic from Mexican-American non-psychotic patients. For this purpose, out of 400 Mexican-American patients, 200 (100 psychotic and 100 non-psychotic) were assigned to sample A and the other 200 (100 psychotic and 100 non-psychotic) were assigned to sample B by random procedures. Sample A was employed in the derivation of the LDF coefficients and then these coefficients were used on sample B for cross-validation purposes.

Table 9 shows the mean scores on 13 MMPI scales for the psychotic (N=100) and the non-psychotic (N=100) groups of Mexican-American patients composing sample A.

Table 10 shows the optimal weighting coefficients providing maximum discrimination between the clinically psychotic and the non-psychotic groups. These are the weighting coefficients that should be applied to the thirteen MMPI scores in order to obtain a single composite score having maximum average difference in value for psychotics and non-psychotic Mexican-American patients.

The frequency distributions of LDF scores derived from the psychotic and the non-psychotic groups composing sample A are shown in Figure 1. Each LDF score is the algebraic sum of each S's raw MMPI score on each scale multiplied by the LDF coefficient

for that scale. The mean values of the discriminant functions are 68.608 and 59.656 for the psychotic group ($\bar{y}^{(1)}$) and for the non-psychotic ($\bar{y}^{(2)}$) group respectively. The variance of the weighted composite within the two diagnostic groups V(y) was estimated to be 19.633. The cutting point (y_c) for maximally separating the LDF scores of the psychotic group from those of the non-psychotic group was determined by the Maximum Likelihood Method. This cutting point turned out to be 64.132 and is graphically shown in Figure 1. The overall probability of misclassification was obtained by computing the Z-score of the cutting point (y_c) as follows:

$$Z^{(1)} = \frac{y_c - \bar{y}^{(1)}}{\sqrt{V(y)}} = -1.010 \text{ and } Z^{(2)} = \frac{y_c - \bar{y}^{(2)}}{\sqrt{V(y)}} = 1.010$$

Since the cutting point y_c was calculated to be equidistant between $\bar{y}^{(1)}$ and $\bar{y}^{(2)}$ the two score values are identical except for sign. Reference to a table for the unit normal distribution indicates that 15.62 per cent of the area is located in the smaller portion of the curve. Thus, the obtained probability of misclassification is Pe=.1562 for members of each of the two clinical groups. In other words, assignment of individuals to psychotic or non-psychotic diagnostic groups on the basis of MMPI profiles should be expected to disagree with clinical diagnostic classification in approximately 16 per cent of the cases. This indicates, however, that classification of psychotic or non-psychotic Mexican-American patients by the LDF is considerably more effective than chance procedures, the formula

TABLE 9.

MEAN SCORES OF 13 MMPI SCALES FOR
Sample A
(100 Psychotics and 100 Non-psychotics)

Scale	Psychotics	Non-Psychotics
L	4.406	3.806
F	11.540	9.800
K	11.633	11.266
Hs	18.240	18.673
D	30.346	27.226
Hy	28.066	26.793
Pd	32.253	27.060
Mf	32.420	28.353
Pa	15.326	13.133
Pt	38.273	34.580
Sc	42.206	35.433
Ma	22.753	22.166
Si	29.113	27.400

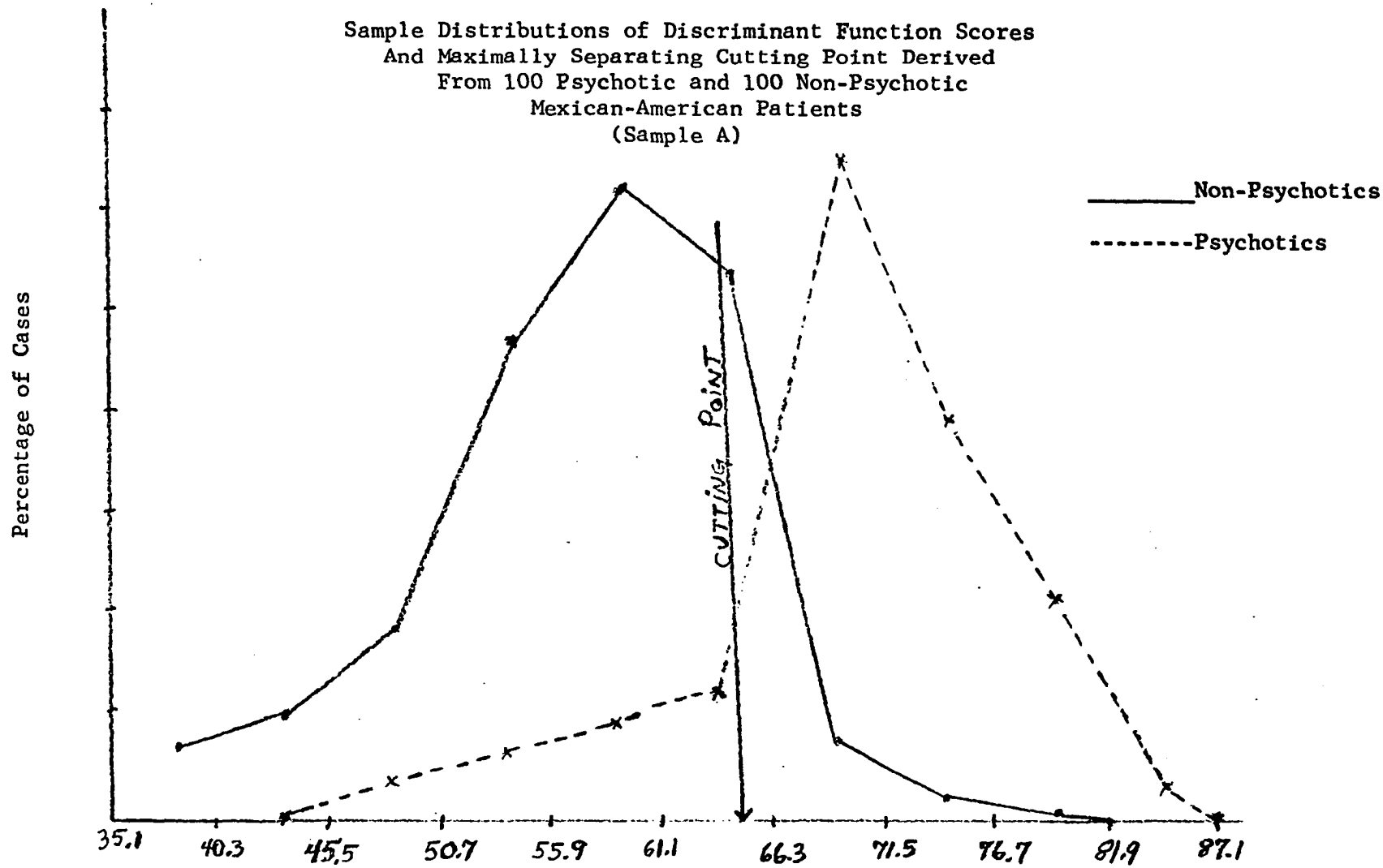
TABLE 10.

OPTIMAL WEIGHTING LDF COEFFICIENTS FOR
DISCRIMINATION BETWEEN 100 PSYCHOTIC
AND 100 NON-PSYCHOTIC MEXICAN-AMERICAN
PSYCHIATRIC PATIENTS

Scale	Coefficients
L	0.733
F	-0.143
K	0.528
Hs	-0.436
D	0.316
Hy	0.174
Pd	0.692
Mf	0.333
Pa	0.108
Pt	-0.219
Sc	0.353
Ma	0.489
Si	0.063

FIGURE 1.

Sample Distributions of Discriminant Function Scores
And Maximally Separating Cutting Point Derived
From 100 Psychotic and 100 Non-Psychotic
Mexican-American Patients
(Sample A)



identifying 84 per cent against 50 per cent identified by chance.

Empirical Cross-Validation. The actual effectiveness of the LDF was tested empirically by applying the coefficients developed on sample A to another sample (B) also composed of 100 psychotic and 100 non-psychotic Mexican-American patients. Cross-validation results are presented in Table 11 showing that the overall percentage of correct classification was 69.00 per cent, a proportion 19 per cent greater than that proportion of correct classification expected by chance. The formula correctly identified 76.00 per cent of the psychotic patients and 62.00 per cent of the non-psychotic patients representing 26.00 and 12.00 per cent respectively, over the proportion of correct classification expected by chance. In each case, the percentage greater chance was statistically significant at the .01 level.

It is worth special mention, since so few cross-validations appear in the literature, that the 69.00 per cent success rate for the cross-validation sample, though significantly better than chance, was also marked by below the 84.00 per cent success rate for the sample from which LDF weights were estimated. Failure to cross-validate in this case would have led to an over-inflated estimate of the efficacy of the LDF in distinguishing between groups.

TABLE 11.

A Summary Comparison of Classification Efficiency of the LDF With Chance Expectation for Sample B by 100 Psychotic and 100 Non-Psychotic Mexican-American patients within the Sample

Sample B	Correct Classification By Formula N	%	Correct Classification By Chance N	%	Percentage Greater than Chance
Psychotics (N=100)	76	76.00	50	50.00	26.00**
Non-psychotics (N=100)	62	62.00	50	50.00	12.00**
Total Sample	138	69.00	100	50.00	19.00**

**Significant at .01

CHAPTER V

DISCUSSION

In this chapter, an interpretation of the results are presented separately for each aspect of this study. In addition, the conclusions arrived at and some implications for future research generated by the findings of this study are discussed.

Aspect I

One of the major purposes of the first aspect of this study (principal question 1) was to investigate differences on MMPI performance associated with differences in cultural group membership between Mexican-American and Anglo-American psychiatric patients. In order to provide an answer to such a question three empirically testable questions were derived. Each one was answered on the basis of the results of one set of 13 squares analysis conducted in conjunction with each question. The first specific question (1.1) investigated was the degree to which the MMPI scores of a heterogeneous group of Mexican-American patients differ from those of a combined group of Anglo-American psychiatric patients. Upon investigation it was found that the cultural factor was significant on four

(F, Pd, Mf and Si) MMPI scales. These findings suggest that clinically heterogeneous Mexican-American psychiatric patients perform significantly different from clinically heterogeneous Anglo-American psychiatric patients on four MMPI scales by virtue of their differences in cultural group membership.

The second specific question (1.2) investigated was the degree to which the MMPI scores of a group of Mexican-American psychotic patients differ from those of a group of Anglo-American psychotic patients. Upon investigation it was found that the cultural factor was significant on three (F, Pd and Si) MMPI scales. These findings suggest that psychotic Mexican-American patients perform significantly different from psychotic Anglo-American patients on three MMPI scales by virtue of their difference in cultural group membership.

The third specific question (1.3) investigated was the degree to which the MMPI scores of a group of Mexican-American non-psychotic patients differ from those of a group of Anglo-American non-psychotic patients. Upon investigation it was found that the cultural factor was significant on two (Mf and Si) MMPI scales. These findings suggest that non-psychotic Mexican-American patients perform significantly different from non-psychotic Anglo-American patients on two MMPI scales by virtue of their difference in cultural group membership.

Since more than one scale was significantly affected by the cultural factor on each of the three sets of least squares analyses conducted in conjunction with specific question 1.1, 1.2 and 1.3, general question 1 was answered in the following way: When a complex least squares analysis of variance is utilized the results indicate that the cultural factor significantly affects the responses of Mexican-American and Anglo-American psychiatric patients. This is true not only when the MMPI responses of two major cultural groups of heterogeneous psychiatric patients are analyzed, but also when the analysis is conducted on the MMPI responses of psychotic patients exclusively or on the responses of non-psychotic patients exclusively. Therefore, these findings suggest that there are significant differences on MMPI performance associated with differences in cultural group membership between Mexican-American and Anglo-American psychiatric patients.

Two major implications suggested by these findings are worth mentioning at this point. The first implication is that the MMPI as a psychometric instrument is less valid when used with Mexican-American patients than when used with Anglo-American patients. This implication, although not directly substantiated by the design of this investigation, is indirectly supported by the significant effect of the cultural factor on MMPI performance reported above. It seems highly probable that the influence of the cultural factor in-

troduces an additional source of variance on the responses of Mexican-American patients which is not present on the MMPI responses of Anglo-American patients. Yet, all the reportedly existing norms, rules, formulas, etc., for inferring personality data on the basis of MMPI responses have been developed exclusively with Anglo-American patients. This, of course, points to the need for some adjustments, development of norms or actuarial procedures for a legitimate use of the MMPI with Mexican-American patients. Furthermore, it generates some doubts about the validity of the MMPI if used with members of other sub-cultural minority groups in the United States. On the other hand it offers some support to the currently increasing practice of using demographic data as moderator variables for MMPI pattern interpretation (Dahlstrom, 1969) as well as to the proponents (Butcher, 1971) of special norms for using the MMPI with members of sub-cultural groups.

Another implication of the findings reported in this investigation is that the development of LDF for classification of psychotic and non-psychotic Mexican-American patients is partially justified. Since the cultural factor does affect the MMPI responses of Mexican-American patients, it seems justifiable to develop an MMPI based actuarial method for classifying psychotic and non-psychotic Mexican-American patients. This method would appear to have a great deal of practical value until valid norms could be developed for a larger

Mexican-American population. It must be noted, however, that in order to ascertain whether or not a LDF would be minimally effective in discriminating psychotic from non-psychotic MMPI profiles of Mexican-American patients it first was convenient to determine if there are any significant differences on MMPI performance associated with gross differences in psychopathology between psychotic and non-psychotic Mexican-American patients. Thus the second general question investigated was the degree to which the MMPI scores of a group of Mexican-American psychotic patients differ from those of a group of Mexican-American non-psychotic patients. Upon investigation it was found that the psychopathology factor was significant on eight (F, D, Hy, Pd, Mf, Pa, Pt and Si) MMPI scales. These findings suggest that psychotic Mexican-American patients perform significantly different from non-psychotic Mexican-American patients on eight MMPI scales by virtue of their gross differences in psychopathology. On the basis of these results the final requirements for justifying the development of a LDF (Aspect II) were fully met. Furthermore, it was found that in terms of the number of MMPI scales involved there are more significant differences between Mexican-American psychotic and non-psychotic patients (eight scales) than between psychotic Mexican-American and psychotic Anglo-American patients (three scales) or between non-psychotic Mexican-American and non-psychotic Anglo-American patients (two scales).

One point should be made before these results are elaborated further. First, the goal of this investigation, as specified by the research questions presented in Chapter II, was to determine whether or not Mexican-American patients respond differently to the MMPI than Anglo-American patients. Concomitantly it was desired to find out whether or not they require different norms in order to legitimately interpret their profiles. It was not the goal of this investigation to determine what are the specific personality differences between Mexican-American and Anglo-American patients nor to ascertain specific differences in manifest psychopathology between the two cultural groups. Interpretation of the results presented here must not beg or forget the research questions and attribute personality characteristics to the Mexican-American patients on the basis of their MMPI responses. These responses were used as the raw data for determining whether or not such procedure is a valid one. To forget this would be to ignore that one of the primary purposes of this investigation was to determine whether or not it is legitimate to interpret the Mexican-American profiles in the same fashion as the Anglo-American profiles are interpreted. Doing so would also ignore the findings of this investigation which in fact negate the validity of such procedures. On the other hand the research questions presented in this study can definitely be answered if the results are interpreted concretely and in terms of the scale differences between

the two cultural groups without inferring the specific personality differences reflected in those differences.

A second general point must be stressed in order to provide a more meaningful interpretation of the results. It can be observed that the scales on which the cultural factor proved to be statistically significant when the least squares analyses were conducted with two specific samples were not invariably the same scales on which the t-test comparisons reflected significant differences with the same comparison groups. For example, on the set of least squares analysis and t-test comparisons conducted in conjunction with research question 1.2 the results of the least squares analysis indicate that the cultural factor is significant on the F, Pd and Si scales. Yet, when the same MMPI responses of the same comparison groups are studied by using t-test comparisons significant differences between the two cultural groups are found on the L and Si scales. The t-tests reflected significant differences on one scale (L) where the least squares analysis did not indicate that the cultural factor was significant. Similarly, although the results of the least squares analysis indicate that the cultural factor is significant on the F scale, the t-test comparisons did not reflect significant differences between the two cultural groups on that scale. This apparent discrepancy is far from surprising in view of the fact that two highly different statistical models are involved, and illustrates the advantage of using

the least squares analysis in the design of this investigation and can be explained in terms of two major factors. First, when interaction effects between the cultural variable and one or more background variables are present the effects of the cultural factor could be cancelled out over different levels of the interacting variable(s) and remain unreflected in the t-test comparison. On the other hand, overrepresentation of Ss at some levels of some background variable(s) can determine statistically significant differences which would be reflected on the t-tests but not on the least squares analyses. This, in fact, is the main advantage of the least squares model in the present investigation. In the example provided above (research question 1.2) this explanation becomes clear by looking at Appendix B and noticing that the sample of Mexican-American psychotics is overrepresented (40% of the sample) with Ss in category 1 (70-89) of the IQ variable. But the sample of Anglo-American psychotics is overrepresented (55% of the sample) with Ss in category 2 (90-110) of the same variable. Reference to Appendix D indicates that this variable (IQ) significantly affects the MMPI responses of the Ss involved in the analysis and therefore could possibly reflect some differences on the t-test comparisons that would not be attributable to the cultural factor in the least squares analysis.

Table 12 shows the MMPI scales for which statistical significance was reflected by the least squares analyses and by the

t-test comparisons conducted in relation to the four research questions of Aspect I.

The results of the first three sets of least squares analyses (1.1, 1.2 and 1.3) indicate that the cultural factor was significant on the F, Pd, Mf and Si MMPI scales. The cultural factor significantly affects the MMPI responses of psychotic patients on scales F, Pd and Si and the responses of non-psychotic patients on scales Mf and Si. When the psychotic and the non-psychotic groups are combined into two major cultural groups of clinically heterogeneous patients, the cultural factor is significant on the same scales as when the analysis is carried out separately for the 2 groups of psychotic patients (F, Pd and Si) and for the 2 groups of non-psychotic patients (Mf and Si). In addition, it must be noted at this point that the Si scale is the only scale on which the cultural factor significantly affects the responses of both the psychotic and the non-psychotic patients in a similar fashion (Mexican-Americans scoring lower than Anglo-Americans on this scale). It is also worth noting that the Si scale is not significantly affected by the psychopathology factor in the set of analyses conducted with the Mexican-American patients alone (2). In other words, the responses of Mexican-American patients on the Si scale are not significantly affected by their membership in the psychotic or the non-psychotic group. On the other hand, the psychopathology factor significantly affects the MMPI responses of Mexican-

TABLE 12

Summary of Statistically Significant Scales as Reflected by the Least Squares Analyses and by the t-test Comparisons Conducted in Relation to the Four Research Questions of Aspect I

Research Question	Least Squares	t-test
1.1	F, Pd, Mf, Si	L, Mf, Si
1.2	F, Pd, Si	L, Si
1.3	Mf, Si	Mf, Si
2	F, D, Hy, Pd Mf, Pa, Pt, Sc	F, D, Pd, Mf, Pa, Pt, Sc

American patients on scales F, D, Hy, Pd, Mf, Pa, Pt and Sc. As far as the Mexican-American patients are concerned this finding indicates that the psychopathology factor affects a larger number of scales (8) than the number of scales (4) significantly affected by the cultural factor when the MMPI responses of Mexican-American and Anglo-American patients are analyzed. It is suggested, then, that in terms of their responses to the MMPI there are more differences between Mexican-American psychotic and Mexican-American non-psychotic patients than between Mexican-American and Anglo-American psychotics, non-psychotics, or clinically heterogeneous patients.

On the right hand side of Table 12 a summary of the statistically significant t-test comparisons is presented. As mentioned

earlier these comparisons were conducted for the purpose of relating the findings of this investigation, if possible, with the results of previous cross cultural studies of the MMPI. In terms of the first three research questions it was found that regardless of the psychopathology factor Mexican-American patients score significantly lower than Anglo-American patients on the Si scale. Mexican-American psychiatric patients (whether they be a group of psychotic, a group of non-psychotic, or a combined group of both psychotic and non-psychotic patients) score significantly lower on the Si scale than their Anglo-American counterparts. In addition, Mexican-American psychotics score significantly higher than Anglo-American psychotics on the L and Pd scales and significantly lower only on the Si scale. Mexican-American non-psychotics score significantly lower than Anglo-American non-psychotic patients on the Mf and Si, and in no scale do they score significantly higher than the Anglo-American non-psychotic patients. When the psychotic and the non-psychotic sub-groups are combined into two groups of clinically heterogeneous patients the Mexican-Americans score significantly higher than the Anglo-Americans on the L scale and significantly lower on the Mf and Si scales. This finding is not surprising in view of the fact that these are, with one exception, the same differences found when the two groups of psychotics and the two groups of non-psychotics are compared separatedly. The one exception is the Pd scale where Mexican-Amer-

ican psychotics score significantly higher than Anglo-American psychotics and yet, this difference is not large enough when non-psychotic patients are also included in the comparison.

In terms of previous cross cultural studies of the MMPI the results of the t-test comparisons conducted in this investigation are most compatible with the findings of Reilley & Knight (1970). The fact that Mexican-American heterogeneous psychiatric patients score significantly higher than Anglo-American patients on the L scale supports Reilley & Knight's (1970) finding with Mexican-American college students. This difference, however, does not apply to Mexican-American non-psychotic patients when their MMPI performance is studied in isolation from the performance of psychotic patients. On the other hand the results of the present investigation did not support Reilley & Knight's (1970) finding that Anglo-American college students score significantly higher on the Pa scale than Mexican-American college students. Finally, the present study's finding that Mexican-American patients score significantly lower than Anglo-American patients on the Si scale is not supported by any of the previously reported studies.

It must be stressed at this point that the results of the t-test comparisons discussed above could legitimately be accounted for in terms of the effect of several variables other than the cultural factor. Reference to Appendix B indicates that both, the Mexican-

American and the Anglo-American samples used in this study were over and under represented at different levels of different variables. This shortcoming, however, does not apply to the results of the least squares analysis where the effect of the cultural factor was partialled out from the effects of all of the other variables.

In terms of the research questions presented in the first aspect of this investigation the results indicate that whether a t-test or a least squares analysis of variance model is utilized, significant differences in MMPI performance emerge between the two culturally different groups of psychiatric patients. Similarly, significant differences on MMPI performance also exist between psychotic and non-psychotic Mexican-American psychiatric patients. These findings pose some doubts about the external validity of the MMPI not only in relation to Mexican-Americans but also in relation to other subcultural minorities (e.g. Negroes, American Indians). It is suggested, on the basis of the findings of this investigation that the MMPI is sensitive enough to certain cultural nuances that it requires special norms for appropriate use with the population of Mexican-Americans. The same conclusion seems to apply to Negroes, who have also been shown to perform differently from Anglo-Americans on the MMPI. It is worth mentioning at this point that in view of the conspicuous differences on MMPI performance between Mexican-American psychotic and non-psychotic patients, this instrument appears to be

highly sensitive to gross differences in psychopathology within the population of Mexican-American psychiatric patients. This sensitivity justifies any efforts toward the development of special norms for the Mexican-American population or as attempted in Aspect II of this study, the development of special procedures for using MMPI data with Mexican-American patients.

Aspect II

The actual effectiveness of the LDF developed in the second aspect of this investigation was tested empirically by applying the coefficients developed on sample A to a different sample (B) similarly composed of 100 psychotic and 100 non-psychotic Mexican-American patients. Inspection of the results revealed that the overall percentage of classification, namely 69.00 per cent fell somewhat short of the theoretically predicted percentage of 84. The fact that the formula correctly identified only 62 per cent of the non-psychotics accounts for most of the shrinkage. Although 24.00 per cent of the psychotics were misclassified as non-psychotics and 38.00 per cent of the non-psychotics were misclassified as psychotic, 76.00 per cent of the psychotics and 62.00 per cent of the non-psychotics in sample B were correctly identified by the formula. These proportions are significantly higher ($p < .01$) than the proportions of correct classification expected by chance. It seems, however, that this formula, although significantly superior to chance procedures is not

effective enough to be used as a sound psychometric criterion for a psychotic versus non-psychotic decision. The nature and implications of such a decision would require a higher rate of "hits", as suggested by Mechl and Roseu (1955), than that which the formula is apparently capable.

Even if the base rate problem did not exist and the formula were to be applied with the same population on which it was developed, about three out of ten psychotics would be classified as non-psychotics and close to four out of ten non-psychotics would be classified as psychotics. This out-put is definitely unsatisfactory when dealing with the kind of decision for which the formula was developed. In terms of its immediate practicality it can be used in conjunction with a larger battery of tests and in the total outcome increase the validity of the battery. In terms of its capabilities as a fast screening device it must be noted that although this formula is not valid enough as an overall psychometric predictor it can be highly efficient in classifying individuals whose LDF scores are distant from the cutting point. Reference to Figure 1 suggests that for any individual score the probabilities of misclassification increases in proportion to the distance of any LDF score from the cutting point. Thus in (extreme) cases where the LDF scores are far removed from the cutting point and their location is such that there is little or no area of overlap between the two curves, the chances of cor-

rect classification by the formula alone are much higher. Yet, this restriction considerably limits the usefulness of the formula to those cases where it is least needed.

Implications

In this section, implications for future research are discussed. There are several important points to be considered.

First, in terms of Aspect I of this study it has been noted that although a total of nine background variables were statistically controlled by the complex design utilized, no effort was made to equalize or control each cultural group in terms of specific clinical disorders within the two major sub-samples of psychotics and non-psychotics. The reason for not equalizing or controlling each group in terms of specific disorders, was basically the numerical restriction of different disorders in the pool of Mexican-American patients from which the sample was drawn. Reference to Appendix C indicates that the Mexican-American non-psychotic sub-sample was over-represented with subjects in the categories paranoid character, hysterical character, and inadequate personality. Similarly, the Mexican-American psychotic sub-sample was overrepresented with subjects in the category schizo-affective reaction and the Anglo-American sub-sample was overrepresented with subjects in the category unclassified schizophrenia. Although this unequal representation of clinical disorders in the two cultural samples is possibly a function

of the incidence of such disorders in each cultural group it can also be considered as a significant source of bias in the present investigation, posing some limitations to the interpretation of the results. An implication for further research, then, is to incorporate this variable in a study similar to the present investigation in order to control statistically for the possible effect on MMPI performance of different proportions of clinical disorders within the two cultural samples. Ideally such an investigation should draw Ss from more than one geographical area in order to increase the generalizing power of the findings. Similarly, it should employ more quantifiable cross validation procedures than the ones employed in this investigation. The basic rationale for such a study would be to provide a more solid understanding of the specific differences between Mexican-American and Anglo-American patients and to generate more empirical support to the findings of this investigation. It seems, in view of the highly significant MMPI differences found between the two cultural groups, that significant differences between Mexican-Americans and Anglo-American patients will still be present after the effect attributable to differences in clinical disorders is partialled out. It is concluded, then, that even if some of the specific findings of this investigation are limited by the disproportionate representation of some clinical disorders in the sample, the general finding of differences in MMPI performance between Mexican-American

and Anglo-American psychiatric patients is still supported by the results of this study.

Second, in terms of Aspect II of the present investigation it has been noted that although the LDF yields an overall proportion of correct classification (69.00) significantly higher than the proportion of correct classification expected by chance it is not valid enough to be considered a sound psychometric procedure for a psychosis versus non-psychosis decision. This formula does not appear as capable as first hoped of providing diagnosticians with a fast screening device for discriminating psychotic from non-psychotic Mexican-American patients. Two factors, however, should be mentioned in this context since they are quite promising for increasing the effectiveness of a LDF as attempted in this study. First, reference to Appendix B indicates that although the sample of Mexican-American non-psychotic patients has an almost equal representation of subjects in categories 3 and 4 of the social class variable (36.00 and 39.00 percent respectively), the sample of Mexican-American psychotic patients shows 36.00 percent in class 3 and only 26.00 percent of the Ss in class 4. This over representation of psychotic Ss in class 3 over class 4 is in direct disagreement with Jaco's (1960) findings that the unemployed, the service, and the manual worker (all classifiable in class 4) have the highest incidence rate of psychosis among the Mexican-American population. It appears, then, that in develop-

ing a LDF for discriminating psychotic from non-psychotic Mexican-American patients more Ss should be included in class 4 than in class 3 as was the case in this study. Otherwise the formula's applicability would be rather limited to settings where the wealthier, non-majority, Mexican-American psychotics receive psychiatric treatment. A suggestion for further research, then, is to include proportionally more class 4 psychotic Mexican-Americans than the number of psychotic Ss included in the other categories of social class. Previous findings (Pokorny & Overall, 1970; Fabrega, Swartz & Wallace, 1968) have indicated that hospitalized Mexican-American patients (most of them belonging to category 4 of social class) display a larger degree of disorganization than Anglo-American or Negro psychotics. These findings suggest that a higher representation of class 4 Mexican-American psychotics will probably reflect more MMPI differences not only between Mexican-American psychotics and Anglo-American psychotics but also between the Mexican-American psychotics and their non-psychotic counterparts. If this is so, the MMPI scores of these two groups (Mexican-American psychotics and Mexican-American non-psychotics) will be more easily separated by a LDF and therefore, the overall percentage of correct classification will be increased.

Another possible way of increasing the LDF's overall percentage of correct classification is exemplified in a study by Eich-

man (1959). This investigation attempted to discriminate female schizophrenics from normals by developing a set of configural rules or signs and then incorporating LDF weights into the procedures. By adding the LDF to the previously developed signs he increased the correct classification from 63.00 to 79.00 per cent. The development of configural rules and their incorporation with LDF weights is then another suggestion for future research.

A final point must be made about the implications for future research generated by the findings of this investigation. As previously stated in this chapter, the results of the present study indicate significant MMPI differences between Mexican-American and Anglo-American psychiatric patients as well as between psychotic and non-psychotic Mexican-American psychiatric patients. It was also stated that the MMPI seems to be sensitive enough to cultural nuances that profiles of Mexican-American (or Negro) patients cannot be adequately interpreted with the reportedly existing norms, rules, or acturial formulas. Yet, a basic limitation of this investigation is that relations between scale scores and behavior have not been explicated at all. This is true not only in terms of the MMPI differences between Mexican-American and Anglo-American samples but also in terms of the MMPI differences between psychotic and non-psychotic Mexican-American patients. Dahlstrom and Welsh (1963) have suggested that the results of Negro-Caucasian comparisons are

a function of "known effects of socio-economic inequities." However, Harrison and Kass (1967) and McDonald and Gynther (1963) have provided evidence against such interpretation. In terms of Mexican-American patients no support of this hypothesis can be adduced from the results of the present investigation since the effects of the class differences were statistically partialled out. A more general hypothesis may account for these differences, namely that MMPI differences between Mexican-American and Anglo-American psychotic patients are culturally determined. More specifically, these differences can be explained as a consequence of a different pattern of interests, values, and expectations. Or, they can be explained as a result of basic differences in manifest psychopathology between the two cultural groups. It is worth noting that both this investigation as well as the other single study (Reilley and Knight, 1970) where Mexican-Americans and Anglo-Americans have been compared on the MMPI, report significant differences between the two groups. A clarification of the factors underlying MMPI differences between the two cultural groups require a great deal of effort, time, and skill. It would be important to study normal as well as abnormal samples, and adult as well as adolescent samples. Like McDonald and Gynther (1963) have previously suggested for the Negro population, the suggestion is offered here that separate norms be developed for scoring and interpreting MMPI profiles obtained from Mexican-Americans.

In the long run such strategy appears highly productive for classification purposes and basically inevitable if the instrument is to be used as a diagnostic device for inferring personality characteristics of Mexican-American individuals.

CHAPTER VI

SUMMARY

The primary purpose of this study was to develop a relatively fast, MMPI based, actuarial procedure for the classification of psychotic and non-psychotic Mexican-American psychiatric patients. The specific procedure chosen for this purpose was Fisher's (1936) Lin Linear Discriminant Function and the Ss employed were all psychiatric patients who had been referred for diagnostic testing to the Division of Psychology at the University of Texas Medical Branch. In Aspect I of this study an attempt was made to provide an empirical justification for the development of the MMPI based LDF for Mexican-American patients. First, the MMPI responses of Mexican-American and Anglo-American psychiatric patients were compared in order to determine if culturally related MMPI differences between the two groups exist, and if so, to suggest that the MMPI profiles of Mexican-American patients cannot be validly interpreted in the same fashion as the profiles of Anglo-American patients. Second, the MMPI responses of Psychotic and non-psychotic Mexican-American patients were compared in order to determine if the MMPI is

sensitive enough to gross differences in psychopathology among Mexican-American patients that it proves potentially capable of discriminating psychotic from non-psychotic Mexican-American psychiatric patients.

For comparing Mexican-American and Anglo-American patients a complex least squares analysis of variance (Overall & Spiegel, 1969) was utilized in order to partial out the effect of the cultural variable on MMPI performance from the effect of other relevant variables (sex, age, marital status, social class, education, religious affiliation, intelligence and psychiatric classification). Similarly, for comparing psychotic and non-psychotic Mexican-American patients the same statistical procedure was employed to partial out the effect of the psychopathology factor on MMPI performance from the effect of the other relevant background variables. The results indicated that whether it be two groups of psychotics, two groups of non-psychotics or two combined groups of diagnostically heterogeneous psychiatric patients, there are significant differences on MMPI performance associated with differences in cultural group membership between Mexican-American and Anglo-American psychiatric patients. The results also indicated that there are significant differences on MMPI performance associated with gross differences in psychopathology between psychotic and non-psychotic Mexican-American psychiatric patients. These findings provided an empirical

justification of Aspect II of this investigation where a LDF for classifying psychotic and non-psychotic Mexican-American psychiatric patients was developed and cross validated. The LDF coefficients yielded a probability of 84.38 per cent of overall correct classification. Cross validation results indicated that although the actual, overall percentage of correct classification, namely 69.00 per cent fell short of the predicted percentage of 84.38, the formula represents a proportion 19.00 per cent greater than that proportion of correct classification expected by chance. It was decided, however, that although this improvement is statistically significant at the .01 level it is not large enough to consider the LDF developed here as a sound psychometric tool for immediate clinical use in the classification of psychotic and non-psychotic Mexican-American psychiatric patients.

Some limitations of this study were discussed and implications for further research were presented. The development of special norms for scoring and interpreting MMPI data of Mexican-American Ss was advanced as the most promising strategy for appropriate use of the MMPI with the population of Mexican-Americans.

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APPENDIX A

DATA SHEET

Code _____

Last Name _____

ID _____

Sex M F

Age _____

Marital NM M

Culture MA AA

Father's occupation _____

Social Class _____

Occupation Husband _____

Education T School _____

Religion P_R C Other _____

IQ _____

Psy. Class _____

MMPI

L _____

F _____

K _____

1 _____

2 _____

3 _____

4 _____

5

6

7

8

9

0

APPENDIX B

(Frequency Distributions of Data Sheets for the Total Sample and for each relevant sub sample on the basis of culture, Psychiatric Classification, Sex, Marital Status, Religion, Education, Social Class, IQ and Age as coded below).

	Categories				
Variable	1	2	3	4	5
Culture	Mexican-Am.	Anglo-Am.	---	---	---
Psychiatric Class.	Psychotic	Non-psychotic	---	---	---
Sex	Male	Female	---	---	---
Marital Status	Not Married	Married	---	---	---
Religion	Protestant	Catholic	Other	---	---
Education	8 or Less	9 to 11	12	13 or More	---
Social Class	High	Middle High	Middle Low	Low	---
IQ	70-89	90-110	111-119	120 or Higher	---
Age	18-20	21-30	31-40	41-50	51 or Older

APPENDIX B (Continued)

ALL SUBJECTS (N = 600)

Variable	Categories									
	1		2		3		4		5	
	N	%	N	%	N	%	N	%	N	%
Culture	400	66.67	200	33.33						
Psychiatric Class	300	50.00	300	50.00						
Sex	278	46.33	322	53.66						
Marital	311	51.83	289	48.16						
Religion	230	38.33	294	49.00	76	12.66				
Education	91	15.16	144	24.00	196	32.66	169	28.16		
Social Class	113	18.83	105	17.50	207	34.50	175	29.16		
IQ	188	31.33	236	39.33	112	18.66	64	10.66		
Age	129	21.50	266	44.33	127	21.16	62	10.33	16	2.66

ALL MEXICAN-AMERICAN SUBJECTS (N = 400)

Variable	Categories									
	1		2		3		4		5	
	N	%	N	%	N	%	N	%	N	%
Psychiatric Class	200	50.00	200	50.00						
Sex	192	48.00	208	52.00						
Marital	219	54.75	181	45.25						
Religion	77	19.25	262	65.50	61	15.25				
Education	85	21.25	101	25.25	110	27.50	104	26.00		
Social Class	64	16.00	61	15.25	145	36.25	130	32.50		
IQ	153	38.25	128	32.00	80	20.00	39	9.75		
Age	97	24.25	175	43.75	81	20.25	41	10.25	6	1.50

APPENDIX B (Continued)

ALL MEXICAN-AMERICAN PSYCHOTIC SUBJECTS (N= 200)

Variable	Categories									
	1		2		3		4		5	
	N	%	N	%	N	%	N	%	N	%
Sex	91	45.50	109	54.50						
Marital	121	60.50	79	39.50						
Religion	47	23.50	117	58.50	36	18.00				
Education	39	19.50	43	21.50	71	35.50	47	23.50		
Social Class	39	19.50	36	18.00	73	36.50	52	26.00		
IQ	80	40.00	53	26.50	43	21.50	24	12.00		
Age	45	22.50	107	53.50	38	19.00	10	5.00	0	0.00

ALL MEXICAN-AMERICAN NON-PSYCHOTIC SUBJECTS (N= 200)

Variable	Categories									
	1		2		3		4		5	
	N	%	N	%	N	%	N	%	N	%
Sex	101	50.50	99	49.50						
Marital	98	49.00	102	51.00						
Religion	30	15.00	145	72.50	25	12.50				
Education	46	23.00	58	29.00	39	19.50	57	28.50		
Social Class	25	12.50	25	12.50	72	36.00	78	39.00		
IQ	73	36.50	75	37.50	37	18.50	15	7.50		
Age	52	26.00	68	34.00	43	21.50	31	15.50	6	3.00

APPENDIX B (Continued)

ALL ANGLO-AMERICAN SUBJECTS (N= 200)

Variable	Categories									
	1		2		3		4		5	
	N	%	N	%	N	%	N	%	N	%
Psychiatric Class	100	50.00	100	50.00						
Sex	86	43.00	114	57.00						
Marital	92	46.00	108	54.00						
Religion	153	76.50	32	16.00	15	7.50				
Education	6	3.00	43	21.50	86	43.00	65	32.50		
Social Class	49	24.50	44	22.00	62	31.00	45	22.50		
IQ	35	17.50	108	54.00	32	16.00	25	12.50		
Age	32	16.00	91	45.50	46	23.00	21	10.50	10	5.00

ALL ANGLO-AMERICAN PSYCHOTIC SUBJECTS (N= 100)

Variable	Categories									
	1		2		3		4		5	
	N	%	N	%	N	%	N	%	N	%
Sex	40	40.00	60	60.00						
Marital	51	51.00	49	49.00						
Religion	75	75.00	17	17.00	8	8.00				
Education	1	1.00	19	19.00	40	40.00	40	40.00		
Social Class	28	28.00	23	23.00	27	27.00	22	22.00		
IQ	17	17.00	55	55.00	16	16.00	12	12.00		
Age	13	13.00	50	50.00	23	23.00	13	12.00	2	2.00

APPENDIX B (Continued)

ALL ANGLO-AMERICAN NON-PSYCHOTIC SUBJECTS (N = 100)

Variable	Categories									
	1		2		3		4		5	
	N	%	N	%	N	%	N	%	N	%
Sex	46	46.00	54	54.00						
Marital	41	41.00	59	59.00						
Religion	78	78.00	15	15.00	7	7.00				
Education	5	5.00	24	24.00	46	46.00	25	25.00		
Social Class	21	21.00	21	21.00	35	35.00	23	23.00		
IQ	18	18.00	53	53.00	16	16.00	13	13.00		
Age	19	19.00	41	41.00	23	23.00	9	9.00	8	8.00

APPENDIX C

Distribution of All Psychotic Subjects (N = 300) on the Basis of Specific Clinical Disorder and Cultural Group Membership

Clinical Disorder	Cultural Group Membership			
	Mexican-Americans (N = 200)		Anglo-Americans (N = 100)	
	Frequency	Percentage	Frequency	Percentage
Unclassified Schizophrenia	26	13.00	30	30.00
Incipient Schizophrenia	39	19.50	18	18.00
Paranoid Schizophrenia	50	25.00	24	24.00
Schizo-Affective Reaction	71	35.50	20	20.00
Other	14	7.00	8	8.00
Total	200	100.00	100	100.00

APPENDIX C (Continued)

Distribution of All Non-Psychotic Subjects (N 300)
on the Basis of Clinical Disorder
and Cultural Group Membership

Clinical Disorder	Cultural Group Membership			
	Mexican-Americans (N 200)		Anglo-Americans (N 100)	
	Frequency	Percentage	Frequency	Percentage
Schizoid Character	0	0.00	10	10.00
Paranoid Character	31	15.50	7	7.00
Obsessive-Compulsive Character	5	2.50	5	5.00
Hysterical Character	42	21.00	14	14.00
Phobic Character	14	7.00	8	8.00
Mixed Character	7	3.50	4	4.00
Narcissistic Character	15	7.50	10	10.00
Anxiety State	11	5.50	7	7.00
Hypochondriac Reaction	10	5.00	7	7.00
Inadequate Personality	45	22.50	14	14.00
Depressive Reaction	18	9.00	11	11.00
Other	2	1.00	3	3.00
Total	200	100.00	100	100.00

APPENDIX D

Complete Least Squares Analysis of Variance Summary Tables Conducted in Conjunction with Four Research Questions for Each MMPI Scale and Involving Nine Variables as Coded Below.

Variable

1. Sex
2. Age
3. Marital Status
4. IQ
5. Social Class
6. Education
7. Religion
8. Psychological Classification
9. Culture

ALL SUBJECTS (400 MEXICAN-AMERICANS AND 200 ANGLO-AMERICANS)
SCALE L

Source	DF	MS	F
1	1	3.645	0.666
2	4	34.942	6.389
3	1	41.348	7.560
4	3	44.243	8.089
5	3	11.774	2.152
6	3	11.026	2.016
7	2	19.928	3.643
8	1	5.529	1.011
9	1	0.246	0.044
Error	580	5.469	

ALL SUBJECTS (400 MEXICAN-AMERICANS AND 200 ANGLO-AMERICANS)
SCALE F

Source	DF	MS	F
1	1	51.088	1.505
2	4	161.079	4.745
3	1	70.770	2.084
4	3	275.370	8.112
5	3	2.520	0.074
6	3	51.195	1.508
7	2	220.844	6.505
8	1	444.868	13.105
9	1	158.991	6.710
Error	580	23.945	

APPENDIX D (Continued)

ALL SUBJECTS (400 MEXICAN-AMERICANS AND 200 ANGLO-AMERICANS)
SCALE K

Source	DF	MS	F
1	1	29.096	1.200
2	4	85.310	3.521
3	1	8.050	0.332
4	3	24.825	1.024
5	3	101.979	4.209
6	3	31.946	1.318
7	2	20.429	0.843
8	1	21.895	0.903
9	1	6.147	0.253
Error	580	24.228	

ALL SUBJECTS (400 MEXICAN-AMERICANS AND 200 ANGLO-AMERICANS)
SCALE Hs

Source	DF	MS	F
1	1	542.021	16.034
2	4	152.191	4.502
3	1	164.730	4.873
4	3	279.446	8.266
5	3	27.991	0.828
6	3	34.205	1.011
7	2	63.818	1.887
8	1	75.824	2.243
9	1	74.499	2.203
Error	580	33.803	

APPENDIX D (Continued)

ALL SUBJECTS (400 MEXICAN-AMERICANS AND 200 ANGLO-AMERICANS)
SCALE D

Source	DF	MS	F
1	1	438.171	8.354
2	4	217.222	4.141
3	1	136.721	2.606
4	3	270.271	5.153
5	3	17.080	0.325
6	3	44.208	0.842
7	2	0.929	0.017
8	1	549.069	10.469
9	1	58.848	1.122
Error	580	52.444	

ALL SUBJECTS (400 MEXICAN-AMERICANS AND 200 ANGLO-AMERICANS)
SCALE Hy

Source	DF	MS	F
1	1	1080.843	27.166
2	4	43.974	1.105
3	1	29.581	0.743
4	3	94.352	2.371
5	3	80.139	2.014
6	3	104.923	2.637
7	2	96.900	2.435
8	1	45.996	1.156
9	1	0.695	0.017
Error	580	39.786	

APPENDIX D (Continued)

ALL SUBJECTS (400 MEXICAN-AMERICANS AND 200 ANGLO-AMERICANS)
SCALE Pd

Source	DF	MS	F
1	1	163.910	6.835
2	4	195.782	8.164
3	1	89.609	3.737
4	3	22.911	0.955
5	3	70.834	2.954
6	3	255.821	10.668
7	2	460.248	19.194
8	1	1767.542	73.713
9	1	179.477	7.484
Error	580	23.979	

ALL SUBJECTS (400 MEXICAN-AMERICANS AND 200 ANGLO-AMERICANS)
SCALE Mf

Source	DF	MS	F
1	1	10309.787	381.476
2	4	13.872	0.513
3	1	79.430	2.939
4	3	101.089	3.740
5	3	110.496	4.088
6	3	84.010	3.108
7	2	133.203	4.928
8	1	321.688	30.403
9	1	299.035	11.064
Error	580	27.026	

ALL SUBJECTS (400 MEXICAN-AMERICANS AND 200 ANGLO-AMERICANS)
SCALE Pa

Source	DF	MS	F
1	1	107.658	4.971
2	4	44.433	2.051
3	1	33.256	1.535
4	3	128.349	5.927
5	3	33.192	1.532
6	3	17.767	0.820
7	2	73.122	3.376
8	1	394.409	18.214
9	1	10.611	0.490
Error	580	21.654	

ALL SUBJECTS (400 MEXICAN-AMERICANS AND 200 ANGLO-AMERICANS)
SCALE Pt

Source	DF	MS	F
1	1	347.185	6.195
2	4	114.375	2.040
3	1	8.873	0.158
4	3	204.799	3.654
5	3	155.377	2.772
6	3	287.838	5.136
7	2	213.256	3.805
8	1	1299.381	23.186
9	1	90.954	1.623
Error	580	56.040	

APPENDIX D (Continued)

ALL SUBJECTS (400 MEXICAN-AMERICANS AND 200 ANGLO-AMERICANS)
SCALE Sc

Source	DF	MS	F
1	1	762.391	8.648
2	4	286.318	3.247
3	1	257.854	2.924
4	3	509.107	5.775
5	3	145.535	1.650
6	3	58.548	0.664
7	2	612.502	6.947
8	1	5118.532	58.061
9	1	0.0117	0.000
Error	580	88.157	

ALL SUBJECTS (400 MEXICAN-AMERICANS AND 200 ANGLO-AMERICANS)
SCALE Ma

Source	DF	MS	F
1	1	19.843	0.759
2	4	61.529	2.353
3	1	113.776	4.352
4	3	32.448	1.241
5	3	39.171	1.498
6	3	34.511	1.320
7	2	189.153	7.236
8	1	220.961	8.453
9	1	0.604	0.023
Error	580	26.139	

APPENDIX C (Continued)

ALL SUBJECTS (400 MEXICAN-AMERICANS AND 200 ANGLO-AMERICANS)
SCALE Si

Source	DF	MS	F
1	1	382.164	3.446
2	4	314.788	2.839
3	1	0.402	0.003
4	3	719.639	6.490
5	3	128.395	1.158
6	3	614.217	5.539
7	2	1710.749	15.430
8	1	5.557	0.050
9	1	1553.024	14.007
Error	580	110.870	

APPENDIX D (Continued)

ALL PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE L

Source	DF	MS	F
1	1	0.163	0.033
2	4	18.004	3.752
3	1	14.945	3.114
4	3	23.027	4.799
5	3	9.659	2.013
6	3	32.380	6.748
7	2	21.442	4.468
8			
9	1	1.364	0.284
Error	281	4.798	

ALL PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE F

Source	DF	MS	F
1	1	5.171	0.202
2	4	131.648	5.148
3	1	30.739	1.202
4	3	203.469	7.957
5	3	41.756	1.632
6	3	46.104	1.803
7	2	55.090	2.154
8			
9	1	198.346	7.756
Error	281	25.570	

APPENDIX D (Continued)

ALL PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE K

Source	DF	MS	F
1	1	72.656	4.129
2	4	45.515	2.586
3	1	34.723	1.973
4	3	59.105	3.359
5	3	101.870	5.789
6	3	66.999	3.807
7	2	1.691	0.096
8			
9	1	30.109	1.711
Error	281	17.596	

ALL PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Hs

Source	DF	MS	F
1	1	65.124	2.212
2	4	57.216	1.943
3	1	71.510	2.429
4	3	108.906	3.699
5	3	8.690	0.295
6	3	20.032	0.680
7	2	41.094	1.395
8			
9	1	6.244	0.212
Error	281	29.439	

APPENDIX D (Continued)

ALL PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE D

Source	DF	MS	F
1	1	10.322	0.182
2	4	73.245	1.295
3	1	0.049	0.000
4	3	511.952	9.057
5	3	75.511	1.355
6	3	45.065	0.797
7	2	16.465	0.291
8			
9	1	168.831	2.987
Error	281	56.521	

ALL PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Hy

Source	DF	MS	F
1	1	207.567	5.979
2	4	44.539	1.282
3	1	4.659	0.134
4	3	71.282	2.053
5	3	24.748	0.712
6	3	147.974	4.262
7	2	140.006	4.032
8			
9	1	98.032	2.823
Error	281	34.716	

APPENDIX D (Continued)

ALL PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Pd

Source	DF	MS	F
1	1	2.360	0.107
2	4	125.638	5.697
3	1	59.247	2.686
4	3	63.639	2.885
5	3	51.015	2.313
6	3	183.275	8.310
7	2	223.198	10.120
8			
9	1	345.525	15.667
Error	281	22.053	

ALL PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Mf

Source	DF	MS	F
1	1	2670.449	113.737
2	4	40.770	1.736
3	1	102.439	4.363
4	3	76.094	3.240
5	3	141.858	6.041
6	3	20.475	0.872
7	2	61.414	2.615
8			
9	1	31.068	1.323
Error	281	23.479	

APPENDIX D (Continued)

ALL PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Pa

Source	DF	MS	F
1	1	9.835	0.455
2	4	66.082	3.060
3	1	303.047	14.035
4	3	102.379	4.741
5	3	121.587	5.631
6	3	62.619	2.900
7	2	3.230	0.149
8			
9	1	8.174	0.378
Error	281	21.592	

ALL PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Pt

Source	DF	MS	F
1	1	13.175	0.222
2	4	142.494	2.406
3	1	47.620	0.804
4	3	411.798	6.955
5	3	75.710	1.278
6	3	54.906	0.927
7	2	174.218	2.942
8			
9	1	75.569	1.276
Error	281	59.207	

APPENDIX D (Continued)

ALL PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Sc

Source	DF	MS	F
1	1	444.171	5.375
2	4	381.066	4.611
3	1	322.720	3.905
4	3	648.842	7.852
5	3	200.496	2.426
6	3	18.504	0.223
7	2	297.510	3.600
8			
9	1	9.391	0.113
Error	281	82.628	

ALL PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Ma

Source	DF	MS	F
1	1	64.294	2.473
2	4	125.233	4.818
3	1	6.355	0.244
4	3	17.013	0.654
5	3	78.893	3.035
6	3	36.428	1.401
7	2	226.247	8.705
8			
9	1	20.891	0.803
Error	281	25.989	

APPENDIX D (Continued)

ALL PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Si

Source	DF	MS	F
1	1	4.986	0.044
2	4	670.870	5.994
3	1	129.350	1.155
4	3	824.235	7.364
5	3	470.288	4.202
6	3	381.453	3.408
7	2	599.121	5.353
8			
9	1	1480.061	13.225
Error	281	111.913	

APPENDIX D (Continued)

ALL NON-PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE L

Source	DF	MS	F
1	1	2.237	0.398
2	4	19.865	3.535
3	1	11.230	1.998
4	3	10.431	1.856
5	3	2.160	0.384
6	3	2.342	0.416
7	2	10.812	1.924
8			
9	1	0.411	0.073
Error	281	5.619	

ALL NON-PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE F

Source	DF	MS	F
1	1	133.934	3.323
2	4	96.900	2.404
3	1	22.213	0.551
4	3	78.657	1.951
5	3	49.537	1.229
6	3	106.514	2.643
7	2	226.703	5.625
8			
9	1	0.052	0.001
Error	281	40.299	

APPENDIX D (Continued)

ALL NON-PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE K

Source	DF	MS	F
1	1	28.806	0.992
2	4	70.998	2.447
3	1	1.857	0.064
4	3	8.359	0.288
5	3	77.404	2.668
6	3	29.206	1.006
7	2	41.405	1.427
8			
9	1	23.451	0.808
Error	281	29.010	

ALL NON-PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Hs

Source	DF	MS	F
1	1	537.003	15.607
2	4	190.486	5.536
3	1	4.018	0.116
4	3	188.994	5.492
5	3	39.606	0.789
6	3	27.155	2.908
7	2	100.082	0.452
8			
9	1	39.606	1.151
Error	281	34.407	

APPENDIX D (Continued)

ALL NON-PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE D

Source	DF	MS	F
1	1	1113.875	27.468
2	4	87.826	2.165
3	1	427.005	10.529
4	3	16.026	0.395
5	3	172.245	4.247
6	3	46.064	1.135
7	2	19.906	0.490
8			
9	1	2.946	0.072
Error	281	40.551	

ALL NON-PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Hy

Source	DF	MS	F
1	1	710.888	17.939
2	4	56.756	1.432
3	1	71.304	1.799
4	3	139.395	3.517
5	1	31.309	0.790
6	3	45.518	1.148
7	3	1.081	0.027
8			
9	1	27.850	0.702
Error	281	39.627	

APPENDIX D (Continued)

ALL NON-PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Pd

Source	DF	MS	F
1	1	219.772	9.203
2	4	110.918	4.644
3	1	58.868	2.465
4	3	20.010	0.837
5	3	44.340	1.856
6	3	121.656	5.094
7	2	222.858	9.332
8			
9	1	1.041	0.043
Error	281	23.879	

ALL NON-PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Mf

Source	DF	MS	F
1	1	7085.985	253.114
2	4	5.034	0.179
3	1	35.459	1.266
4	3	53.198	1.900
5	3	24.348	0.869
6	3	84.537	3.019
7	2	21.439	0.765
8			
9	1	352.477	12.590
Error	281	27.995	

APPENDIX D (Continued)

ALL NON-PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Pa

Source	DF	MS	F
1	1	133.437	6.981
2	4	38.585	2.018
3	1	112.698	5.896
4	3	18.045	0.944
5	3	8.027	0.419
6	3	26.353	1.378
7	2	65.979	3.451
8			
9	1	3.349	0.175
Error	281	19.114	

ALL NON-PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Pt

Source	DF	MS	F
1	1	326.210	6.741
2	4	44.084	0.911
3	1	107.624	2.224
4	3	82.996	1.715
5	3	148.693	3.073
6	3	180.310	3.726
7	2	43.062	0.889
8			
9	1	20.482	0.423
Error	281	48.386	

ALL NON-PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Sc

Source	DF	MS	F
1	1	134.967	1.595
2	4	188.996	2.233
3	1	0.609	0.007
4	3	477.086	5.638
5	3	64.427	0.761
6	3	89.495	1.057
7	2	487.208	5.757
8			
9	1	42.026	0.496
Error	281	84.617	

ALL NON-PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Ma

Source	DF	MS	F
1	1	87.688	3.782
2	4	47.742	2.059
3	1	138.427	5.971
4	3	65.045	2.805
5	3	32.725	1.411
6	3	62.932	2.714
7	2	44.615	1.924
8			
9	1	18.006	0.776
Error	281	23.183	

APPENDIX D (Continued)

ALL NON-PSYCHOTICS (200 MEXICAN-AMERICANS AND 100 ANGLO-AMERICANS)
SCALE Si

Source	DF	MS	F
1	1	1482.632	16.258
2	4	43.459	0.476
3	1	19.373	0.212
4	3	39.191	0.429
5	3	222.655	2.441
6	3	771.568	8.461
7	2	678.360	7.438
8			
9	1	375.287	4.115
Error	281	91.191	

APPENDIX D (Continued)

ALL MEXICAN-AMERICAN SUBJECTS (N = 400)
SCALE L

Source	DF	MS	F
1	1	15.483	3.012
2	4	35.953	6.994
3	1	47.146	9.171
4	3	35.054	6.819
5	3	12.290	2.390
6	3	18.716	3.640
7	2	43.719	8.504
8	1	26.881	5.229
9			
Error	381	5.141	

ALL MEXICAN-AMERICAN SUBJECTS (N = 400)
SCALE F

Source	DF	MS	F
1	1	52.578	3.018
2	4	145.646	8.362
3	1	81.277	4.666
4	3	76.227	4.376
5	3	12.316	0.707
6	3	2.093	0.120
7	2	176.479	10.133
8	1	139.335	8.000
9			
Error	381	17.416	

APPENDIX D (Continued)

ALL MEXICAN-AMERICAN SUBJECTS (N = 400)
SCALE K

Source	DF	MS	F
1	1	49.022	2.055
2	4	137.959	5.784
3	1	50.448	2.115
4	3	55.171	2.313
5	3	74.268	3.114
6	3	63.848	2.677
7	2	15.598	0.654
8	1	7.066	0.296
9			
Error	381	23.849	

ALL MEXICAN-AMERICAN SUBJECTS (N = 400)
SCALE Hs

Source	DF	MS	F
1	1	333.378	11.734
2	4	270.633	9.525
3	1	272.471	9.590
4	3	208.537	7.340
5	3	38.200	1.344
6	3	9.215	0.324
7	2	76.041	2.676
8	1	34.840	1.226
9			
Error	381	28.411	

APPENDIX D (Continued)

ALL MEXICAN-AMERICAN SUBJECTS (N = 400)
SCALE D

Source	DF	MS	F
1	1	284.054	6.416
2	4	268.167	6.057
3	1	91.521	2.067
4	3	460.032	10.391
5	3	36.535	0.825
6	3	183.398	4.142
7	2	62.256	1.406
8	1	556.705	12.575
9			
Error	381	44.269	

ALL MEXICAN-AMERICAN SUBJECTS (N = 400)
SCALE Hy

Source	DF	MS	F
1	1	788.596	23.249
2	4	107.025	3.155
3	1	52.534	1.548
4	3	166.503	4.908
5	3	124.634	3.674
6	3	172.721	5.092
7	2	129.662	3.822
8	1	297.756	8.778
9			
Error	381	33.919	

APPENDIX D (Continued)

ALL MEXICAN-AMERICAN SUBJECTS (N = 400)
SCALE Pd

Source	DF	MS	F
1	1	368.932	19.661
2	4	172.575	9.197
3	1	192.917	10.281
4	3	89.321	4.760
5	3	42.702	2.275
6	3	123.194	6.565
7	2	444.398	23.683
8	1	1602.593	85.407
9			
Error	381	18.764	

ALL MEXICAN-AMERICAN SUBJECTS (N = 400)
SCALE Mf

Source	DF	MS	F
1	1	5700.511	271.657
2	4	29.385	1.400
3	1	135.904	6.476
4	3	135.308	6.448
5	3	134.125	6.391
6	3	199.005	9.483
7	2	215.578	10.273
8	1	1253.211	59.721
9			
Error	381	20.984	

ALL MEXICAN-AMERICAN SUBJECTS (N = 400)
SCALE Pa

Source	DF	MS	F
1	1	147.717	6.892
2	4	116.814	5.450
3	1	0.576	0.026
4	3	148.280	6.919
5	3	58.082	2.710
6	3	5.969	0.278
7	2	43.577	2.033
8	1	181.548	8.471
9			
Error	381	21.430	

ALL MEXICAN-AMERICAN SUBJECTS (N = 400)
SCALE Pt

Source	DF	MS	F
1	1	295.604	5.852
2	4	180.552	3.574
3	1	4.013	0.079
4	3	414.804	8.212
5	3	309.986	6.137
6	3	420.992	8.335
7	2	293.222	5.805
8	1	850.285	16.834
9			
Error	381	50.509	

APPENDIX D (Continued)

ALL MEXICAN-AMERICAN SUBJECTS (N = 400)
SCALE Sc

Source	DF	MS	F
1	1	1207.573	16.579
2	4	504.592	6.928
3	1	95.857	1.316
4	3	305.468	4.194
5	3	262.309	3.601
6	3	111.133	1.525
7	2	554.645	7.615
8	1	2634.428	36.170
9			
Error	381	72.833	

ALL MEXICAN-AMERICAN SUBJECTS (N = 400)
SCALE Ma

Source	DF	MS	F
1	1	155.921	6.151
2	4	69.405	2.738
3	1	19.763	0.779
4	3	39.610	1.562
5	3	38.485	1.518
6	3	18.867	0.744
7	2	237.567	9.373
8	1	23.843	0.940
9			
Error	381	25.345	

APPENDIX D (Continued)

ALL MEXICAN-AMERICAN SUBJECTS (N = 400)
SCALE Si

Source	DF	MS	F
1	1	85.395	0.981
2	4	289.608	3.330
3	1	140.393	1.614
4	3	1199.150	13.788
5	3	256.463	2.949
6	3	1429.285	16.435
7	2	2247.615	25.845
8	1	216.291	2.487
9			
Error	381	86.965	