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Its Reevaluation and Improvement As Related To A Profile Analysis Classification System

Mark A. Skovron
Utah State University

THE MINI-MULT

ITS REEVALUATION AND IMPROVEMENT AS RELATED TO A PROFILE ANALYSIS CLASSIFICATION SYSTEM

by

Mark Skovron

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Mark Skovron

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ABSTRACT

The Mini-Mult:

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by

Mark A. Skovron, Doctor of Philosophy

Major Professor: Dr. Roland Bergeson
Department: Psychology

Over the first half of the present study the Mini-Mult (MM_1), a brief form of the Minnesota Multiphasic Personality Inventory (MMPI), was compared with the standard MMPI in relation to eleven criteria classifications. These criteria were composed of the profile analysis classifications of Marks and Seeman (1963). Pearson product-moment correlations between the MM_1 and MMPI failed to reach statistical significance for any of the eleven criteria.

As based on the information gained, a correction factor was devised and added to the MM_1. Subsequently, the second half of the study involved a comparison between the MMPI and the revised MM_1. This revised test was termed the MM_2. In only two of eleven criteria cases did the correlation between the MM_2 and MMPI reach statistical significance. However, for nine of the eleven criteria the MM_2 did obtain a higher positive correlation with the MMPI than did the MM_1.

Such results indicate that the proposed correction factor is a step in the right direction and deserving of continued investigation.

Although the MM_2 as it presently stands cannot be validy substituted for the MMPI, continued research in the area of modifying its correction factor can yield it a useful clinical tool.

(88 pages)

CHAPTER I

INTRODUCTION

Psychological testing has, and still does, play a prominent role in the global concept of psychology as a science. It is that particular objective component of psychology which sets it against some more subjective "therapeutic" disciplines such as psychiatry and related areas.

In the use of the objective test, the psychologist is making an attempt to objectively quantify and measure some domain of personality, intellectual functioning, perceptual-motor ability, etc. Such measurement will, hopefully, result in a much greater precision as regards delineating particular psychological problems and the therapeutic measures required to alleviate them.

One of the most widely used objective personality indices has been the Minnesota Multiphasic Personality Inventory (MMPI).

This test has proven itself valuable in a wide variety of situations. However, it is a long and often time-consuming instrument which requires extended concentration and attention on the part of clients often unable to extend such effort.

The purpose of the present study is to investigate and hopefully improve on a short form of the MMPI, this brief form called the Mini-Mult (1968).

CHAPTER II

PROBLEM

Rationale

The reason prompting the construction of a valid and reliable short form of the MMPI is, of course, mainly economical as related to time, effort, and available personnel. In clinical situations, a patient is often unable or will refuse to complete the long form of the MMPI. However, the same patient might answer a shorter series of items. In addition, one often finds oneself in a situation requiring a rapid evaluation of one or several individuals, and a short form of the MMPI could accelerate the gathering of data for interpretation and communication. Also, in the area of research many programs might include a standardly administered personality inventory if the time and motivation variables involved in such a procedure could be minimized.

In many hospital settings especially, where testing generally contributes significantly to the decision making process, a valid short form of the MMPI would certainly prove beneficial.

Purpose

The Mini-Mult is the short form of the MMPI to be used in the present study. Although the instrument has been constructed and validated by Kincannon against several criteria, the present author (Skovron, 1969) found it to be lacking in validity as compared to the standard MMPI when being used to predict the complex code type configurations of Marks and Seeman.

Several critics of the short form have based their evaluations on the fact that the short form, though it may predict several criteria

nearly as well as the long, suffers because its classification error rate and clinical decisions emanating from them far exceeds in practice what it would have been as estimated by the short-to-long form correlations reported. Such criticisms were upheld as related to the MM by Skovron's study (1969). However, that study also indicated that, with certain corrective adjustments, the MM could be improved upon and its validity possibly increased.

The purposes of the present study, then, are twofold in nature. The first is to compare again the Mini-Mult with the standard MMPI form in relation to the latter's classification according to 11 Marks and Seeman code types.

Secondly, as based upon the data obtained from the author's 1969 study, and that accumulated over the first half of the present study, corrective adjustments will be derived related to the MM's basic weaknesses.

These adjustments will be applied to the Mini-Mult, and another test of the comparability of the MM to the standard MMPI (again using the Marks and Seeman criteria) will be conducted. It is anticipated that, following such corrective adjustments, the validity of the MM will be improved to the point of its being useful as a meaningful replacement for the MMPI when the situation warrants.

Five of the original Marks and Seeman code types have been eliminated due to the fact that each of them utilizes two or more profile rules involving the "Mf" and "Si" scales. These scales, for reasons to be discussed, are not present on the Mini-Mult and thus codes involving them could not be used.

The Hypotheses

For purposes of clarity in stating the experimental hypothesis of the present study, the standard MM (to be used in the first half of the

study) will be termed MM_1.

The revised MM (to be used the second half of the study) will be termed MM_2.

The purposes of the present study can then be expressed in terms of the following null hypothesis:

H_o: There will be no significant difference between the correlation coefficients of the MM_1 and MM_2 with the standard MMPI when using eleven separate Marks and Seeman code type classifications (Appendix A) as criteria.

Several pertinent areas require exploration and summary prior to discussing the main body of the present investigation.

CHAPTER III

LITERATURE REVIEW

A. The Short Form

The development of short test forms received its major impetus from attempts of the military to develop rapid screening devices with which to measure intellectual abilities and to determine the competence of an individual to perform certain tasks, perhaps after experiencing the immediate effects of a combat situation.

From these beginnings, short from construction infiltrated the clinical field, but throughout has been concerned mainly with intelligence and ability testing, as opposed to personality testing. The obvious reason for this trend is the tremendous complexity involved with measuring personality and filtering out the relevant factors contributing to its development and variability. Though the measurement of intelligence involves similar problems, the great influence of the Standford-Binet and Wechsler Scales on the measurement and definition of intelligence has inspired investigators to develop varieties of short form intelligence measurement techniques. Thus, the first step in developing a short form personality measure seems to be the consideration of problems concerning the definition of personality and its measurement. The widest and most inclusive positions concerning this area revolve around those proposing an idiographic approach to human functioning as opposed to those maintaining a nomothetic one.

For some time there has been a controversy over whether or not general traits of personality exist. Those who have espoused the nomothetic view are mainly concerned with the development of general laws applicable to the general population while the idiographic view is directed

towards a personalized approach. Basically, the latter point of view sees each individual as a law unto himself. In relation to factor-analytic approaches, this would mean that either there are no general factors among personality characteristics or those which do exist fail to touch on the real basis of the individual. The idiographic approach is similar to that used by novelists who explore in detail the inner workings and behavior of one person. This is in contrast to the nomothetic approach which attempts to represent the important personality characteristics of all people in terms of profiles of measurable traits.

Those of the idiographic trend believe that before finding general traits or factors of personality, it is necessary to find correlations among specific traits or habits. Yet, everyday experience suggests that such correlations frequently are very low or absent completely. For example, it makes sense to deal with a general trait of submissiveness only if there are positive correlations among tendencies to be submissive in specific situations; but there are so many instances of individuals who are submissive at work but dominant with their wives or vice versa, submissive with men but not with women, and so on.

For the nomotheticist to be successful, he must point out a general personality factor and find it evidenced in the correlations among more specific traits, or if he has no hypotheses, he must find such clusters of correlated traits in his factor-analytic explorations. If such successes fail to occur, the nomotheticist must eventually admit that the idiographist is correct. That is, personality traits are distributed over the population in such a manner that the only approach to understanding the individual is by tracing the developmental antecedents of his personality. Each individual must be considered an unique configuration of specific traits; there are no general traits of dominance, introversion,

etc. If this were true, psychology as a science would suffer since idiography discourages the search for general laws and encourages the description of particular phenomena.

The relevance of this dichotomy to the measurement of personality traits is the philosophy behind such measures: the idiographic approach is not entirely correct; there are some general traits of human personality. To accept a completely idiographic view in advance of testing the nomothetic viewpoint would be to postulate that chaos prevails in the description of human personalities in that no general laws of human behavior exist.

The development of short test forms is particularly relevant to these two schools of thought. A shortened form of test is nomothetic by admitting that individuals can be defined according to a limited set of consistently operating traits, and that the number of items which measures these traits can be lessened.

Yet, if one puts aside the idiographic-nomothetic dichotomy, there is no contradition in saying that one can use a personality measuring device within an idiographic framework, and if that particular personality device can be shortened and still maintain its discriminative usefulness, all the better. For example, there is no reason to assume that because we employ an MMPI to gather information about an individual we need to ignore other historical and observational data concerning him. And subsequently, one could argue that not only is the MMPI valuable to the idiographist, but a short form MMPI would be even more valuable in that it would allow the examiner greater time to explore other variables he deems important for a thorough description of the individual.

Consequently, a variety of short test forms would give the examiner a better overall picture of the individual's present functioning than the

administration of a restricted range of longer forms. One would then have a greater time to explore developmental and corrective procedures.

Above and beyond these considerations, the short form has pragmatic and practical applications, whether one is idiographically or nomothetically oriented. For example, the time and manpower of testers and the motivation of patients frequently hamper administration of long test forms. In these cases, the short form can be a valuable ally, and sometimes one"s only available, standardized method. Heavy case loads and time limitations are given as the primary motivating factors behind a search for valid short forms of intelligence and personality tests.

In relation to research with short form measures of intelligence, results have varied depending on the test used, the group tested, and other factors.

The brief form of the Binet was determined by Terman and Merrill (1937) by omitting two of the six items at each age level, with a time saving of approximately 25 per cent. In contrast, the brief forms of the Wechsler Intelligence Scale for Children (WISC) have been established by independent studies arising from arbitrary selections of subtests. The time involved depends upon the number of subtests used, but can result in a time saving of 50 per cent or more.

A brief WISC has been defined by Schwartz and Levitt (1960) as one in which six or fewer subtests are used to calculate the full IQ. This follows the rule that time saved when fewer than five of the eleven subtests are omitted does not seem sufficient to justify the violation of the WISC standard administration.

Current studies of brief WISC's emphasize the correlation of the various combinations of subtests with the total number of subtests. The

best brief WISC's are considered to be those which correlate best with the full IQ. This approach seems to be a carry over from the Binet, where the omission of items in the brief form is based purely on their lesser discriminative value in predicting the total score. It ignores the potential value of serial subtesting. By selecting subtests purely on their statistical "weight" in determining the full scale IQ, other subtests which might provide valuable information about the child's approach to certain intellectural tasks may be omitted. When the net result is merely a very small increase in accuracy of measurement, the approach must be questioned.

Actually, brief forms are of most value when chosen to suit a particular purpose. While emphasis is placed on the overall IQ estimate, the brief WISC offers additional specific advantages. For example, it can give a rapid measure of school skills (Information, Arithmetic) verbal problem-solving, (Comprehension, Similarities), or visual motor problems (Picture Completion, Block Design, Coding). Selecting a brief form which gives some estimate of both verbal and performance skills, of course, gives a more rounded picture of the child.

Current studies of brief forms can be considered under two headings. One consists of thorough checking of one or more previously selected combinations, using specific populations, such as mentally retarded school children. The other involves the calculation of all possible combinations of subtests, usually consisting of from 2 to 6 combinations.

The published brief forms of the Wechsler-Bellevue served as the model for initial WISC brief froms (Herring, 1952). However, a crucial change from this random approach followed McNemar's (1950) insistence on the determination of brief forms by utilizing Wechsler's original standardi-

zation samples. Pointing out that "valid validities" could never be achieved by using test results from deviant populations, McNemar published formulas allowing for rapid calculation of best combinations. These formulas allowed Wechsler's standardization samples to be used as reference groups for computing correlations between brief forms and the full scale. (The intercorrelations among the subtests given in the manual were employed for this purpose.) Using this formula with the Wechsler-Bellevue, McNemar demonstrated that the resulting coefficients were high for the standardization group. Actually, they proved to be higher than originally reported (Howard, 1958).

In 1959, Bridges used this approach to calculate nomographs for computing the validity of WISC brief forms.

Also, in 1959, Geuting used the same formulas to compute results for all possible combinations of three and four subtests of the WISC, calculated for ages $7\frac{1}{2}$, $10\frac{1}{2}$, and $13\frac{1}{2}$, the ages for which correlation data is available. Later, Howard (undated) expanded this approach by combining every possible pair, trio, quartet, and quintet of subtests. Then, assuming that short or brief forms are most likely to be used for children not representative of the general population, he studied the best brief forms as applied to two small atypical samples. Accuracy seemed high in the cross-validation; the errors of prediction were found to be very similar to those of the standardization sample.

Three other studies used all combinations, but employed atypical samples. Enburg, et. al. (1961) reported all combinations of three, four and five subtests using a large sample of suspected emotionally disturbed children seen at a child guidance clinic. Schwartz and Levitt (1960) reported all possible combinations of two to six subtests

using a sample of mentally retarded school children, two-thirds of whom were Negro. Osborne and Allen (1962) reported all possible triads for a large sample of retarded school children.

Other studies of brief forms of the WISC consist of a few, often arbitrarily selected, combinations which have been applied to various groups, including normal school children (Gainer, 1962: Guyol et. al., undated), physically disabled (Wight and Sandry, 1962), emotionally disturbed (Nickols and Nickols, 1963; Simpson and Bridges, 1959; Yalowitz and Armstrong, 1955), and, most often, mentally retarded children in schools or in institutions (Carlton and Stacey, 1954; Finley and Thompson, 1958, etc.) These studies are relevant in that by referring to them psychologist is able to consider the adequacy of a specific combination of subtests for various subpopulations.

A potentially important criticism of brief testing was advanced by Ross (1959). The method of test selection involves a comparison of the prorated score based on the combination of subtests chosen with the total test score. However, the method of gathering this material is by utilizing the full test administered in standard order. In other words, each child has been given a standard test, not a brief test. Noting this, Sosulski (1961) administered the WISC to two groups of mentally retarded school children. The first group was administered a brief form (Information, Picture Arrangement, Picture Completion, Block Design, Coding) first, and the WISC then completed. The second group was given a standard WISC. For the two groups, correlations of the brief form with the total test were identical.

Criticizing the earlier, somewhat haphazard approach to brief testing, Ross (1959) further suggested that the most valid brief test

would be that most thoroughly evaluated: the complete verbal scale of the WISC. Certainly in a school setting there is much to recommend this approach. The correlation with the full scale is acceptable (.89 or better); the relationship to school success closely parallels findings with the Binet; and the total administration time is relatively short and predictable.

There are at present so many combinations reported in the literature that no one specific brief-form can be considered in preference to any other. Simpson and Bridges (1959) discovered a correlation of .87 between WISC full scale IQ's and short form IQ's based on the vocabulary and block design tests. Wight and Sandry (1962), using the same subtests, obtained a correlation of .91 with full scale IQ's. Enburg, Rowley, and Stone (1961), using short form combinations of three, four, and five subtests, found correlations with full scale IQ's ranging as high as .96. Correlations up to .94 were found by Schwartz and Levitt (1963) with short forms composed of all possible combinations of subtests. Yalowitz and Armstrong (1955) found correlations much lower than these -- from .55 to .61 -- using combinations of four and five subtests.

One rule of thumb has been advanced by Schwartz and Levitt (1960). They note that a correlation of .90 between the brief form and full scale would result in an estimated error of 8.6 scale score units. In other words, the IQ calculated from the brief test would be no more than 9 IQ points above or below the "true" (full scale) IQ in two-thirds of the cases. (This is similar to the reliability coefficient of .91 between the test and retest with the Binet.) Therefore a correlation in the lower .90's should be a reasonable baseline of allowable error in prediction.

Reviewing the studies of brief tests, several generalizations can be made. First, the most reliable estimates of intelligence from brief tests occur in the middle age range ($10\frac{1}{2}$ years). This is to be expected, since the WISC is generally most stable at this point. Second, the use of fewer than four subtests in a brief form results in a fairly low coefficient of reliability (.70 to .90), and the size of the resulting error of measurement must be considered carefully before such brief combinations are employed.

Perhaps the most meaningful criticism of the brief WISC with its eliminative procedures is that it results in the loss of important information regarding the child's functioning in various areas. Each examiner must seriously consider the significance of this loss as against the time to be saved by brief testing.

In addition, Mumpower (1964) points out that statistics can be misleading. He considers the fact that with a correlation as high as .90 only 81 per cent of the variance of short form IQ is attributable to the full scale IQ, leaving 19 per cent, or nearly one-fifth of the variance, unaccounted for. This leads one beyond the bare fact of a .90 correlation and to the question of the proximity of the relationship between the full scale IQ and the short form IQ. Thus, Mumpower feels that statistics must be supplemented with actual usage; if a hypothesis can survive both the theoretical test of statistics and the practical test of on-the-job usage, its verification is hardly questionable.

Mumpower presents a study in which the hypothesis is that a short form of the WISC can give results valid enough to substitute with a high degree of confidence for the whole test. He found that two distributions of IQ's, one based on the full scale and the other on the block design and vocabu-

lary, yielded a correlation of .95. In addition to this, however, a practical test of the usability of the short form was devised in which short form IQ's were used to classify individuals according to level of intellectual functioning (e.g., normal, educable retarded, custodial retarded, etc.). Fifty pairs of WISC IQ's were examined, one being the full scale IQ and the other an estimate based on vocabulary and block design subtests. When the pairs of classifications based on these IQ's examined, it was found that 22 per cent were not the same. For these persons, an estimate of IQ, based on the short form, would have led to the wrong classification in more than one-fifth of the cases.

These results are particularly pertinent to the valid use of personality tests in a clinical setting, where clinical classifications in terms of diagnostic labels lead to different therapeutic actions. In the particular study with which this paper is concerned, MMPI code types serve as classificatory titles and each code type is respectively associated with a particular diagnostic label. Thus, though correlations among individual scales of the short and long forms of the MMPI have proven to be fairly high (Kincannon, 1968), this is no guarantee, as seen with intelligence classifications in Mumpower's study, that correlations between paired clasifications, based on the long and short forms, will also be high. Yet, it is in the area of clinical classification that the MMPI is most often used, and thus it seems appropriate that the short form should be tested as to its strength in this area. Inaccuracies in classification could lead to the situation in which a person of average intelligence might be classified by the short form of the WISC as being mentally retarded, and likewise, where a short form of the MMPI would classify a normally adjusted individual as being psychotic. Following this, there would be inappropriate

recommendations and other misclassifications, which very often would prove unfortunate to the individual.

Mumpower employed a supplementary study using short form IQ's based on the Bender-Gestalt and Full Range Picture Vocabulary. It yielded similar results, with classification errors in 24 per cent, or nearly one-fourth, of the cases.

Mumpower concludes by saying that in any IQ there is a probability of error. What is especially pertinent in using the short form IQ is that there is usually an increase in this probability of error. In his studies this error rose to one in four or five cases.

Similar conclusions must be considered as related to classification errors based on a short form of the MMPI. Questions raised are: At what point does the error variance become more than one can accept or tolerate? How many psychologists will accept a procedure that is likely to be wrong in one out of three, four, or five cases? Does time saved compensate for the loss of validity? These are some of the questions which the present study will attempt to answer.

Levy (1968) presents a methodological review of short forms dealing mainly with the Wechsler tests. He concludes that the search for optimium short forms are based on a number of doubtful, if not untenable assumptions: (a) that subtests are equally reliable; (b) that subtests take equal time to administer and score; (c) that an independently administered short form will behave like the short form embedded in the full scale; (d) that shortening a test necessarily reduces reliability; and (e) that shortening a test necessarily reduces validity. (Holmes, Armstrong, Johnson, and Ries, 1965; Watson, 1966).

Levy suggests that only a limited range of alternatives to short forms as time saving devices have been investigated. For example, there is little cross-reference between short-form Wechsler tests and those studies exploring possible replacements for the same test. Shaw (1967) found a correlation of .83 between Wechsler full scale and Ravens Progressive Matrices; Benson (1963) showed a correlation of .86 between Stanford-Binet vocabulary and WAIS full scale. Trier (1958) found a correlation of .85 between WAIS and Rorschach protocols scored for "sophisticated words" by use of the Thorndike-Lorge word count. Such predictive values may prove to be comparable with those for conventional short forms when the spurious validities of the latter are corrected.

Other possible time-saving approaches are those of automated testing and scoring, the employment of specialist testers and scorers, and the use of sequential testing strategies. (Birch, 1955; Taylor, 1959; Wells and Pedrini, 1967).

Hunt, Klebanoff, Mensh, and Williams (1964) designed a study to test the validity, upon a large experimental population, of five previously used intelligence scales, and to devise some new ones for future use. In selecting their five scales, they kept in mind the extent of their previous usage in military and civilian practice, the size of the validity coefficients previously reported, and their general promise for clinical use. The following tests were selected: (1) the comprehension, vocabulary, and similarities (CVS) of the Wechsler-Bellevue scale; (2) the comprehension and arithmetic subtests (CA) of the Wechsler-Bellevue scale; (3) the picture arrangement and digit span subtests (PA-DS) of the Wechsler-Bellevue; (4) the Kent, 10-item, revised EGY; and (5) an abbreviated 15-item vocabulary test drawn from the vocabulary list on the Stanford-Binet, 1937 revision.

The main criteria used were the General Classification Test (GCT), Form III, and a short form of the Wechsler-Bellevue scale, consisting of five subtests and correlating .96 with the full scale.

Of the five abbreviated batteries used, the Kent showed the least agreement with the criteria, correlating only .50 with the Wechsler-Bellevue and .58 with the GCT.

The vocabulary test yielded the highest correlation with GCT, .80. Its correlation with the Wechsler was far, at .66.

All the Wechsler-Bellevue abbreviations showed good agreement with both criteria (from .91 to .70), except for a relatively poor correlation between the PA-DS scales and GCT (.52).

The most promising of these scales seems to be the CVS. It agrees .87 with the Wechsler-Bellevue criterion and .86 with the GCT. It has been designed for diagnostic potentiality since it offers a comparison between vocabulary score, which is relatively insensitive to psychopathology, and scores for comprehension and similarities, both of which are sensitive to pyschopathology.

The results of the study as a whole bear out the previous promises of abbreviated scales as adequate measures of intelligence. Yet, the authors failed to compare the tests as related to their practical classificatory utility, and as Mumpower has shown, this is often the fallacy of the short form. Though they may correlate highly as related to scores, or total IQ's, they may not be suitable to the prediction of intellectual classifications from which functional emanate. The same considerations must be evaluated in terms of personality tests and their ability to validly predict practical, clinical classifications.

Kramer and Francis (1965) report on errors in intelligence estimation with short forms of the Wechsler Adult Intelligence Scale, showing that in many cases such short forms may give seriously inaccurate results. In their study, 41 psychiatric patients of various diagnosis were given Doppelt's short form of the WAIS (arithmetic, vocabulary, block design, and digit span), and results correlated .94 with the full scale. IQ's were also estimated by prorating a sum of sub-scale scores using information, similarities, and block design (ISB). This triad correlated .89 with the full scale score.

Classification was next done according to the categories defined by Wechsler (1955): mental defective, borderline, dull normal, superior, and very superior. The misclassifications resulting from the short form estimates were in marked contrast to the high correlations obtained. The Doppelt misclassified 56 per cent; 15 cases were off by one category and eight by two. The ISB misclassified 71 per cent; 18 were off by one category, 10 by two, and one by three.

Thus, one is again faced with the need to guard against the fallacy of the short form; that is, its ability to yield high total score correlations while at the same time being unable to give comparable classifications from which appropriate clinical decisions emanate.

As McNemar (1950) has pointed out, the usefulness of all abbreviated intelligence scales depends upon the accuracy with which total IQ scores can be estimated and the ability of the short form to result in accurate clinical classifications. This involves taking into consideration the error of estimate in IQ points of the test combinations employed as well as the standard deviation of the full scale IQ. The confidence which an examiner can have in any abbreviated scale will then depend on the leeway which he will allow himself for the anticipatable error of prediction.

More important, however, as regards legitimate employment of a shortened intelligence scale, is the use to which the examiner intends to put his results. For example, if he merely wants an IQ for screening purposes, a triad combination of subtests may suffice. For anything beyond that, McNemar would not recommend short scales. His point of view is that an intelligence test should and can give the examiner much more than an IQ. A meaningful intelligence examination evaluates an individual's special as well as overall capacity, his strengths and weaknesses, and an indiction of how these contribute to his global functioning.

For these very reasons, however, a short form of a personality inventory such as the MMPI seems justified. By constructing a valid short form of the MMPI, one could obtain the necessary diagnosis or classification along with certain descriptive behavioral characteristics usually associated with each classification. At the same time, one would be allowed greater time to apply certain projective and more discrete methods of personality evaluation. Thus, one would have greater opportunity to apply both actuarial and projective, nomothetic and idiographic techniques.

As regards the construction of short tests of personality, much less has been done than in the area of intelligence. Borgatta (1964) has formulated two short personality tests, one being the Behavioral Self-Rating (BSR) and the other the S-ident form.

In relation to the former, Borgatta states that for a test of personality based on self-ratings, the accumulated evidence supports the view that such ratings have internal consistency within five differentiated content areas. The five areas are assertivemess, likeability, intelligence, emotionality, and responsibility. Within each of these areas, the examinee is presented with two, three, or four items on which he has to rate himself and the ratings within each domain are added.

Borgatta's evidence arises in a series of replicated studies ranging from small group research of social interaction to general surveys. Validity was indicated through prediction of parallel peer assessments in a multi-trait-multi-method matrix approach.

The use of the BSR form is proposed only for situations in which a very short test of personality can be useful. It can also be effectively to provide additional scores in more extensive personality testing.

Of course, as with all self-rating techniques, the possibility of falsification must be considered, but Borgatta cites evidence supporting the respondents' usual honesty when rating themselves.

Weider (1964) devised the Cornell Index for rapid psychiatric and psychosomatic evaluation of large numbers of persons in a variety of situations. The index consists of a series of questions referring to neuropsychiatric and psychosomatic symptoms which would serve as a standardized psychiatric history and a guide to the interview, and which, in addition, would statistically differentiate persons with serious personal and psychosomatic disturbances from the rest of the population. It was devised as an adjunct to the interview, rather than a substitute, unless the interview was impractical. This questionnaire, standardized for males only, consists of 101 items. The questions fall into two groups: those differentiating sharply between persons with personality disturbances (e.g., Does worrying continually get you down?) and those concerned with significant bodily symptoms (e.g., Do you usually have trouble in digesting food?) The questions are undisguised and often extreme (e.g., Are you a sleep walker?) They must be answered either "yes" or "no".

The authors of the index report that it has been effective in showing the presence of anxiety states, hypochonriasis, asocial trends,

convulsive disorders, migraine headache, asthma, peptic ulcers, and borderline clinical syndromes. It is to be noted that this inventory, unlike the Bernreuter (1935), the MMPI (Hathaway and McKinley, 1943), and others, does not provide separate scoring scales and norms for specific personality traits or disorders. Scores for the entire inventory are intended only to assist in distinguishing between those having serious personality or psychosomatic difficulties and those not having them. The scoring of the inventory is to be followed by an interview after which the diagnosis may be made.

The 101 questions have been classified under 10 categories ranging from "defects in adjustment expressed as feelings of fear and inadequacy" to "gastrointestinal psychosomatic symptoms".

The efficiency of this index in identifying poor personality risks is great enough to warrant its use for the purpose stated by its authors, especially in situations where large numbers of persons must be rapidly screened. In situations where such pressure does not exist, the index is still useful as a basis for and guide to subsequent interviews and to psychotherapy. As with many short personality tests, the Cornell was developed as a result of wartime pressures, and gives, at some levels, percentages of false positives and negatives. It is now widely recognized that the brief psychiatric screening interviews during World War II were not optimally conducted; and the psychiatric interviewers, in many instances, were inadequately prepared for their task.

Several other short tests of personality have been developed, their utility depending on the purposes of testing, subjects used, and other relevant variables. Some examples are the Bernreuter Personality Inventory which has shown a split-half reliability of .78 to .92 and has been validated

against other inventories, differentiations of extreme groups, and low intercorrelations between part scores. Another is the Security-Insecurity Inventory (Maslow, 1945), with retest reliability of .85 and its validity based on other inventories, self-estimates of subjects, known groups, systematic analysis of syndromes, and security-insecurity observations.

Thus, one is able to get an overview of the part short test forms have played in clinical psychology from their basic inception during World War II. It is no doubt that they have their limitations, but they also have their usefulness in a great variety of situations. As with all tests, the usefulness of short forms depends in the end on the ability of the examiner to understand the principles of their construction and their limitations, and his ability to combine them with other insightful behavioral observations.

A most fundamental criticism of short test forms as based on published research to date is as follows. It is said that the main purpose of a short form is to save time while retaining maximum validity. Maximum (internal) validity may be achieved by retaining the original full scale test. Maximum time may be saved by not giving the test at all. These extremes depict the range of permissible solutions under the present specifications of the problem. Administration time has received little attention and there appear to be no rules about what level of short form-long form correlation is acceptable. In order to judge how much validity may be sacrificed, an equation must be determined which defines a utility, or cost function for the relationship between validity lost and time saved. However, no amount of statistical data, no matter how sophisticated, can develop such an equation.

A practice has developed which suggests that about half the testing time must be saved. However, the justification for this must again reside with the decision-theoretic concept of utility. The 17-item MMPI which the present study investigates would result in a savings of sixty to eighty per cent of the testing time, and such a savings is certainly deemed significant.

A further implication is that the nature of the decision which is to be made on the basis of the test scores must be identified. Few reports identify this decision. The present study is based on the ability of the short MMPI form to yield the same types of Marks and Seeman (1963) diagnostic classifications as the standard MMPI form.

Thus, not only does the present study investigate short form-long form correlations, but specifies a significant degree of time-to-be-saved using the short form as well as the nature of the decisions to be used as the criterion.

The point is that the present investigation should allow the individual clinician to judge for himself whether the time saved using the Mini-Mult is worth the validity sacrificed as based on his particular needs.

B. The MMPI and Related Topics

Research leading to the publication of the MMPI was initiated in 1939 by Hathaway and McKinley, the impetus coming in large part out of practical need. No available personality inventory had much value for application in a routine adult psychiatric setting.

From its start, an attempt was made to overcome the known defects of personality inventories in the construction of the MMPI. First, items were chosen to be intelligible at low reading ability levels. Secondly, items were stated in the first person in an attempt to produce more self-

reference in the examinee. Thirdly, all scoring was dependent on simple item weights of zero or one, and little skill was required in producing the complete profile. Fourthly, items were deliberately varied in content, going far beyond clear face validity. Fifth, in hope of breaking the monotony of true responses always being associated with bad things, there was an effort to find or state items for which an undesirable implication was associated with false response. Sixth, to check further upon the subject's reading ability and to provide a measure of the strength of the tendency to be overly candid, a special scale called "F" was provided. This was arbitrarily composed of items having very infrequent endorsement among the normalizing sample of subjects. Seventh, for measures of too strong a tendency to say good things, the "L" scale was introduced. The items express desirable social facts, but the candid subject usually cannot endorse them. Eighth, normative data were obtained from ordinary middle-aged persons more like those who might be tested in the practical situations of clinical work than the normative samples that most inventories had used. And, ninth, all items were validated by reference to empirical frequency differences between the general normal group and various clinically defined deviant groups characterized by internationally known and used categorical terms. The variables were tied to schizophrenia, depression, paranoia, hypomania, and other routinely estimated clinical cases.

MMPI scales were made up entirely of items selected empirically from among a large and heterogenous pool. Scale selection was based upon the actual response frequency differences between clinical criterion and normal groups. As a result of this empirical item selection, many subtle items were discovered. An additional outcome of the method was that resultant scales appeared more heterogenous in item content. An example would be scale three, derived from criterion cases of conversion hysteria. Opposed

to current psychometric theory which required internal consistency in a scale, there are at least two strong factors in scale three. One enumicates the existence of physical symptoms, and the other the denial of mental weakness. These contrasting factors combine to produce the higher scores of the scale.

The MMPI was originally intended as an objective aid in the common psychiatric case work-up of adult patients and as a method for determining the severity of the conditions. In addition, the inventory was expected to serve as an objective estimate of psychotherapeutic effect and other changes in the severity of conditions over time. For all these tasks, Hathaway (1965) states the MMPI has attained only moderate success. Yet, considering the contradictory definitions of personality and the tenuousness of our classification system, it has done rather well. Approximately 60 per cent to 70 per cent of disturbed adults will produce profiles judged to be representative of the type and severity of their disturbance. Supposedly normal persons will also show such profiles in 10 per cent to 20 per cent of the cases. Little work has been done to explain these false positives, yet Hathaway (1965) comments that many of them would be considered rather maladjusted if they were examined in a clinical setting. He feels that there is probably some factor allied to self-dependence or determined independence that prevents the symptoms endorsed by this group from causing as much handicap as is observed among persons who admit to needing professional help. The measure on the MMPI which has come nearest to meeting the requirements of this "control" variable is the "K" scale.

The popularity of the MMPI appears to be based not only upon its unique empirical standardization, but also on the general structure of the test. It contains provisions for some control over undesirable response

patterns, detection of invalid records such as those from nonreaders, the use of simple language, the simplicity of administration and scoring, and the general clinical familiarity of the profile variables. It has come to be widely used in many applications not closely related to its original beginnings, in that the variables that are known in severe patterns of mental illness are also, in less severity, important in the evaluation of normal individuals, and these variables tend to show greater intensity preceding more overt personality breakdown.

The MMPI employed a unique device to test extended validity. This consisted of combing a coding of the test profiles with collections of corresponding case histories of persons who have been studied and described. Coding is a number system providing a class number for each profile shape. When profiles having similar deviant scores are combined under certain code designations, one can take an obtained profile and look up the case histories of other persons who received the same code types. Collections of case histories used in this manner are generally termed atlases, and this is the method employed by Marks and Seeman (1963), whose code types are being used as the principal validating criteria in the present study.

The code type classifications of Marks and Seeman are more intricate and discreet than those earlier developed by authors such as Hathaway and Meehl, thus providing a stern test for the classification powers of the Mini-Mult.

Since the material of the case histories is not contaminated by knowledge of the test results, the validity derived from specific generalities among the case histories appears to be more completely empirical than that coming from test manuals where the meanings of the scales are usually described by someone who has depended upon his individual experience to tell what the scale means.

In ever greater degrees, empirically derived personality inventories are coming to dominate the clinical testing field, and many psychologists are replacing nosological labels of mental illness with various profile code types. Though in agreement with many professions who seek to abandon classifications based on descriptions of mental illness, the author feels that until a better system is developed, it would seem that an empirical classification system as used in MMPI profile and code type techniques would serve to somewhat eliminate the variablility and sources of error which our present classification system propagates. As long as classifications must exist, and it may be that practical necessities will always require them, they should be performed in the most direct and consistent manner possible. Neither a code type nor a descriptive title can ever totally represent the complexity and uniqueness of the individual personality, but it can, if accurate, contribute important orienting knowledge to the investigator in a quicker and more efficient manner than other methods. Subsequently, he can give more time to idiographic and personal aims..

C. Short Forms of the MMPI

Holzberg and Alessi (1949) comment that although a favorable attitude toward the MMPI is not shared by all investigators, and certain of its scales appear to have greater validity than others, it still remains one of the most useful nonprojective personality tests that can be used in the clinical setting.

At the time these authors conducted their experiment, the MMPI consisted of 550 items, only 351 of which were actually used in scoring. The 199 additional items constituted a reservoir from which the authors

of the MMPI planned to construct additional scales for personality testing. Holzberg and Alessi held that the use of these additional items constituted a drain on much needed testing time.

Ferguson (1946) removed the cards not used in scoring because he found no marked difference in results by so doing, but he provided no reliability data. Gough (1946), on the other hand, stated:

> "It is questionable whether or not these 199 cards should be deleted in order to save time in administering and scoring the test, as is sometimes done. All of the questions contribute towards the context, or the "question-environment", about which the test was standardized. The influence of these 199 questions on subjects responses to the 351 scored items is an unknown, but important factor, and until we know something of the effects of this interaction we have no accurate idea of the validity of the norms when the test is shortened in this way." (p. 36)

Holzberg and Alessi's study investigated the reliability of reducing the MMPI to the items actually used in testing as compared to the whole inventory.

Thirty psychiatric admissions were divided into two groups of 15 each, and administered the long and short forms of the MMPI on consecutive days and in counterbalanced order. Correlations between raw scores and mean weighted scores on each scale were calculated as were the significance of differences between them.

Correlations between the scales of the long and short forms ranged from .927 to .519. These compare favorably to the reliability coefficients (test-retest) found in the original research concerning the MMPI, which ranged from .470 to .830. The authors state: "When the correlations of the present study are compared with those reported by the authors in their manual, on only three scales (1, 4, and 9) do the correlation coefficients in the former fall below the lowest correlation quoted by the latter and two fall above the highest." (p. 290)

The average administration and scoring time for the long form was 103 minutes and for the short 67 minutes. This represents a saving of one-third the time required to administer and score the long form.

Thus, authors conclude that although the range of correlation coefficients between the scales of the long and short forms is greater than that reported by the authors of the inventory in their manual, they compare favorably with the correlation coefficients published for the specific scales.

In addition, though significant statistical differences were reported for half the scales, mean weighted scores for each scale revealed little significant clinical differences. This is considered important because the profile results as determined on the MMPI are those which give the test its clinical usefulness.

Since no general lowering of scale scores was noted on the short form, no correction statistics were deemed necessary in using it.

Gordon W. Olson (1954) noted that previous studies concerned with shortening the MMPI sought to remove the unscored or "sleeper" items, regardless of item position within the test. He concludes that the results of this research have generally shown poor reliability between the standard and short forms. Also, he feels that most MMPI users agree that the number of items should not be reduced because of the detriment to future research with this instrument, and many items not scored on the original scales are now scored for scales recently developed. He recognizes that wholesale application of the short form would be imprudent; however, feels that a more valid abbreviated form should be available when the need for such arises.

Analysis of the scoring keys of the group form MMPI reveals that only 22 items are scored beyond Item #420. Two of these are "K" items

and 20 are "Si" items. Olson reasons that if the test is stopped at Item #420, very little information can be lost, although results indicate a savings of 26 per cent of the testing time. This is done without disturbing the original item arrangement. The problem considered in his study is the validity of proration or other methods of extrapolation of the scores obtained on the first 420 items for Scales "K" and Si".

The first 50 group form MMPI profiles alphabetically encountered were drawn from the files of Hastings State Hospital. In addition, 85 normal profiles were gathered and from each of these, scores for the "Si" and "K" scales obtained. Each profile was also scored for the number of significant items beyond 420 which contributed to the total scores on "K" and "Si". The latter score was subtracted from the total score and the result considered to be the score which would have been obtained on these scales on the short form. From these data, a table of proration was developed for the "Si" scale and a method of extrapolation for the "K" scale by which one point would be added to the raw "K" score when it equalled or exceeded 12 on the short form.

Olson concluded that this 420 item group form, which eliminated only two "K" items and 20 "Si" items, yet saved 26 per cent of the testing time, was the most reliable and valid abbreviated group form of the MMPI at that time. The "K" scale correction was found to be accurate within one raw score point in 97 per cent of the cross-validation group, and the "Si" scale correction within five points among 97 per cent of the entire sample of 157 hospitalized and nonhospitalized persons. "The results indicate rather clearly that very little change in absolute score, or in the configuration of the profiles as a whole, will be produced by the use of this procedure." (p. 388)

Gordon L. MacDonald (1952) states that while shortened forms of the MMPI are not recommended for general use, there appears to be no available data on the comparison of both the individual and group forms of the MMPI shortened to 356 scorable items. The purpose of his study was to compare both forms of the MMPI shortened to these scorable items.

The group form of the MMPI used in this study had the second entry of the sixteen duplicated items crossed out, a red line drawn after Item 365, and the "K" scale items past this point checked with a red pencil. Cards of the individual form were paired with items on the group form so that each form contained the same 356 items.

There was a one week interval between test and retest, with one group taking the individual form first and the other the group form first.

The results indicated that the values of coefficients between scales of the long and short forms are such as to indicate a questionable validity. The validity was effected by the scoring method, with T-score coefficients being lower than those obtained from raw score comparisons. Results showed the group form to be more valid than the individual form. Test-retest coefficients also indicated questionable reliability.

MacDonald adds that the questionable validity and reliability of these two shortened forms needs consideration form aspects other than statistical data. The population used (normal high school graduates) does not cover the entire area of the curve of normal distribution. As a result, the data analysis is adversely affected. In addition, normal scores as obtained in this study cover a very wide range, and such a dispersion of scores results in differences arising within the normal range

which may well be significant. Other authors have noted that studies of the MMPI with college students are not always trustworthy.

Yet, in summarizing, MacDonald feels that the data from his study reveal discrepancies of such a nature as to raise questions of the validity and reliability of the shortened forms used. He again adds that the population selected is in part responsible for these resulting discrepancies, as is the wide range of normal scores obtained on the various scales. "However, for two forms of a test consisting of identical items the results leave much to be desired." (p. 311)

MacDonald (1952) conducted a follow-up study in which he investigated the effects of time interval between test and retest on short forms of the MMPI as well as the effect of item arrangement on the individual form of the inventory. He hypothesized that either, or both, of these factors might have been responsible for the low statistical values obtained for validity and reliability in his previously conducted study.

Four groups of subjects were used consisting of: (1) a mixed population of college students and student nurses composed of 50 males and 67 females; (2) a subgroup of 24 student nurses form the latter population; (3) a group of 10 student nurses, and (4) a control group of 25 student nurses.

The group and individual forms of the MMPI were shortened by eliminating all the unscored items including the sixteen duplicated items on the group form. The items on the individual form were arranged in identical order with those on the group form. They were arranged in this same order after each scoring.

The control group took both test forms at one session, the forms being alternated in presentation. The items on the individual form were

rearranged in the same order as the group form after being scored. The mixed population (N:117) and the subgroup (N:24) had a one week interval between tests, with the items on the individual form being randomized for each presentation. The group of 10 subjects took both test forms at a single sitting with the individual form items being randomized.

Results indicated that though the control group shows less discrepancy in performance from one form to the other than did the mixed population in MacDonald's earlier study, the results of this comparison of two forms composed of identical items arranged in identical order and administered at the same session leave much to be desired in a test to be used in evaluating personality.

Also, the comparison of the control group with other groups shows that the improvement in test performance of the control group is statistically insignificant.

MacDonald concludes that: "These studies show that item arrangement on the individual form and the time interval between test and retest did not effect performance significantly. The discrepancies of the earlier study cannot be attributed to these factors." (p. 410)

Kincannon (1968) constructed the Mini-Mult (MM), which is the short form being evaluated in the present study. He feels that there would be much clinical and research utility for an abbreviated MMPI form. In spite of its usefulness, no valid abbreviation of the MMPI had been developed prior to his experimentation. He advances that the holding of certain assumptions has deterred the appropriate research. The most outstanding of these assumptions was that a longer form would be statistically more reliable and thus potentially more valid than a shorter one. This conviction is statistically expressed in the Spearman-Brown formula. Yet,

Kincannon points out that this formula is based on two further assumptions which make it inappropriate to criticisms concerning a systematized shortening of the MMPI scales. The first assumption is that the formula assumes that all items within a scale are equivalent. This has been shown to be false by many experimenters, including Gocka and Mees (1960) and Comrey and Marggraff (1958), who have demonstrated that the scales are quite heterogenous. Secondly, the formula assumes that any elimination of items would be made randomly, yet this need not be so. An item reduction can follow a systemetized plan, and the "MM" employs just such a plan in using the factor-analytic data of the Comrey (1957) studies.

Kincannon concludes: "Since the assumptions justifying the use of the Spearman-Brown formula either are or can be rendered inapplicable, there is no reason to feel that the reliability and consequently the validity of an abbreviated instrument would be as seriously attenuated as the formula would predict." (p. 319)

The "MM" was derived by clustering the items within each scale, with the cluster formations being based on the aforementioned Comrey data. Comrey felt that in view of the marked overlapping variance between scales of the MMPI and the apparent lack of homogeneity within scales, it would seem advantageous to know something about the factorial content of the items themselves. This knowledge would be helpful in regrouping present items and in suggesting areas where additional items might be developed. Comrey adds that research along these areas had previously been forestalled because of the tremendous efforts involved in carrying out many factor analyses, using dozens of variables in each, when hand computing methods must be employed. However, he developed programs for carrying out these analyses by electronic computer, thus making it possible to undertake the considerable job of analyzing the items of the abnormal scales used on the

MMPI. Comrey accordingly analyzed each of the clinical and validity scales according to his methodology, beginning with the Hypochondriasis scale. He omitted the "Mf" and "Si" scales because these scales are homogeneous in item content, that is, the items on these scales do not overlap with items on the other scales and were thus not appropriate to his programmed factor-analytic techniques.

A total of 360 cases were used for each MMPI scale analysis. They were composed of 85 male hospital patients of random psychiatric diagnosis, 82 female hospital patients of random psychiatric diagnosis, 80 subjects who had sought psychological help but were not hospitalized at the time, and 103 normals.

All the MMPI analyses were based on the uncorrected phicoefficient. A centroid factor analysis was carried out, for example, with the 33 items of the MMPI Hypochondriasis (Hs) scale. Added were the variables of age, sex, and hospitalization.

It was found that the major factor in the "Hs" scale is certainly "Factor 1" of Comrey's analysis which he termed "poor physical health". This factor had substantial factor loadings on over half the items contained in the scale. The only items with loadings of less than .3 on this factor were 7, 13, 23, 29, 43, 63, 72, 108, 114, 125, 130, 155, 161, 188, 273, and 274. Most of these items are the ones which define the remaining factors isolated on the "Hs" scale. Thus, a revised and more pure scale might be derived employing the items having a loading of .3 or more on this "poor physical health" factor. Though items contained in this population also are included in other factors measured by the "Hs" scale (e.g. digestive difficulties, bad eyesight, etc.), the degree of homogeneity in the revised scale would be much greater than that of the original "Hs"

scale. Therefore, "health concern" might be a better title for this scale than "hypochondriasis". The conclusion is that something approaching a general factor seems very reasonable in view of the similarity of so many of the items and the tendence for intercorrelations between them (in terms of "yes" responses) to be substantial.

In the "Hs" scale eight major factors were identified and certain isolated clusters of items associated with each factor, the broadest and most general factor being, as explained, "poor physical health". Examples of other factors and representative item clusters were "bad eyesight", "digestive difficulties", "lung damage", "poor bowel function", "hypochondriasis", "sinusitis", and "hospitalization".

In the construction of the MM, from each cluster or aggregate of items (i.e., those having a phi coefficient greater than or equal to .3 with reference to the other items within the cluster) were selected a number of items to proportionately represent each cluster. Thus, the greatest proportion of items selected for the "Hs" scale on the MM would come from the factor isolated in the Comrey data called "poor physical health". In addition, the items scored on the greatest number of clinical and validity scales were the ones usually chosen for the MM.

The same method of item selection was applied to each clinical and validity scale excluding the "Mf" and "Si" scales. As a result, the item pool for all scales was reduced from 383 to 71 items. This group of 71 items was entitled the "MM".

The experiment conducted by Kincannon involved three types of comparison. The first consisted of the comparison of the MM and standard MMPI on 50 male and 50 female unselected recent admissions to the psychiatric service of a city-county general hospital. Product-moment correlations betw een

the two sets of raw scores were calculated from the single answer sheet, and ranged from .80 to .93.

A second comparison involved 25 male and 25 female consecutive admissions to the local community mental health center. Product-moment correlations obtained were very similar to those obtained from the inpatient group, ranging from .70 to .96.

The third comparison investigated the functioning of the MM in conditions as similar as possible to the clinical ones under which it would be used. Thirty male and 30 female new admissions to the acute psychiatric service of a hospital were used as subjects. Upon entrance, each completed a standard MMPI as a routine admission procedure. Each was then asked to participate in a research project in which he was requested to complete a retest of the standard MMPI and also the MM. These three test situations were completed on three consecutive days, and the sequence varied so that the MM and retest alternated between the second and third positions in the sequence.

Considering first the means and standard deviations, the latter for the MM was smaller than for the comparable standard administration, with this restricted variance most marked for scales "F" and "Ma". This leads to the conclusion that the MM underestimates extreme elevations for these scales. No statistically significant differences appeared between the scaled means for each scale on the MM and standard form except for Scales "F", "Ma", and "Hs". The differences for these first two were attributed to their limited variance, while the differences on the "Hs" scale were attributed to sampling error. Correlations ranged from .45 on the "F" scale to .88 on the "Pt" scale, with a mean correlation of .75.

In addition, the loss in reliability was less for each scale than would have been predicted by the Spearman-Brown formula. The MM scales, which ranged from one-fourth to one-half of the length of the standard comparable scales, suffered an average loss in reliability of 9 per cent. The Spearman-Brown formula would have predicted a 28 per cent loss.

A crude estimate of the ability of the MM to predict the standard administration (S1) scale scores showed that the short form averaged only a 14 per cent loss in correspondence, as compared with a 28 per cent loss based on the Spearman-Brown formula.

However, Mumpower, Silverstein, and others have argued that short-to-long form correlations underestimate the classification error rate of the brief forms. Thus, some comparison of the decisions based on the two forms should be made. Two attempts were made to test comparisons of this kind. In the first, K-corrected profiles were plotted on standard profile sheets for the "S1", the second standard administration (S2), and the MM for each subject included in the third comparability study. Three-point code types determined from these administrations were then compared. The average loss in code type correspondence using the MM was 8 per cent. This result is important for the present study, but the classification system to be used is based on a complete profile configuration and is much more systematized and intricate than a simple three-point elevation code.

In a second analysis, experienced clinicians were presented with the "S1" profile and also, with the "S2" or the MM profile. This was accomplished without their knowledge and is an alternate pattern. They were then asked to rate, on an 11 point interval scale, the degree to which their interpretations of the two profiles would overlap. Results indicated that the mean loss in correspondence attributable to the use of the short form

would be about 14 per cent, which is consistent with the correlational estimate found previously in the study.

Kincannon states: "When no other comparable psychometric testing is available, it seems likely that the amount of error introduced through the use of the Mini-Mult would be tolerable." (p. 323) He feels that too extreme conservatism and a lack of understanding of the assumptions underlying the Spearman-Brown formula have served to suppress the development of brief clinical techniques.

In answer to the objection that the short form results in classification errors, Kincannon notes that critics have tended to assume that a test score (e.g., the long form score) is a true score. Thus, all error-variance in the decision making process is attributed to the short form. Yet, the long form itself has error variance, as a retest conducted in the third comparability study showed. "Certainly, the results of this investigation would have been less encouraging had not a retest been introduced as a control." (p. 323)

Kincannon also presents data implying that factor-analytic methods may not be the most appropriate mathematical techniques to use when making nosological inferences. For example, Shure and Rogers (1965) undertook a study to explore the possibility that the factor analysis of scales embodying item overlap, such as the MMPI, may be a cause of concern instead of reassurance and the findings of factor stability may imply the existence of a methodological artifact associated with item overlap. To test this, the MMPI inter-scale common-element correlations were factor analyzed. Three factors were extracted and compared to normal MMPI factorial results. Two of these factors proved to be highly similar to the neurotic triad and psychotic triad-tetrad factors found in four factor analysis of

original scale scores (including overlap and non-overlap items). Furthermore, these two factors don't appear in a factor analysis of truncated MMPI scale scores where item overlap is eliminated. Since the overlap factors are based solely on the built-in correlations of overlap items, these results open to question the validity of the reported, factored, personality variables. Cross-study factor stability may be erroneously exaggerated by item-overlap artifacts rather than reflecting basic personality factors. Thus, the need for continued research on the effect of item overlap on factorial studies seems warranted.

Gocka and Mees (1960) factor analytic studies resulted in three MMPI factor scales. However, when compared with the standard clinical scales, it was found that the "Hy", "Pd", "Mf", and "Pa" scales had an extremely low proportion of variance accounted for by the three factorial predictors. Thus, to do a substantial job of replacing the clinical scales, at least one or two additional factor scales would be necessary. The conclusion is that most of the clinical scales not well predicted have a multidimensional complexity not accounted for completely by the three factor scales discovered.

Such considerations are particularly important when using a configurational profile code, such as that of Marks and Seeman, in that the error variance resulting from them might be accentuated.

The present author (Skovron, 1969) conducted a study which compared with the Mini-Mult with the MMPI in relation to the profile analysis system of Marks and Seeman. The study was particularly aimed at testing contentions of those such as Mumpower and Silverstein who have criticized abbreviated tests due to the fact that short-to-long form correlations underestimate the classification error rates of the shortened forms.

A total of 100 MMPI's was drawn from the files of Dayton State Hospital. Each test was scored according to standard scoring procedures and also according to templates developed to score the MM. The result was graph consisting of profiles from both the MMPI and the MM. The two profiles were then compared in relation to 11 Marks and Seeman profile configurations and a category 12, which signified a nonfit according to one of the aforementioned 11 codes. Percentages and correlations were carried out to test the ability of the MM to predict these Marks and Seeman code types as compared with the standard MMPI.

No significant correlations between the MMPI and the MM were obtained. However, several reasons were advanced to explain this outcome. These reasons tended to show that statistics told only a part of the story in relation to the meaningfulness of the study. The major correlation (.537) did approach significance, and percentage factors indicated that the MM is not as useless clinically as bare statistics would warrant.

The basic significance of the study, then, was not derived solely from the fact that the correlations of the MM with the MMPI proved insignificant. More important was that the short form sufferred weaknesses when used to make clinical decisions over and above what one might expect as based on the correlations obtained by Kincannon. The study also indicated weaknesses mainly resided, and what might be done to correct them. Thus, the MM was not proven to be clinically useless, but, as based on appropriate future modifications, to be a potentially valuable clinical tool. For example, it was found that the variability on scales 7 (Pt) and 8 (Sc) of the MM were probably responsible for a large majority of the short-form misclassifications. Also, certain validity scale configurations indicative

of probable misclassifications by the MM than others, and certain diagnotic classifications (mainly neurotic) could be accepted with more confidence than certain psychotic ones.

Accordingly, the present study is aimed at a revalidiation of the MM, again using the Marks and Seeman criteria. In addition, corrective adjustments will be proposed, as based on both the 1969 data and the present study, which will hopefully raise the correlation between the MM and MMPI to a significant level.

D. The Profile Analyses of Marks and Seeman

The procedure employed by Marks and Seeman in the construction of their atlas employs a contingency method similar to that of Halbower (1955), Meehl (1959), and Meehl and Dahlstrom. It relies on the researcher's experience with the MMPI, knowledge of scale reliability over time, and knowledge of frequencies of single and multiple scale high points. Of available methods of profile analysis, evidence suggests that this method is probably the most promising (Meehl and Dahlstrom 1960).

The rather complicated procedure used by Marks and Seeman can be summarized as follows:

a. Tabulation was made of high point frequencies of all MMPI profiles for all patients at the Department of Psychiatry of the University of Kansas Medical Center over a one-year period (N= 165 women, 83 men).

b. Grouping of profiles was made on the basis of 2 or 3 digit high point codes, irrespective of sex.

c. Nine preliminary code types were identified with a minimum requirement of 25 patients per type.

d. Inspection of all profiles for "goodness of fit" in grouping was made and further specifying profile criteria added. For example, for the "2-3-1" code, Scales 2, 3, and 1 must be above T-score 70, Scale 2 minus Scale 1 must be greater than 5 T-score points, etc.

e. Computation of difference scores and other criteria were made (e.g., Scales (7+8) - Scales (1+2) might equal one quantity for one particular diagnostic group and a different quantity for another, etc.)

f. Additional refinement of specification rules was undertaken on the basis of "Step d" above.

g. The testing of the newly refined specification rules on patient populations for the following year was carried on. (N=257 women, 130 men)

h. Seven additional code types were identified.

i. Continued revision and refinement of the rules was undertaken (e.g., for the 2 - 3 - 1 code type, Scale 7 greater than Scale 8 or Scale 3 minus Scale 7 less than 5 T-score points).

j. Testing of the most recently refined specification rules on a subsequent 2-year population was carried out (N=556 women, 270 men).

As a result of these procedures, 16 profile code types were devised which collectively accounted for 80 per cent of the psychiatric adult patients encountered in the major psychiatric setting in which Marks and Seeman worked.

However, the authors did not stop here. They added to the usefulness of their system by correlating with each particular code type independently accumulated IQ statements, case history information and other psychometric data. Thus, a particular code type provides not only an empirically determined diagnosis, but also were more statistically related descriptive data concerning prognosis, average length of hospital stay, scores on the tests, etc.

The Marks and Seeman system as a whole provides valuable, empirically determined information over and above diagnostic classification per se. Likewise, the care with which the rules depicting each code type were derived provides a stringent test of the validity of the MM as compared to the MMPI.

CHAPTER IV

EXPERIMENTAL PROCEDURE

A specially designed set of scoring templates (which can be obtained upon request from the author) were prepared to score the MM_1. Utilizing such templates, the MM_1 was scored and profiled on the same graph as the standard form of the MMPI for 100 standard MMPI forms randomly selected from the files of Dayton State Mental Hospital. As a result, a graph was obtained which contained a profile based on the MM_1 and a profile based on the MMPI. (Appendix C offers a specific example of this process). These two profiles were then compared with each other according to their agreement on 11 separate code type classifications (Appendix B).

More specifically, each of the eleven separate criteria are classifications involving anywhere from 8 to 10 rules which a specific profile must fulfill if it is to fit that particular classification. A particular profile is evaluated as to how many rules on each of the 11 separate critera it met. Thus, for example, for a particular individual test, the MMPI might meet 7 rules on code type one, 5 rules on code type two, etc. The MM_1, for the same individual, might fulfill 6 rules on code type one, 3 rules on code type two, etc.

Each individual test, one based on the MMPI and one on the MM, were compared with each other as related to each of the 11 criteria used (Appendix A). These comparisons were statistically represented via the Pearson Product-Moment Correlation Coefficient such that one ended up with 11 separate correlation coefficients. Each of these 11 represented the correlation between the MMPI and the MM_1 on each of the 11 criteria utilized. For example, as based on the 100 cases utilized over this first part of the study, the MMPI and MM_1 might yield a correlation of .57 on code type one, .45 on code type two, etc.

As based on the results obtained over this first part of the study and those obtained by the author in his 1969 study, a correction factor was devised for the MM_1. The addition of this correction factor to the MM_1 resulted in the tool utilized over the second half of the present study and termed the MM_2.

One hundred more MMPI standard profiles were randomly selected from the files of Dayton State Hospital, and the MMPI and MM_2, compared with each other according to procedures identical to those explained for the first part of this study. As a result, one ended up with eleven additional correlation coefficients, each representing the correlation between the MMPI and MM_2 on each of the 11 separate criteria.

The final analysis involved a test of the significance of the difference between correlation coefficients of the MM_1 and MM_2 with the standard MMPI on each of the 11 separate criteria utilized. Thus, one ended up with 11 separate difference scores and tests as to whether such scores were statistically significant.

It was anticipated that with the addition of a correction factor, there would be a significantly higher correlation between the MMPI and MM_2 on each of the 11 separate criteria than that obtained between the MMPI and MM_1 on the same criteria.

Subjects

Two sets of 100 standard MMPI forms each were drawn randomly from the files of Dayton State Mental Hospital. This randomization was accomplished via drawing an equal number of profiles from each file as based on alphabetic designation. For example, 8 forms were selected from the file containing all names beginning with "A", 8 from the file containing "B's", etc.

All 200 profiles were selected on the same day from a population of psychiatric patients who had been admitted to the hospital within the previous years time.

Both male and female profiles were selected, with the ages ranging from twenty to fifty-five.

An additional criteria was that each patient had completed at least the first 400 items of the inventory.

Dayton State Hospital is a residential and outpatient treatment facility receiving a wide variety of psychiatric clientele, including the neurotic, psychotic, and character disorder types.

With the aforementioned sampling characteristics in mind, it is obvious that the results of the present study are applicable to a select range of patients. Specifically, such are composed of people from 20 to 55 who have been admitted to a psychiatric, inpatient facility. To generalize the results to a normal population, to specifically outpatient populations, to adolescents, etc., would not be justified. However, these other populations certainly offer promising research potential.

CHAPTER V

RESULTS

The major statistical treatment for the present study was based on the Pearson Product-Moment Correlation Coefficients obtained between 100 MM_1's and corresponding MMPI's as compared with those obtained between 100 MM_2's and corresponding MMPI's. The eleven Marks and Seeman categories listed in Appendix A were used as the criteria. The particular scores and process used to calculate the correlations were explained in the experimental procedure section of this paper. As explained earlier, the MM_2 is the revised MM_1 following the addition of a correction factor.

The following table depicts the correlation coefficients of the MM_1 and the MM_2 respectively with their standard MMPI forms as well as the significance of the difference between the coefficients of these two short forms on each of the 11 criteria utilized (Appendix A).

TABLE 1

Pearson Product-Moment Correlation Coefficients
of the MM_1 and MM_2
With Their Respective Standard MMPI Forms

Code Type	r_1 of MM_1 With MMPI	r_2 of MM_2 With MMPI	Significance of Difference Between r_1 and r_2 in Terms of Z-Scores
1	.7131	.7523	0.59
2	.5520	.5743	0.24
3	.5456	.6336	1.64
4	.6167	.7129	1.23
5	.2787	.5636	2.48 +
6	.3264	.4085	0.66
7	.3283	.6256	2.76 ++
8	.4623	.6103	1.46
9	.5593	.5376	0.21
10	.5268	.6196	0.94
11	.6041	.6775	0.82

+=p < .05 ++=p < .01

Tables 2 and 3 present the means and standard deviation for the data presented in Table 1. The means refer to the average number of rules the short form and long form fulfilled on each of the eleven criteria code types (Appendix A). For example, on Code Type 1, the mean number of rules fulfilled by the MMPI was 3.49. The mean number of rules fulfilled by the MM_1 was 3.66. In addition, the standard deviations for the MMPI and MM_1 on Code Type 1 were 2.19 and 2.02 respectively.

TABLE 2 (N=100)

Means and Standard Deviations
of MMPI and MM_1
As Related to the Average Number of Criteria Rules Fulfilled

Code Type	$\bar{x}$ for MMPI	$\bar{x}$ for MM_1	Standard Deviation for MMPI	Standard Deviation for MM_1
1	3.49	3.66	2.19	2.02
2	5.26	4.70	1.32	1.56
3	4.27	4.13	1.63	1.47
4	4.30	3.56	1.67	1.57
5	2.71	2.65	1.79	1.84
6	4.36	4.13	1.25	1.21
7	4.53	3.74	1.02	1.06
8	3.85	3.38	1.81	1.41
9	3.09	2.59	1.68	1.38
10	2.34	1.94	1.28	1.15
11	1.70	2.00	1.15	1.27
			$\bar{x}$ = 1.53	$\bar{x}$ = 1.45

TABLE 3 (N=100)

Means and Standard Deviations
of MMPI and MM_2
As Related to the Average Number of Criteria Rules Fulfilled

Code Type	$\bar{x}$ for MMPI	$\bar{x}$ for MM_2	Standard Deviation for MMPI	Standard Deviation for MM_2
1	3.41	3.33	1.89	1.72
2	5.24	4.85	1.28	1.40
3	4.57	4.21	1.68	1.60
4	4.59	4.26	1.68	1.70
5	2.87	2.89	1.79	1.60
6	4.46	4.22	1.05	1.14
7	4.53	4.03	1.12	1.31
8	3.78	3.73	1.68	1.65
9	3.31	2.95	1.69	1.67
10	2.35	2.10	1.54	1.43
11	1.70	1.94	1.29	1.39
			$\bar{x}$ = 1.46	$\bar{x}$ = 1.51

Tables 4 and 5 present percentage matching data for the MM_1 and MM_2 respectively with their corresponding MMPI's. The matching refers to the number and percentage of times the short and long forms yielded like code type classifications.

A particular profile was depicted as fitting a particular Marks and Seeman code type if it violated no more than one rule as enumerated for each particular code type in the atlas of these authors. A particular profile violating two or more rules was designated a "nonfit". (Category 12) Thus, a long and short form could match each other by neither of them corresponding to one of the other 11 Marks and Seeman code types. Under such conditions they would both be placed in Category 12 (nonfit). The justification for allowing the relaxation of one rule is based on the research of Payne and Wiggins who found that such a procedure did not

appreciably decrease the validity of the profile classification, yet allowed a larger percentage of patients to be classified within the Marks and Seeman system.

TABLE 4

The Frequencies of 12 Code-Types on the MMPI and MM_1 and the Number of Times the MM_1 Predicted the MMPI Code Type

Code-Type Category	Frequency on MMPI	Frequency on MM_1	Matches
1	6	5	2
2	7	9	6
3	5	3	0
4	10	4	1
5	9	11	3
6	4	2	2
7	3	0	0
8	11	4	3
9	8	1	0
10	2	3	1
11	4	6	4
12	31	52	28
SUM	100	100	50

Percentage of correct predictions made by the MM_1: 50%

TABLE 5

The Frequencies of 12 Code Types on the MMPI and MM_2 and the Number of Times the MM_2 Predicted the MMPI Code-Type

Code-Type Category	Frequency on MMPI	Frequency MM_2	Matches
1	5	3	3
2	7	8	5
3	6	5	3
4	11	9	5
5	9	7	3
6	2	3	1
7	3	2	2
8	10	10	5
9	8	6	4
10	4	4	3
11	6	7	5
12	29	36	26
SUM	100	100	65%

Percentage of correct predictions made by MM_2: 65%

Percentage matching figures were also calculated for the MM_1 and MM_2 with the MMPI as based on an alternate classification system, Henrichs' rules (1964). This system yields a fourfold classification of psychotic, neurotic, character disorder, and indeterminate.

TABLE 6

The Frequencies of Four Diagnostic Classifications
On the MMPI and MM_1 (Henrichs' Rules)
And the Number of Times the
MM_1 Predicted the MMPI Classification

Classification	Frequency on MMPI	Frequency on MM_1	Matches
Psychotic	13	5	3
Neurotic	6	12	3
Indeterminate	5	6	4
Personality Disorder	4	5	2
SUM	28	28	12

Percentage of correct predictions made by the MM_1: 43%

TABLE 7

The Frequencies of Four Diagnostic Classifications
On the MMPI and MM_2 (Henrichs' Rules)
And the Number of Times the
MM_2 Predicted the MMPI Classification

Classification	Frequency on MMPI	Frequency on MM_2	Matches
Psychotic	10	9	6
Neurotic	7	9	5
Indeterminate	6	6	4
Personality Disorder	5	4	2
SUM	28	28	17

Percentage of correct predictions made by the MM_2: 61%

CHAPTER V I

DISCUSSION

The overall conclusion to be drawn from the results of the present experiment is that the MM_2 cannot be confidently used as a replacement for the MMPI when employing the Marks and Seeman scoring system. As Table 1 reveals, in only two of eleven cases (Code Types 5 and 7) did the increase in the correlation between the MM_2 and the MMPI as compared to that between the MM_1 and the MMPI reach a level of statistical significance. One could expect such results by chance alone.

However, though the correction factor proposed for the MM_2 did not improve it to the point of justifying its generalized use, results did suggest that the present research is on the right track.

Table 1 shows that in ten of eleven cases, the correlation obtained by the MM_2 with the MMPI increased in the positive direction as compared to that obtained between the MM_1 and MMPI. Again, although only two of these increases were of a great enough magnitude to reach statistical significance, it would appear that the present correction factor is an improvement and deserving of future research and elaboration.

Additional evidence in the form of percentage matching results (Tables 4, 5, 6, and 7) also indicates that the MM_2 is yielding the same classification as the MMPI in a greater percentage of the cases than did the MM_1. Table 4 reveals that with the MM_1, the short form and the MMPI yielded the same Marks and Seeman code types 50 per cent of the time. Table 5 shows that the MM_2 and MMPI yielded like classifications 65 per cent of the time.

Likewise, in relation to Henrichs' rules and as depicted in Tables 6 and 7, the MM_1 and MMPI yielded like classifications 43 per cent of the

time while the MM_2 and MMPI obtained a percentage matching figure of 61 per cent.

Another important factor to be gathered from Tables 4 and 5 is in relation to Category 12 classifications. As mentioned earlier, a particular MM or MMPI profile was given a Category 12 classification when it failed to meet enough rules on any of the designated criteria categories (Appendix A) to receive a particular code type classification. In such a case, the profile was called a "nonfit".

In 52 of 100 cases, the MM_1 failed to yield any classification which corresponded to one of the 11 designated Marks and Seeman categories. The MM_2 resulted in only 36 nonfit classifications. In the experimenter's 1969 study, the MM_1 yielded 65 nonfit classifications. The critical point to be deciphered from such data is that the MM_2 is more often yielding classifications, diagnoses, etc., which are realistically found in clinical populations. Thus, it would seem that the present correction factor is a step in the positive direction toward enhancing the clinical utility of the short test form.

Tables 2 and 3 are also somewhat encouraging when looking at the mean standard deviation figures obtained with the MM_1 and MM_2. The mean standard deviation of 100 MMPI's as depicted in Table 2 was 1.53 while for the 100 MM_1's it was 1.45. In other words, the range of rules met by the MMPI was was greater than those met by the MM_1.

In contrast, Table 3 indicates that the range of rules set by the MM_2 (standard deviation = 1.51) was greater than that met by the 100 MMPI's of Table 3 (standard deviation = 1.46).

Such results can be related to a criticism Kincannon (1968) made of the MM_1 pertaining to its restricted range on several of the clinical

scales. That is, the variability of the MM_1 was of such a restricted nature on several scales that it was not yielding certain extreme elevations which the MMPI was yielding.

The results of Table 3 suggest that the present correction factor is a step in the positive direction as related to increasing the range and variability of the short form.

Likewise, Tables 2 and 3 indicate that in 9 of 11 cases (with only Code Types 3 and 6 being exceptions) the MMPI and MM_2 differed less from each other as related to the mean number of rules they fulfilled on a particular code type (Appendix A) than did the MMPI and MM_1. In other words, the MMPI and MM_2 compared more highly with each other than did the MMPI and MM_1, on 9 of 11 criteria categories.

As based on the experimenter's previous study and the results obtained over the first half of the present study, it was felt that the MM_1 was weakest in the area of adequately matching the long form on several of the psychotic scales and particularly the "Sc" scale. For example, on Henrichs' rules, the MM_1 predicted more neurotic than psychotic classifications while the MMPI did the opposite. Likewise, Table 1 indicated that the MM_1 obtained lower correlations with the MMPI on code types such as 5, 6, 7 and 9 than on Code Types 1, 2, 3, 4, and 11. The former represent basically psychotic classifications while the latter represent neurotic ones. As explained in the introduction section of the present study, the construction of the MM was based on the Comrey data. In factor analyzing the "Sc" scale, Comrey explains that since the electronic computer programs developed for his study did not permit the analysis of matrices exceeding 63 variables, it was not possible in factor analyzing the "Sc" scale to include all 78 items on the

MMPI "Sc" scale. Thus, some items overlapping with several other scales were removed and the analysis was based on 58 remaining "Sc" scale items.

Twelve factors were extracted and after the fifth factor, only one had a phi coefficient of .30 or higher. Thus, these 12 factors were based on only 65 per cent of the total MMPI "Sc" scale. The factors also ranged in size from only two to ten items. Thus, it seems unlikely that one could predict whatever is measured by the "Sc" scale of the MMPI by this limited set of factorially pure indicators.

Subsequently, the "Sc" scale of the MM_1 has too few items for optimum accuracy. Comrey noted this, and added that it would perhaps serve until further analysis and item development provided a better exploration of the particular area of personality involved. Yet, one can see the important consequences of using such a scale, especially when applied in relation to other scales to make practical, clinical classifications. As empirically observed in the experimenter's two studies using the MM_1, the "Sc" scale tended to significantly underestimate the "Sc" scale of the MMPI.

The following set of three tables present data as to the marked discrepancy occurring between certain psychotic scales on the MM_1 and the MMPI (Scales "Sc", "Pt" and "Ma").

TABLE 8

Differences Between the "Sc" Scales
In Terms of T-scores
28 MMPI's and MM's
Failing to Match Each Other
On Any of the Eleven Criteria Categories

MMPI		MM_1	
Individual 1	99	Individual 1	58
Individual 2	89	Individual 2	69
Individual 3	90	Individual 3	52
Individual 4	81	Individual 4	55
Individual 5	66	Individual 5	58
Individual 6	88	Individual 6	48
Individual 7	55	Individual 7	41
Individual 8	94	Individual 8	56
Individual 9	59	Individual 9	49
Individual 10	90	Individual 10	72
Individual 11	87	Individual 11	69
Individual 12	80	Individual 12	69
Individual 13	65	Individual 13	40
Individual 14	80	Individual 14	73
Individual 15	55	Individual 15	41
Individual 16	74	Individual 16	49
Individual 17	71	Individual 17	61
Individual 18	100	Individual 18	55
Individual 19	91	Individual 19	71
Individual 20	88	Individual 20	55
Individual 21	90	Individual 21	58
Individual 22	100	Individual 22	68
Individual 23	62	Individual 23	44
Individual 24	71	Individual 24	55
Individual 25	81	Individual 25	70
Individual 26	72	Individual 26	48
Individual 27	85	Individual 27	55
Individual 28	69	Individual 28	63
$\bar{x} = 79.7$			$\bar{x} = 57.2$
MMPI	$t = 6.1 < .01$		MM

TABLE 9

Differences Between "Ma" Scales
in Terms of T-scores
for the
28 Cases Used in Table 8

MMPI		MM_1	
Individual 1	61	Individual 1	61
Individual 2	84	Individual 2	78
Individual 3	50	Individual 3	48
Individual 4	75	Individual 4	59
Individual 5	66	Individual 5	60
Individual 6	75	Individual 6	60
Individual 7	55	Individual 7	53
Individual 8	50	Individual 8	43
Individual 9	60	Individual 9	50
Individual 10	84	Individual 10	74
Individual 11	69	Individual 11	62
Individual 12	75	Individual 12	68
Individual 13	74	Individual 13	68
Individual 14	58	Individual 14	59
Individual 15	70	Individual 15	55
Individual 16	70	Individual 16	63
Individual 17	70	Individual 17	60
Individual 18	50	Individual 18	53
Individual 19	105	Individual 19	84
Individual 20	60	Individual 20	55
Individual 21	75	Individual 21	54
Individual 22	66	Individual 22	68
Individual 23	63	Individual 23	48
Individual 24	65	Individual 24	60
Individual 25	62	Individual 25	61
Individual 26	61	Individual 26	58
Individual 27	79	Individual 27	59
Individual 28	95	Individual 28	70
$\bar{x} = 69.1$ MMPI		$\bar{x} = 60.5$ MM	

$t = 2.9$ $(.01$

TABLE 10

Differences Between "Pt" Scales
in Terms of T-scores
for the
28 Cases Used in Table 8

MMPI		MM_1	
Individual 1	81	Individual 1	71
Individual 2	94	Individual 2	69
Individual 3	74	Individual 3	54
Individual 4	71	Individual 4	55
Individual 5	81	Individual 5	74
Individual 6	53	Individual 6	45
Individual 7	65	Individual 7	65
Individual 8	69	Individual 8	60
Individual 9	64	Individual 9	64
Individual 10	56	Individual 10	55
Individual 11	64	Individual 11	65
Individual 12	66	Individual 12	66
Individual 13	51	Individual 13	50
Individual 14	72	Individual 14	71
Individual 15	51	Individual 15	35
Individual 16	67	Individual 16	56
Individual 17	56	Individual 17	48
Individual 18	89	Individual 18	71
Individual 19	80	Individual 19	60
Individual 20	74	Individual 20	54
Individual 21	70	Individual 21	48
Individual 22	88	Individual 22	90
Individual 23	51	Individual 23	48
Individual 24	75	Individual 24	63
Individual 25	74	Individual 25	55
Individual 26	79	Individual 26	63
Individual 27	80	Individual 27	71
Individual 28	53	Individual 28	47
$\bar{x}$ = 69.6 MMPI		$\bar{x}$ = 59.7 MM	

$t = 3.04 < .01$

The important factor to be derived from such data is that on a selection of 28 MMPI's and MM_1's, which differed from each other by at least 8 t-scores on the "Sc" scale, and which failed to match each other on any of the designated Marks and Seeman categories, there existed a statistically significant difference between them on the "Sc", "Pt", and "Ma" scales. Each of these scales is particularly relevant as related to certain psychotic diagnoses, and the fact that they often tend to be suppressed in unison on the MM_1 is likely related to the latter's classificatory inadequacies. Further, such results lead one to suspect that the addition of a correction factor to these scales, as related to other characteristics of the profile in general, might improve the validity of the MM. It is toward the investigation of these other characteristics of the profile that we now turn.

The "F" scale elevations of the 28 MM profiles employed in the previously presented tables (each of which failed to predict the "Sc" scale within 8 t-scores or more) were calculated and compared with 28 MM profiles which successfully predicted the "Sc" scale (within 8 t-scores.) The following table contains this data.

TABLE 11

F-Scale T-Scores for MM's Failing to Predict the "Sc" Scale of the MMPI and Those Successful in Predicting "Sc" Scale of MMPI

FAILURES		SUCCESSES	
Individual 1	65	Individual 1	63
Individual 2	99	Individual 2	47
Individual 3	59	Individual 3	50
Individual 4	60	Individual 4	57
Individual 5	54	Individual 5	57
Individual 6	76	Individual 6	58
Individual 7	66	Individual 7	63
Individual 8	75	Individual 8	51
Individual 9	59	Individual 9	52
Individual 10	65	Individual 10	53
Individual 11	77	Individual 11	67
Individual 12	80	Individual 12	63
Individual 13	59	Individual 13	75
Individual 14	69	Individual 14	48
Individual 15	65	Individual 15	47
Individual 16	65	Individual 16	66
Individual 17	65	Individual 17	49
Individual 18	75	Individual 18	60
Individual 19	80	Individual 19	62
Individual 20	91	Individual 20	55
Individual 21	65	Individual 21	66
Individual 22	65	Individual 22	70
Individual 23	58	Individual 23	47
Individual 24	75	Individual 24	47
Individual 25	69	Individual 25	50
Individual 26	69	Individual 26	44
Individual 27	65	Individual 27	40
Individual 28	59	Individual 28	61
$\bar{x}$ = 68.8		$\bar{x}$ = 55.8	
σ = 10.1		σ = 8.6	

$t = 2.55 \quad \langle 10, \rangle .05$

Results, though just barely failing to reach statistical significance, suggest the elevation of the F-scale to be a discriminating factor as related to those MM_1's successfully predicting psychotic scales as opposed to those failing to do so. The evidence is supported if one includes the data from the pilot study conducted during the experimenter's previous investigation (Skovron, 1969). At that time, the mean F-score for 15 MM's failing to predict the "Sc" scale was 73.5 (as compared to 68.8 for the present study). The mean F-score for those 15 MM's successfully predicting the "Sc" scale was 57.7 (as compared to 55.8 for the present study). The difference between the means of F-scores for MM's failing and those succeeding in predicting the "Sc" scale for the two studies was 15.8 and 13.0 t-scores respectively. Such consistently marked differences point to the F-scale as being a discriminative indicator of whether the MM_1 is or is not yielding a more representative classification.

A second discriminative factor concerns itself with the overall shape of the validity scales as such. In the present study, 82 per cent of those MM's failing to predict the MMPI psychotic scales had their validity scales in the shape of an inverted "V" (this compares with 100 per cent yielding like results in the experimenter's previous study). Contrastingly, only 14 per cent of those MM's successful in predicting the MMPI psychotic scales had their validity scales in the form of an inverted "V" (this compares with 25 per cent yielding like results in the experimenter's previous study).

Thus, the overall shape of the validity scales, in combination with the t-score elevation of the F-scale, seem to be two factors discriminating between those MM_1's predicting the MMPI psychotic scales as opposed to those not doing so.

The third, and final factor having discriminative significance in determining more representative MM_1 profiles is the elevation of the K-scale on the MM_1. It would seem that certain minimal values on the K-scale, when viewed in combination with the two discriminative factors thus far referred to, are indicative of a MM profile which is not predicting psychotic scales correctly and is thus in need of a correction factor.

The following table presents K-scale data from those 28 MM's successfully predicting the "Sc" scale as opposed to those failing to do so.

TABLE 12

K-Scale T-Scores for MM's Failing to Predict the "Sc" Scale of the MMPI and Those Successful in Predicting the "Sc" of the MMPI

FAILURES		SUCCESSES	
Individual 1	42	Individual 1	56
Individual 2	49	Individual 2	59
Individual 3	50	Individual 3	69
Individual 4	45	Individual 4	64
Individual 5	46	Individual 5	56
Individual 6	44	Individual 6	53
Individual 7	45	Individual 7	54
Individual 8	50	Individual 8	60
Individual 9	43	Individual 9	61
Individual 10	40	Individual 10	64
Individual 11	44	Individual 11	59
Individual 12	50	Individual 12	58
Individual 13	52	Individual 13	68
Individual 14	41	Individual 14	50
Individual 15	45	Individual 15	51
Individual 16	47	Individual 16	58
Individual 17	46	Individual 17	61
Individual 18	47	Individual 18	62
Individual 19	43	Individual 19	63
Individual 20	49	Individual 20	59
Individual 21	50	Individual 21	57
Individual 22	40	Individual 22	57
Individual 23	43	Individual 23	60
Individual 24	46	Individual 24	54
Individual 25	48	Individual 25	64
Individual 26	48	Individual 26	63
Individual 27	46	Individual 27	59
Individual 28	45	Individual 28	60
$\bar{x}$ = 45.8		$\bar{x}$ = 59.6	
σ = 3.17		σ = 4.48	

$t = 13.02 < .01$

These figures indicate a significant difference between the K-scale values of those MM's successfully predicting the "Sc" scale as opposed to their counterparts. The results are also in agreement with those obtained in the experimenter's previous study, where the mean K-value for successful MM's was 59.1, while for unsuccessful ones it was 45.7.

In light of the information presented thus far, the experimenter proposed the addition of a correction factor to the Scales "Pt", "Ma", and "Sc" as based on the following conditions:

1. The shape of the validity scales being in the form of an inverted "V".
2. The value of the F-scale being 65 t-scores or above.
3. The value of the K-scale being 50 t-scores or less.

Under such conditions, one could conjecture that the MM_1 is underestimating the "Sc", "Pt", and "Ma" scales of the long form by values of 20, 10, and 9 t-scores respectively. Thus, the correction factor proposed would add these t-scores values to the "Sc", "Pt", and "Ma" scales as based on the profiles concordance with the three conditions proposed above.

The specific numerical values to be added to certain scales were derived from data gathered over the experimenter's previous study and that depicted in Tables 8 through 12. For example, Table 8 indicates that the MM_1 underestimated the "Sc" scale of the MMPI by a mean of approximately 20 t-scores. Thus, when the three criteria conditions previously mentioned were fulfilled for a certain profile, a value of 20 t-scores was added to the "Sc" scale. The other numerical values added followed a similar rationale.

The results of the present study certainly indicate that the MM_2 cannot be validly substituted for the MMPI.

However, the same results do indicate that the correction factor utilized is a step in the right direction and deserving of continued research. More specifically, it does appear that the MM_1 is weakest in the area of predicting scales "Pt", "Ma", and "Sc". Likewise, under certain validity scale configurations the results of the short form can be accepted more confidently than under others.

Thus, the present correction factor data are in need of refinement and elaboration as opposed to their being discarded. This is a prime area of research in the direction of improving the usefulness of the short form of the MMPI.

There are other areas which also deserve investigation and which are germane to improving the Mini-Mult. The first of these is the construction of measures for the Mini-Mult representing the standard "Mf" and "Si" scales of the MMPI. The absence of these two indices greatly reduces the variability of practical clinical decisions which the MM can make, as evidenced by the fact that the present study could employ only 11 of 16 Marks and Seeman code types. This involves nearly a one-third reduction in classification power, and is, in large part, responsible for the large number of nonfits as well as the reduced correlations obtained. The assumption is that the ability to make a wider range of classifications, one will increase the practical clinical usefulness of the MM by making it applicable to wider range of clinical problems. By leaving out the code types which use the "Mf" and "Si" scales, at least 75 MMPI profiles examined had to be cut out of the present study. A certain long and short form might match on all scale rules, but because the particular code type involved used two or more rules of the "Mf" or "Si" variety, the profile had to be discarded. It is probable that within these 75 profiles, many would have correlated highly with the MM, thus perhaps increasing the correlational figures.

Another factor which must be examined when evaluating the statistical results of any study involving a nosological criteria, even of the empirical nature as Marks and Seeman, is the reliability of the criterion itself. In

other words, the source of error cannot be blamed entirely on the short form itself. A study should be conducted to test whether the long form, when matched against itself, gives the same type of Marks and Seeman code type or another variety of classification. Though on rational grounds one would expect a better showing than obtained on the MM, the fact remains that one would most probably not obtain a perfect correlation. The point is that sources of error reside in any classification system as well as in the MMPI itself. To base the usefulness of the MM solely on its ability to match the MMPI is to leave questionable other important sources of error. A measurement technique can be no better than its criterion, and though Marks and Seeman classifications are probably as empirically stable as any that exist, they still need continued research.

As an extension of research along these lines, and as an attempt to extend the usefulness of the MM, it should be employed in studies using criteria other than those of Marks and Seeman and Henrichs' rules. The correction factor utilized in the present experiment somewhat improved the MM's classificatory power in relation to both criteria used, and it would be expected that such results would also generalize to other classifi-classification systems (e.g., Meehl and Dahlstrom, 1960). However, such conjectures are in need of empirical validation. Only via such validation can the correction factor data become consistently refined and generalizable.

A final factor is a reconsideration of Comrey's factor analytic data based on the several criticisms of factor analysis mentioned in the literature review section of this study. Is this method the most appropriate for a test such as the MMPI? Should, perhaps, the MM be based on different considerations and employ different items? Research, empirical and experimental, is badly needed in this area.

The considerable amount of nonfits obtained in this study (by both the MM_1, MM_2, and MMPI itself) attests to the limitations of any classification system, Marks and Seeman included. Each system continually must add more empirically determined code types or categories. Yet, a conclusion is reached based on ideas similar to those commented upon in the beginning of this study. No code type system, nosology, or group of classifications can ever encompass the variability of behavior and thinking exhibited by the individual. In the end, the idiographist and nomotheticist must meet at a midpoint and share with each other their peculiar skills and beliefs. A nomothetic instrument, such as a test, must be used idiographically. And alternately, to employ the idiographic method at all, one must utilize the time and effort saving devices which the nomotheticist proposes.

Thus, the present study contributes to a global picture of man based on the realization of his never-ending uniqueness coupled with the notion that to continue exploring this uniqueness, one must use one's time and effort selectively.

The MM_2, as it presently stands, cannot be validly used as a substitute for the MMPI. However, it is an improvement over the MM_1 and deserving of future modifications along similar lines. With such modifications, it does appear that this short form of the MMPI can become a useful idiographic tool.

CHAPTER VII

SUMMARY

A short form of the MMPI (Mini-Mult) was constructed by Kincannon in 1967 consisting of 71 items. Though investigations revealed that its mean interscale correlation with the MMPI was .75, no adequate investigation was performed on its ability to predict clinical classifications or categories from which practical decisions emanate. Several authors (e.g., Mumpower, Silverstein, et. al.) criticized abbreviated tests due to the fact that short-to-long form correlations underestimated the classification error rate of the shortened forms.

Skovron (1969) performed a study utilizing the MM_1 with the Marks and Seeman categories as criteria, in an attempt to test the criticisms of the aforementioned authors in reference to the MM. He found such criticisms to be largely justified, as the MM failed to attain a statistically significant correlation with the MMPI as related to a practical classificatory system from which clinical decisions emanate (Marks and Seeman categories).

However, Skovron did feel that with certain modifications in the form of a correction factor, the MM could function as an adequate replacement for the MMPI when conditions required a short form.

The purpose of the present study was to reevaluate the Mini-Mult (MM_1) and to hopefully devise and add to it a correction factor which would improve its validity and usefulness.

A total of 100 MMPI's were randomly drawn from the files of Dayton State Mental Hospital. Each test was scored according to standard scoring procedures and also according to templates developed to score the MM_1. The result was a graph consisting of profiles from both the MMPI and the MM_1. Each long and short MMPI form was compared with each other as re-

lated to eleven Marks and Seeman code type classifications (Appendix A). That is, a particular long and short form were compared with each other on each of the eleven separate criteria. Pearson product-moment correlation coefficients were calculated as well as percentage matching tables. The correlations were between the MM_1 and the MMPI for each of the eleven separate criteria.

As based on the results obtained over the first half of this study and those obtained by the experimenter in his previous study, a correction factor was devised and added to the MM_1. The revised MM_1 was then labeled the MM_2.

A test of the usefulness of the MM_2 was then carried out via a repetition of the methodology used over the first half of the study. That is, 100 more test profiles were selected from the same source and like statistical manipulations and comparisons applied to them.

Results indicated that for only two of the eleven criteria did the correlation coefficient of the MM_2 with the MMPI improve significantly over that obtained between the MM_1 and MMPI. Such results could be expected to occur by chance alone.

The conclusion drawn was that the MM_2 could not be validly substituted for the MMPI.

However, in ten of the eleven criteria cases, the correlations obtained between the MM_2 the MMPI were higher than those obtained between the MM_1 and MMPI. Likewise, percentage matching tables and data deciphered from means and standard deviations did indicate that the MM_2 was doing a better job of matching the MMPI on the eleven criteria utilized than was the MM_1.

Thus, although the MM_2 as it presently stands cannot be used in place of the MMPI, the correction factor proposed would seem to be a step in the right direction and deserving of future research.

Several other areas of research were also proposed as related to improving the MM_2. The two most promising are the construction of representative "Mf" and "Si" scales for the MM_2 in relation to alternate classification systems.

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APPENDICES

APPENDIX A

Code Type 1

2-7

1. Scale 2 and Scale 7 above 70 t-scores
2. Scale 2 greater than Scale 7
3. Scale 2 minus Scale 8 greater than 15 t-scores
4. Scale 7 greater than Scales 1 and 3
5. Scale 7 minus Scale 4 greater than 10 t-scores
6. Scale 7 minus Scale 6 greater than 10 t-scores
7. Scale 7 minus Scale 8 greater than 10 t-scores
8. Scale 9 less than 60 t-scores
9. Scales L, F, and K less than 70 t-scores

Code Type 2

2-7-4

1. Scales 2, 4, and 7 greater than 70 t-scores
2. Scale 2 minus Scale 4 less than 15 t-scores
3. Scale 2 minus Scale 7 less than 10 t-scores
4. Scale 7 greater than Scales 1 and 3
5. Scale 7 minus Scale 4 less than 10 t-scores
6. Scale 7 minus Scale 8 greater than 5 t-scores
7. Scale 8 greater than Scale 9
8. Scale 9 greater than 40 t-scores
9. Scales L and K less than 70 t-scores, Scale F less than 60 t-scores

Code Type 3

2-7-8

1. Scales 2, 7 and 8 greater than 70 t-scores
2. Scales 2 minus 1 greater than 15 t-scores
3. Scale 2 minus Scale 8 less than 15 t-scores
4. Scale 7 minus Scale 4 greater than 10 t-scores
5. Scale 7 minus Scale 6 greater than 10 t-scores
6. Scale 7 greater than Scale 8 (or Scale 8 minus 7 less than 5 t-scores)
7. Scales 7 and 8 greater than Scales 1 and 3
8. Scale 9 less than 70 t-scores
9. Scale 0 greater than 70 t-scores
10. Scales L and K less than 70 t-scores; Scale F less than 80 t-scores

Code Type 4

2-8

1. Scales 2 and 8 greater than 70 t-scores
2. Scale 2 minus Scale 8 less than 15 t-scores
3. Scale 7 greater than Scales 4 and 6
4. Scale 8 greater than Scales 1 and 3
5. Scale 8 minus Scale 7 greater than 5 t-scores
6. Scale 9 less than 70 t-scores
7. Scale 0 greater than Scale 9
8. Scales L and K less than Scale F

Code Type 5

4-6

1. Scales 4 and 6 greater than 70 t-scores
2. Scale 4 minus 2 greater than 15 t-scores
3. Scales 4 and/or 6 minus Scale 5 greater than 25 t-scores
4. Scales 4 and 6 greater than 8
5. Scales 6-2 greater than 10 t-scores
6. Scale 8 greater than Scales 7 and 9
7. Scale 9 less than 70 t-scores
8. Scales L, F, and K less than 70 t-scores

Code Type 6

4-6-2

1. Scales 4, 6, and 2 greater than 70 t-scores
2. Scale 4 minus Scale 2 less than 15 t-scores
3. Scales 4 and 6 greater than Scale 8
4. Scale 4 greater than Scale 7 (or Scales 7-4 less than 5 t-scores)
5. Scales 6 minus 2 less than ten t-scores
6. Scale 7 greater than Scale 8 (or Scales 8 minus 7 less than 5 t-scores)
7. Scale 9 less than 70 t-scores
8. Scales L and K less than Scale F, Scale F less than 80 t-scores

Code Type 7

4-8-2

1. Scales 4, 8, and 2 greater than 70 t-scores
2. Scales 4 minus Scale 2 less than 15 t-scores
3. Scale 4 greater than Scale 7 (or Scales 7 minus 4 less than 5 t-scores)
4. Scales 8 minus 2 less than 15 t-scores
5. Scales 8 minus 7 greater than 5 t-scores
6. Scales 8 minus 9 greater than 10 t-scores
7. Scales 9 less than 70 t-scores
8. Scales L and K less than F, Scale F less than 80 t-scores

Code Type 8

4-9

1. Scales 4 and 9 greater than 70 t-scores
2. Scale 4 greater than Scale 8
3. Scale 4 greater than Scale 9 (or Scale 9 minus Scale 4 less than 5 t-scores)
4. Scale 6 less than Scale 8
5. Scales 9 minus 8 greater than 5 t-scores
6. Scales 2 and 7 less than 70 t-scores
7. Scale 0 less than 60 t-scores
8. Scale F greater than Scales L and K, Scale F less than 70 t-scores

Code Type 9

8-6

1. Scales 1, 8, 6, 4 and 2 greater than 70 t-scores
2. Scales 1 and 3 less than Scales 2, 6, 7 and 8
3. Scales 2 minus 1 greater than 10 t-scores
4. Scale 6 minus Scale 5 greater than 25 t-scores
5. Scale 6 greater than Scale 7
6. Scale 8 minus Scale 7 greater than 10 t-scores
7. Scale 8 minus Scale 9 greater than 10 t-scores
8. Scale F greater than Scales L and K, Scales L and K less than 60 t-scores

Code Type 10

9-6

1. Scales 9 and 6 greater than 70 t-scores
2. Scales 1, 2 and 3 less than 70 t-scores
3. Scales 6 greater than Scale 4 (or Scales 4-6 less than 5 t-scores)
4. Scales 9 minus 2 greater than 15 t-scores
5. Scales 9 minus 4 greater than 5 t-scores
6. Scales 9 minus 8 greater than 10 t-scores
7. Scale 0 less than 70 t-scores
8. Scales L and K less than 70 t-scores, Scale F less than 80 t-scores

Code Type 11

Normal K+

1. Psychiatric inpatients only
2. All clinical scale scores less than 70 t-scores
3. 6 or more clinical scale scores less than 60 t-scores
4. Scales L and K greater than Scale F
5. Scale K minus Scale F greater than 5 t-scores
6. Scale F less than 60 t-scores

The Minnesota Multiphasic Personality Inventory

Starke R. Hathaway and J. Charnley McKinley

Scorer's Initials _____

Name _____ F Female

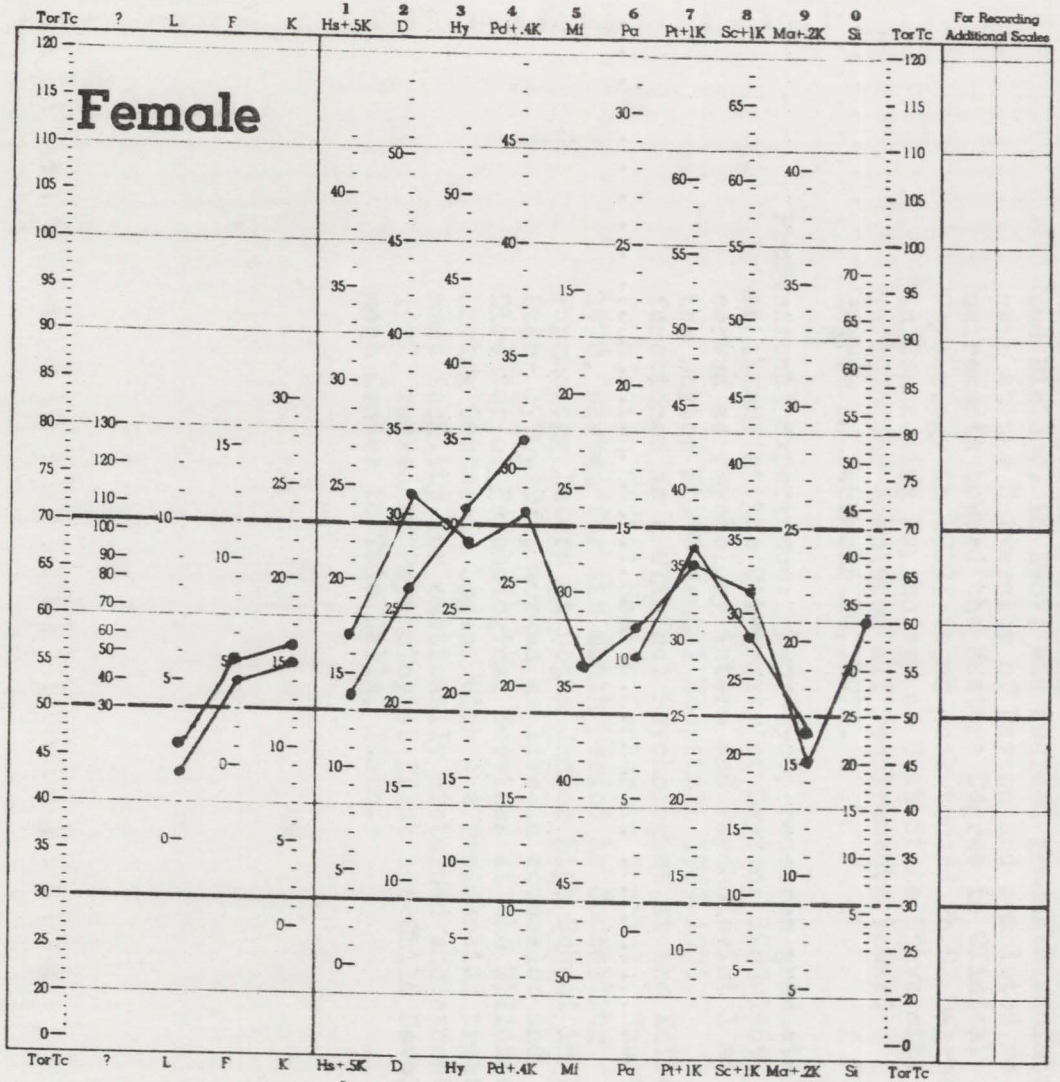
Address _____

Occupation _____ Date Tested _____

Education _____ Age _____

Marital Status _____ Referred by _____

NOTES



Fractions of K			
K	.5	.4	.2
30	15	12	6
29	15	12	6
28	14	11	6
27	14	11	5
26	13	10	5
25	13	10	5
24	12	10	5
23	12	9	5
22	11	9	4
21	11	8	4
20	10	8	4
19	10	8	4
18	9	7	4
17	9	7	3
16	8	6	3
15	8	6	3
14	7	6	3
13	7	5	3
12	6	5	2
11	6	4	2
10	5	4	2
9	5	4	2
8	4	3	2
7	4	3	1
6	3	2	1
5	3	2	1
4	2	2	1
3	2	2	1
2	1	1	0
1	1	1	0
0	0	0	0

APPENDIX B

Red: Long Form (MMPI)

Black: Short Form (MM_1 or MM_2)

92

Signature _____ Date _____

VITA

Mark Allen Skovron

Ph.D.: Clinical-Counseling Psychology

Thesis: The Mini-Mult: Its Reevaluation and Improvement as Related to a Profile Analysis Classification System

Biographical Information:

Personal Data: Born at Cleveland, Ohio, March 14, 1945, son of Anaysius and Mildred Skovron

Education: Attended elementary school in Cleveland, Ohio; graduated from St. Ignatius High School in 1963; received the Bachelor of Arts degree from the University of Dayton in Dayton, Ohio (1967), with a major in Psychology and minors in Philosophy and Biology, in 1967; was awarded graduate assistantship at the University of Dayton and completed requirements toward the Masters Degree in Clinical Psychology in 1969; began work toward Ph.D. Degree in Counseling Psychology at Utah State University in 1970 and completed all requirements toward degree on December 14, 1972.

Professional Experience: 1967-1968, research graduate assistant at the University of Dayton; 1967-1969, served as Psychology intern and Psychologist I at the Dayton State Mental Hospital; 1969-1970, functioned as a Clinical Psychologist at the Kaiser Foundation Mental Health Center in Honolulu, Hawaii; 1970, served for six month period as Counseling Psychology Intern at Logan Junior High School in Logan, Utah; 1970-1971, worked as live-in counselor and Director of Psychological Services at the Hillside Living Center in Logan, Utah - a residential treatment facility for emotionally disturbed adolescents; 1972, worked as Psychologist II at the Child Development Center in Twin Falls, Idaho.