Personality Patterns of Male Psychiatric Inpatients: Cluster Analysis of the MCMI-II Guided by Blashfield's Recommendations

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LOYOLA UNIVERSITY CHICAGO

PERSONALITY PATTERNS OF MALE
PSYCHIATRIC INPATIENTS: CLUSTER ANALYSIS
OF THE MCMII GUIDED BY
BLASHFIELD'S RECOMMENDATIONS

A DISSERTATION SUBMITTED TO
THE FACULTY OF THE GRADUATE SCHOOL
IN CANDIDACY FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

DEPARTMENT OF PSYCHOLOGY

BY
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CHAPTER 1
INTRODUCTION

"Personality" is a way to describe an individual's typical pattern of relating to others, problem-solving, thinking, and feeling. Whether it is the "Oedipal type", "introverted type", "neurotic type", or "borderline", the study of personality variants is common in the literature. Perhaps the reason that we are so fascinated with different types of personalities is that classification helps to simplify our world. If an individual is described as having a particular personality style, this serves a heuristic function. Namely, one can make certain assumptions about behavior and/or history if we know the individual's personality style. As with all heuristics, identifying an individual's personality type may serve the practical purpose of simplifying a large set of data, but in doing so, one may miss some important details about the particular individual.

In the field of psychology, there is an emerging recognition that the clinician must focus not only on the acute symptoms which have brought an individual in for treatment, but attention must be paid to the lifelong pattern of relating to others, coping with stress, thinking, and feeling, in order to understand, predict, and treat the
individual who is seeking assistance. Increased specificity is necessary in order to further scientific research, and the ability to distinguish acute symptoms from lifelong patterns is helpful in order to communicate among professionals, conduct reliable and valid research, and increase the effectiveness of treatment strategies for psychological conditions.

Knowledge of personality styles in general and the specific personality of the individual contributes to therapeutic strategies and planning (Butcher, 1990; Millon, 1981; Shapiro, 1965). If the clinician knows what type of personality style the client has, it serves as a useful framework from which predictions and explanations stem because the individual has been problem-solving, relating to others, thinking, and feeling all his or her life. This information is crucial to understanding how a person will deal with the circumstances which led them to seek treatment. The symptoms may be the "figure" and the personality may be the "ground." It is impossible to understand the symptoms without understanding the ground which lends meaning to them.

In order to study personality types which have an empirical basis, a common statistical procedure called cluster analysis is often used. Cluster analysis is a relatively new method of analyzing data which has been growing in popularity over the past few decades. In cluster
analysis, sets of subjects with known attributes are grouped according to their characteristics such that members within a particular group are more like each other than they are to members of other groups (Hair, Anderson, Tatham, & Black, 1992). In some fields, cluster analysis is used to group heterogenous samples of subjects into smaller, homogenous subgroups which share similar characteristics and theoretically may share a common origin. Social scientists have begun to use cluster analysis in a similar way, grouping subjects based upon personality style. The difficulty is that there is no agreed upon distribution of personality types which can be validated using the cluster analysis procedure. Thus the underlying population distribution of personality groups or clusters is unknown. However, several methods of cluster analysis have been shown to be reliable and valid when analyzing data which has known population parameters and distributions. Therefore, we can infer that these procedures would also be reliable and valid with personality data.

In many psychological studies using a variety of instruments, personality clusters or personality types have been the focus. These studies postulate that individuals who share personality styles or patterns of relating may respond in similar ways to treatment, thus increasing the efficacy of treatment which is "personality specific." While this type of research is in its infancy, it is
nonetheless a valuable beginning in our efforts to treat clients with methods that are person-specific.

One way to look at the problem is to take the case of depression. Certainly there appear to be many causes of depression. Trying to judge the effectiveness of treatments for depression is rather difficult because there are so many different persons and personalities who suffer from depression. While one treatment may work for some people, it does not work for others. Trying to determine why this occurs requires some specificity. What kind of depression, is it biological, environmental, or both? What kind of person is it, does he or she have good social skills or poor ones? These types of questions require a bit more detail than to simply say that the person is depressed. One way to examine this question is to find if there are groups of persons who are similar on some dimension (i.e. personality), and who also share some disorder.

In the psychiatric nomenclature, the question may be asked: Are people with certain personality styles more prone to particular symptom patterns? Millon’s (1981) theory would suggest that this is the case.

Personality and clinical symptoms are both described and require attention in the Diagnostic and Statistical Manual of Mental Disorders (3rd ed., rev.) or DSM-III-R (American Psychiatric Association, 1987). Perhaps one of the most revolutionary aspects of DSM-III-R and its prede-
cessor (DSM-III) was the importance placed upon personality disorders which are chronic, not acute. Clinicians may have a tendency to overlook personality, and the multiaxial system forces the professional to consider a variety of factors (personality, stressors, physical illness) which contributed to the diagnostic picture. The DSM-III-R has addressed the importance of an individual's typical style of relating when making a diagnosis, and clinicians have begun to focus on "Axis II" disorders or styles as well. Donat, Geczy, Helmrich, and LeMay (1992) noted:

The separation between Axis I and Axis II was intended to ensure that consideration is given to the possible presence of important characteristics (personality or trait pathology) that are frequently overlooked while attention is directed to the usually more florid Axis I disorder.... the failure to adequately assess the presence of personality dysfunction or the interaction between personality and Axis I conditions has been identified as a source of numerous complications and frustrations in the development and implementation of intervention strategies. (p. 36-37)

Some have suggested that there is a systematic relationship between certain Axis I and Axis II conditions, perhaps no one more strongly than Theodore Millon. Millon (1981) suggested that environmental stress and personality styles interact to produce Axis I disorders. In other words, he proposed that Axis I disorders are due to the breakdown or fragility of the person's enduring personality style in response to stressful life events or circumstances. As Millon (1985) noted:

Axis I consists of clinical symptom disorders, those syndromes that wax and wane in their severity over
time, and that display themselves as the acute and more
dramatic forms of psychopathology. On Axis II are
found the personality syndromes representing those
enduring and pervasive characteristics that often
underlie and provide a context and foundation for
understanding the more florid and transient symptom­
atology recorded on Axis I. (p. 20)

Millon (1987) later reiterated his position:

In contrast to the personality disorders (Axis II), the
clinical syndrome disorders comprising Axis I are best
seen as extensions or distortions of patients' basic
personality patterns. These syndromes tend to be
relatively distinct or transient states, waxing and
waning over time, depending upon the impact of stress­
ful situations. Most typically, they caricature or
accentuate the basic personality style. (p. 31)

Similar sentiments have been articulated by others.
Hogg, Jackson, Rudd, and Edwards (1990) have argued: "it is
likely that the information collected on Axis II has
relevance for etiology, prognosis, and/or treatment in ways
that are not predicted by the Axis I diagnosis alone" (p.
198).

Also, Donat, Geczy, Helmrich, and LeMay (1992) ex­
pressed a similar attitude. They stated that "maladaptive
personality traits may coexist with, predispose to, or
result from Axis I conditions and may significantly influ­
ence their presentation, course, management, and response to
treatment" (p. 37).

The current study is designed to examine what proto­
typical personality styles are present in a circumscribed
population and to assess if there is any correlation between
these styles and clinical syndromes. Certainly, this study
must be followed up with other empirical work addressing the
same issue. Conceptualizing personality types predates the discipline of psychology, dating back at least to Hippocrates and the four humors (Holmes, 1991). Cluster analysis has been a relatively recent tool used to find "natural" groups of subjects or individuals. Cluster analysis has been used to study personality types and their relationship to clinical symptoms. It is hoped that the current study will contribute to our understanding of personality, psychopathology, and cluster analysis. The first step is simply to describe the population of study.

As Eysenck and Eysenck (1985) have stated:

Description and taxonomy are only the first steps in scientific analysis; as we shall see, they provide a scaffolding that enables us to go on to causal analysis, motivational studies, psychophysiological investigations, and a comparative analysis of genetic and environmental causes, and so forth. The dual nature of the scientific enterprise should never be forgotten; it is nonsensical to criticize one part of the exercise for not having the virtues of the other, and vice versa. No dynamic analysis is possible without a descriptive framework, and the concepts provided within this framework are the stepping stones to a more dynamic analysis and understanding. (p. 7)

This study might be portrayed as a taxonomic endeavor since its purpose is largely to describe the population of interest. This research is an extension of previous literature which focused on typical personality profiles among psychiatric inpatients and to determine if there are clinical syndromes associated with these personality styles. Cluster analysis will be applied to the data derived from subjects who completed the Millon Clinical Multiaxial
Inventory-II (Millon, 1987). These results will have bearing on our understanding of cluster analysis, personality, and clinical syndromes.
CHAPTER 2

METHODS OF CLUSTER ANALYSIS

Classification of subjects into "natural" groups is the aim of cluster analysis, however what determines how natural a grouping is has proven quite difficult to grasp. There are a host of cluster analytic methods, each with its own strengths and weaknesses and none which has proven its superiority over all others. Because of this problem, it is often the case that at least two types of cluster analyses are used on the same data, and the results are compared. First, it is important to understand how cluster analysis works.

A simple dichotomy can be used to classify cluster analytic methods: hierarchical versus non-hierarchical. Hierarchical clustering methods can be viewed as tree-like in that one large group (trunk) is split off into smaller and smaller groups (branches and leaves). In agglomerative hierarchical cluster analysis, each subject begins as it's own cluster. In the next step, the two most similar subjects are combined into a cluster with two subjects in it. Then, the subject which is most similar to the first two is joined or averaged into the first cluster. It may be that an individual is not very similar at all to the
subjects in the first cluster, so a new cluster starts to form in which the subjects in it are similar to each other, but different from those in the other cluster. This process continues until all subjects are grouped together in the same large cluster. Agglomerative hierarchical clustering methods are perhaps the most widely used in the literature and are generally viewed as the most reliable methods of cluster analysis (Morey, Blashfield, & Skinner, 1983; Overall, Gibson, & Novy, 1993; Scheibler & Schneider, 1985).

Divisive hierarchical clustering methods are also available. They are basically the same as agglomerative hierarchical clustering methods except that the process is done in reverse. That is, one starts with all subjects in one large group, and then dissimilar subjects are split off and turned into clusters of smaller size until each subject ends up in its own cluster.

Hierarchical clustering methods are susceptible to odd or unusual combinations early in the clustering sequence. Thus two subjects might be very similar to each other, but not at all similar to any others but, because they were the first subjects grouped together, other subjects might be "forced" into that group. Also, hierarchical methods are susceptible to the effects of outliers in the data (Hair, Anderson, Tatham, & Black, 1992). Despite this, hierarchical clustering methods have been the most popular in the literature. Specifically, Ward’s method and Average Linkage
hierarchical procedures have performed best in several previous studies (Borgen & Barnett, 1987; Hair et al., 1992; Milligan, 1981; Morey, Blashfield, & Skinner, 1983; Scheibler & Schneider, 1985; Skinner & Blashfield, 1982). In an extensive review (Milligan, 1981) concluded that:

- the group average and Ward’s method, should always be included in a study in order to provide a basis of comparison for other methods. Since the two algorithms have been found to give good recovery on several occasions, the relative performance of other methods can be established. (p. 404)

Recently, though, Overall, Gibson, and Novy (1993) conducted a thorough validation study of 35 cluster analysis methods. The results of this study were somewhat different than those of previous studies. In the recovery of underlying population clusters with different patterns, as well as different profile elevations, Overall et al. (1993) discovered that Ward’s and Complete Linkage methods of cluster analysis were the most robust methods studied.

The specific type of algorithm or formula used to determine the distance between, and similarity within clusters must be examined. Ward’s, Average Linkage, and Complete Linkage hierarchical procedures are perhaps the best overall methods of clustering data. In Ward’s method, the cluster means across all variables are calculated, and then the squared Euclidean distance between each subject and the mean is summed. Clusters are combined at subsequent stages such that the overall sum of squared within cluster distance is minimized (Hair et al., 1992; Norusis, 1988).
Ward's method is biased toward creating clusters with equal numbers of subjects in each cluster (Hair et al., 1992).

In the Average Linkage Within Groups method, subjects are not compared with the mean of the cluster, but with each other. In this method, every subject is compared with every other subject in the group and clusters are formed so that the average distance between cluster members is as small as possible (Hair et al., 1992; Norusis, 1988). Average Linkage clustering methods are less affected than other methods by the effects of outliers in the data. (Hair et al., 1992; Norusis, 1988). This method also tends to produce clusters with similar variances. Average Linkage Between Groups method of cluster analysis is similar, but rather than comparing each member to every other member of the same cluster, the clusters are determined by maximizing the average distance between members of one group in comparison to the members of the other groups.

The Complete Linkage method of cluster analysis is often used in the literature. In this procedure the distance between clusters is calculated as the distance between the furthest points in the clusters. Clusters are formed to produce groups which have maximum distance between these data points. Because maximum distance is used as the criterion to form clusters, an extreme score may cause unnatural groupings to occur with some regularity. Some research suggested that this method has not performed as
well as Ward's and Average Linkage methods (Milligan, 1981). But more recently, Complete Linkage has performed best at retrieving underlying clusters which vary on profile elevation, not shape of profile (Overall et al., 1993). The preceding paragraphs highlight the methods of cluster analysis known as "hierarchical" methods. These forms of cluster analysis are the most common in the literature and were selected for use in the current study based upon the wealth of data regarding their reliability and validity. These are not the only methods of cluster analysis, but appear to be the most respected in the literature.

Non-hierarchical clustering procedures are also used in the literature, but there are several drawbacks to their use. Non-hierarchical clustering procedures require prespecified starting points or cluster centers, and then all subjects or observations which fall within a specific distance from the center are combined into clusters. One either begins with a single starting point or with several starting points in non-hierarchical clustering methods. One advantage with non-hierarchical clustering techniques is that if a subject is beyond the prespecified distance from the starting point, the data from that subject will not be forced into a cluster rather, it will be left out of the solution. Although outliers in the data are not a problem in non-hierarchical procedures, identification of beginning center points for the clusters poses a problem. Unless the
researcher has a clear theoretical or practical basis for pre-identifying cluster centers, it is very difficult to determine a good "natural" cluster center.

As the reader can grasp, there are a number of different clustering algorithms (Ward’s, Complete Linkage, etc.) each with relative strengths and weaknesses. Understanding cluster analysis does not end, however, at identification of the clustering algorithm. In addition to the formula used to determine cluster profile membership, it is necessary to delineate which interprofile distance measure is to be used in the clustering algorithm. This formula is used to compute interprofile distance, or to compute how "far apart" are the sets of data about each subject. These formulas are also called "distance" or "similarity" measures. Perhaps these formulas should be referred to as measures of "proximity." The most commonly used, and best proximity measure is Squared Euclidean Distance (Overall et al., 1993). To determine the Euclidean distance (proximity) between two subjects who were assessed along two dimensions, the differences between the subjects on each variable are squared, and the sum of the the two products is computed, 

$$[(X_1 - X_2)^2 + (Y_1 - Y_2)^2]$$. Finally, the square root of the result is then calculated. If there are more than two dimensions, it is easy to see how the differences between subjects would be computed, but it is extremely time consuming and difficult to do by hand.
With the development of high speed computers and software, cluster analysis is now a popular statistical procedure which may be easily misused. Due to the abundance of methods to perform cluster analysis, care must be taken to insure that the correct procedures are followed. Based upon reviews of the literature, squared Euclidean distance is the interprofile distance measure of choice, and there is general agreement that Ward's, Average Linkage, and Complete Linkage are the most robust clustering algorithms.

Once the methods and proximity measures are selected, cluster analysis is still not complete. The final piece of information needed to undertake a study involving cluster analysis is information regarding how many "true clusters" are in the data. Perhaps this has been the most challenging aspect of cluster analysis. There are many opinions about when to stop the clustering algorithm from splitting the data into smaller clusters, and no firm conclusions can be drawn from the literature. Hair, Anderson, Tatham, and Black (p. 279, 1992) said:

Unfortunately, no standard, objective selection procedure exists. The distances between clusters at successive steps may serve as a useful guideline, and the analyst may choose to stop when this distance exceeds a specified value or when the successive distances between steps make a sudden jump.... In the final analysis, however, it is probably best to compute solutions for several different clusters (e.g., two, three, four) and then decide among the alternative solutions based upon a priori criteria, practical judgment, common sense, or theoretical foundations. Also, one might start this process by saying, "My findings will be more manageable and easier to communi cate if I have, for example, three to six clusters,"
and then solve for this number of clusters and select
the best alternative after evaluating all of them.

This tactic was adopted in the current study. In addition,
the recommendation of Cyr, Atkinson, and Haley (1986) was
followed. These authors recommended utilizing the cluster
solution which contained the most clusters, with a minimum
of 10 subjects per cluster. Since there are no clearly
superior methods of arriving at numbers of clusters, several
factors were taken into account, including minimum number of
subjects in each cluster (ten), clinical significance of
clusters, and similarity to previous studies. Further
research is needed in this area to help make this proces
more reliable and valid.

In studies which involve cluster analysis, Blashfield
(1980) outlined several criteria which should be reported in
the methodology in order to communicate the results in a
meaningful fashion. These criteria are as follows: "An
unambiguous description of the cluster analytic method
should be provided" (p. 456). The second criterion was "The
choice of similarity measure for statistical criterion (if
an iterative procedure is used) should be clearly specified"
(p. 457). Blashfield's (1980) third criterion was that
"The computer program used to perform the cluster analytic
method should be stated" (p. 457). The fourth criterion was
"The procedure used to determine the number of clusters
should be explained" (p. 457). And finally, the fifth
criterion was:
Adequate evidence of the validity of a cluster analytic solution should be provided before the solution is published.... replicating a solution across parallel data sets, across different cluster analytic methods, and across a different collection of variables as three general procedures to validate a solution (p. 457).

The current study followed these guidelines in the presentation of the results and subsequent discussion. Blashfield (1980) was critical of previous research which did not meet these criteria because the communication of the results is limited.
CHAPTER 3

REVIEW OF THE MCMI AND MCMI-II

The Millon Clinical Multiaxial Inventory (MCMI) and its revised version (Millon Clinical Multiaxial Inventory-II or MCMI-II) are specifically designed to measure personality disorders or personality styles (Millon, 1987; Choca, Shanley, & Van Denburg, 1992; Choca, Shanley, Van Denburg, Agresti, Mouton, & Vidger, 1992) as well as clinical syndromes such as depression or anxiety disorders. These inventories closely correspond to the disorders represented in DSM-III-R. The MCMI-II has become widely used in clinical practice as well as research (Choca, Shanley, & VanDenburg, 1992). In addition, the MCMI-II has been used in a number of cluster analytic studies. The MCMI-II was chosen as an appropriate measure for the current study because of its wide use in clinical practice, and previous literature in which cluster analysis was used.

The MCMI-II is comprised of 175 true-false items. Three steps were used to derive these items. First, Millon's theory was used to select items which should measure the personality styles and clinical syndromes of interest. Out of this large pool (several thousand) alternate forms of the instrument were administered to
clinical populations and item-total correlations were used to reduce the number of items. Then, patient populations were given the instrument and clinical judgement was used to assess the accuracy of the scales in diagnosing the groups. Through this process more items were eliminated. Finally the instrument was administered to clinical populations with various diagnoses. Final items (175) were retained if they (1) helped define diagnostic groups, and (2) represented Millon’s theoretical positions. After the MCMI-I was developed, research to improve the accuracy of the instrument was undertaken. In addition, two new scales were added (Aggressive-Sadistic & Self-Defeating) to bring the instrument more closely in line with diagnoses being considered by DSM-III-R in the Appendix. The procedure to replace items was similar to the original development of the MCMI-I. After thorough evaluation, 45 items were replaced and the result was the MCMI-II (1987).

Through weighted combinations of items, ten personality disorder scales and three severe personality disorder scales are computed in addition to six clinical syndromes and three severe syndrome scales. The diagnostic categories on the MCMI-II approximate those in DSM-III-R. The ten basic personality scales are Schizoid, Avoidant, Dependent, Histrionic, Narcissistic, Antisocial, Aggressive-Sadistic, Compulsive, Negativistic, and Self-Defeating. The three severe personality disorder scales are Schizotypal, Border-
The six clinical syndrome scales are Anxiety, Somatoform, Bipolar-Manic, Dysthymic, Alcohol Dependence, and Drug Dependence. The three severe syndrome scales are Thought Disorder, Major Depression, and Delusional Disorder. In addition, there are two modifier indices which detect either Desirability or Debasement, and finally a Validity scale which detects positive endorsement of extremely unlikely responses.

The standardization sample for the MCMI-II included 1,292 subjects. The group was drawn from a variety of outpatient and inpatient clinical populations and prisons, in addition to non-clinical groups. The ethnic breakdown was approximately 88% Caucasians, 7% African-Americans, 4% Hispanic/Latinos, and 1% others. There were approximately equal numbers of men and women in the standardization group (Millon, 1987).

Millon (1987) provided convincing evidence of the MCMI-II's reliability and validity, and numerous other studies have shown the instrument's value in clinical and research activities (Choca et al., 1992; Donat et al., 1992). The instrument's demonstrated utility, along with its relative brevity, has made it a very popular diagnostic/descriptive tool.

One of the desirable features of the MCMI-II is that the items were theoretically derived and then subjected to
analysis. This is unlike the procedures used to develop similar instruments which have no theoretical base. The MCMI-II was constructed not to represent "pure" factor scales but to represent actual clinical and personality disorders, thus item overlap across scales was not eliminated because several items could be representative of more than one disorder. Millon (1987) gave an example of how item overlap between scales makes clinical sense. There are many similarities between the avoidant and the schizoid personality in terms of symptom presentation and dynamics. Therefore, overlap between these two scales on the MCMI-II represents the "true" state of affairs in the world, not a weakness of the test. Recognizing the statistical difficulties with item overlap, the items in the MCMI-II have been weighted differentially according to the particular scale being scored. Thus, an item might be more important in some diagnoses than in others and is therefore weighted accordingly. So "prototype" items of a disorder are given the highest weight (3), while items which are less central to the trait being assessed are given lesser weights for endorsement by the subject (1 & 2). In any event, internal consistency of the scales was sought by the developers of the test as was the ability of the test to discriminate between disorders. Millon (1987) reports internal consistency correlations (Kuder-Richardson) ranging between .81 to .95 on the clinical scales with a median of .90.
Other reviewers have noted that the instrument does have a high degree of sensitivity to the presence of various personality dimensions (Choca et al., 1993). However, clinical experience indicates that the instrument may produce more false-positives than would be desirable. For this reason, Choca et al. (1993) suggest using the instrument as a measure of personality styles, not personality disorders as Millon (1987) suggested.

McCann (1991) conducted an analysis of the MCMI-II and the MMPI to determine the convergent and discriminant validity of the personality disorder scales. The study involved 80 psychiatric inpatients who suffered from a diagnosed personality disorder. McCann (1991) compared the MCMI-II personality scales which had item overlap with other scales which had no item overlap, in addition to correlating all the scales with comparable MMPI scales. McCann (1991) found that "item overlap did not appear to affect convergent/discriminant validity in general" (p.15). McCann (1991) conducted factor analyses in addition to scale correlations and found results which supported the theoretical framework of Millon's personality theory.

McCann (1991) found that three scales were most affected/contaminated by item overlap: Passive-Aggressive, Self-Defeating, and Borderline. However McCann (1991) also found that the Borderline and Paranoid scales performed better at diagnosing patients with the overlapping items
than without them.

Other research on the MCMI-II involved factor-analytic studies to determine if the clinically derived factors are representative of the underlying personality factors postulated by Millon. Strack, Lorr, Campbell, and Lamnin (1992) reported the results of a factor analytic study of over 200 subjects which assessed the underlying personality and syndrome factors of the MCMI-II. Their results supported the validity of the MCMI-II in addition to the underlying biopsychosocial model of Millon.

The MCMI-II is scored by using Base Rate scores rather than T scores. The Base Rate (BR) scores are not normally distributed. Millon (1987) anchored the BR scores to the prevalence of the particular disorder in the standardization sample of over 1,200. Thus a BR score of 74 indicates the presence of a clinical syndrome or the presence of a particular personality style. A BR score of 84 or above indicates a prominent clinical syndrome, or prominent personality style.

The cutoff scores do not represent a standard percent of the theoretical distribution since disorders occur at different rates in the population. The scores are adjusted to maximize the positive-predictive-validity and minimize the number of false-positives. In other words, the cutoff scores are prorated to match the number of patients in a clinical population who suffered from a disorder based upon
the normative population (Millon, 1987). Other tests have used standardized scores and view the cutoff as two standard deviations above the mean (T > 70). A standardized distribution assumes a normally distributed population, and therefore the prevalence rate based upon a score two standard deviations above the mean would indicate that only 2.3% of the population would be diagnosable or score above the criterion. For instance, the prevalence of schizophrenia is 1-2% (American Psychiatric Association, 1987) yet the prevalence of alcoholism may be as high as 10% (Corbisiero & Reznikoff, 1991). Therefore, if one constructed scales to measure schizophrenia and others to measure alcoholism, a T Score of 70 on either of these would suggest that 2.3% of the population would score at this rate or higher. This logic does not follow from the prevalence rates of these disorders.

Lorr, Strack, Campbell, and Lammn (1990) conducted an item factor analysis of the MCMI-II with data collected from 248 male psychiatric patients. The inpatient subjects were tested between two and four weeks after admission, and outpatients were tested between two weeks and one year after initial treatment. Lorr et al. (1990) concluded that there were six or seven factors which accounted for the variance in the personality disorder scales and that this view was consistent with the structure of the MCMI-II. Lorr et al. (1990) also concluded that their results were consistent
with Millon's in that a dimensional, rather than categorical, view of personality and personality disorders was supported.

Overall, the MCMI-II appears to be one of the best self-report measures designed to assess dimensions of personality. It has been used widely in clinical practice and research (Streiner & Miller, 1989) with satisfactory reliability and validity. Although Millon's personality theory and description of personality disorders are not identical to those in DSM-III-R, there is considerable congruence between the personality styles and disorders described by Millon (1987) and those of the DSM-III-R. Because of the MCMI-II's compatibility to the diagnostic categories of DSM-III-R, along with the test's ease of administration, and prevalence among the literature on personality and psychopathology, it was selected for use in the current study.
Millon (1987) has suggested that a desirable way to interpret the MCMI is as a profile with many data points taken into account. For instance, a dependent-compulsive person would probably present a different clinical picture than would a dependent-histrionic person. Thus, when interpreting standardized tests such as the MCMI, one should take into account the overall profile of scores, not just singular data points. This type of interpretation can be done with cluster analytic studies involving psychiatric patients assessed with the MCMI and MCMI-II.

One early study which demonstrated the use of cluster analysis on MCMI data was conducted by Bartsch and Hoffman (1985). The authors obtained MMPI and MCMI data on 125 male veteran inpatient alcoholics. The authors performed a hierarchical cluster analysis of the MCMI profiles and found that "... conceptually meaningful clusters exist among MCMI profiles" (Bartsch & Hoffman, 1985, p.707). Bartsch and Hoffman (1985) used subjects who were admitted to an alcohol treatment facility and rejected subjects who also had "obvious histories of drug abuse" (p. 708). The subjects completed the MCMI within seven to ten days of admission to
the facility. Bartsch and Hoffman (1985) transformed the MCMI scales to standard scores with a mean of zero and variance equal to one so that each scale could "... contribute equally to the determination of cluster membership" (p. 708). These transformed scores were used in the statistical analyses.

Bartsch and Hoffman (1985) reported five distinct groups on the basis of their cluster analysis of MCMI data for the inpatient alcoholics. The first group peaked on scales measuring Antisocial and Compulsive scales. The second group of subjects had elevations on the Narcissistic, Histrionic, and the Antisocial scales of the MCMI. The third group of subjects was typified by a peak score on the Negativistic scale with other elevations on the Dependent, Avoidant, Borderline, Paranoid, Anxiety, and Dysthymia scales. In the fourth group there were similarities to the second group. The MCMI profiles showed elevations on the Narcissistic, Antisocial, and Histrionic scales. In addition, Group Four showed elevations on the following scales: Schizoid, Avoidant, Negativistic. Finally, the fifth group of subjects displayed a pattern of MCMI scores in which the following scales were elevated: Schizoid, Avoidant, Dependent, Schizotypal, Borderline, Anxiety, and Dysthymia. The results of this study displayed how to use the MCMI to subdivide a seemingly homogeneous group (alcoholics) and provide information which could be used to
Craig, Verinis, and Wexler (1985) also conducted a study using the MCMI and cluster analysis of profiles. In their study, the authors utilized the MCMI profiles of 106 alcoholics and 100 drug addicts. Diagnoses were based upon the prevalence of alcohol and drug abuse, although most subjects in this study had histories of cross-substance abuse. The base rate scores of the MCMI were used in the statistical analyses.

Craig, Verinis, and Wexler (1985) found that there were two clusters of profiles for the drug addicts. The first cluster of drug addict profiles scored highest on the Narcissistic and Antisocial Personality scales and also scored highly on Alcohol and Drug Abuse Scales. The second cluster of drug addicts scored highly on the following scales: Negativistic, Avoidant, Anxiety, and Dysthymia.

Craig, Verinis, and Wexler (1985) reported four clusters in the profiles of alcoholics in their study. The first cluster scored highly on Negativistic, Borderline, and Paranoid scales. The second group scored highly on Dependent, Avoidant, Negativistic, and Schizoid scales. The third cluster scored highly on the Compulsive scale and within a normal range for psychiatric patients on the other scales. The last group of subjects scored highly on Narcissistic, Antisocial, Paranoid, and Drug Abuse scales.
Lorr and Strack (1990) conducted an investigation similar to that of the previous authors, but used the MCMI-II and a heterogeneous population of psychiatric patients. Lorr and Strack (1990) conducted a principal cluster analysis on MCMI-II profiles gathered from 166 male inpatients who carried diagnoses of schizophrenia, alcohol dependence, adjustment disorder, unipolar affective disorder, and bipolar affective disorder. These subjects were tested within two to four weeks of admission for inpatients, and outpatients were tested from two weeks to one year after treatment began. Base rate scores were used in the statistical analyses.

Lorr and Strack (1990) divided their subject pool into two groups of 83 and conducted separate cluster analyses of the data. The results were comparable across groups. The results of the analysis yielded four profile groups. The first group scored highest on Antisocial, Aggressive-Sadistic, and Negativistic scales while also scoring highly on Avoidant and Borderline scales. The first group scored lowest on the Dependent and Compulsive scales. The second group scored highest on the following scales: Avoidant, Schizoid, Self-Defeating, Schizotypal, and Borderline. The Histrionic and Narcissistic scales were the lowest in the second group. The third group of profiles had elevations on the Schizoid, Dependent, and Compulsive scales. The fourth and final group displayed "flat" profiles with no striking
Donat, Walters, and Hume (1991) conducted a cluster analytic study involving the MCMI personality profiles of 200 patients who had histories of alcohol or polysubstance abuse. In addition, Donat et al. (1991) administered the Alcohol Use Inventory to determine if there were any relationships between style of alcohol use and personality cluster. The authors used two methods of cluster analysis in their study, Complete Linkage and K-Means. Kappa was computed to measure the level of agreement corrected for chance between the two clustering methods. Kappa was computed to be $0.70, p < 0.01$, indicating significant agreement between the two clustering methods.

Donat, Walters, & Hume (1991) found a five cluster solution using both methods of cluster analysis with between 33 and 50 subjects in each cluster. There was considerable similarity between the clusters and those of previous studies involving alcoholics. Cluster I had elevations on the Dependent and Compulsive scales. Cluster II had elevations on the Histrionic, Narcissistic, and Antisocial scales. Cluster III had elevations on the Schizoid, Avoidant, Dependent, and Negativistic scales. Cluster IV had elevations on the Schizoid, Avoidant, Dependent, Negativistic, and Borderline scales. Finally, Cluster V had elevations on the Negativistic, Histrionic, and Borderline scales. Cluster membership differentiated between subjects
on a number of alcohol use characteristics including perceived benefits, problems resulting from use, and drinking style.

Donat, Geczy, Helmrich, and LeMay (1992) conducted a similar study of 195 psychiatric patients from a state hospital. The MCMI-II was included in the study to determine the existence of personality subtypes within the group of psychiatric patients. Subjects were predominantly white, and approximately equal in numbers of men and women. Of the patients, 24% were diagnosed as suffering from schizophrenia, 22% were diagnosed as suffering from an affective disorder, 19% received the diagnosis of "psychotic disorder" (Donat et al., 1992: p. 39), and the others had diagnoses including organic syndromes, substance abuse, adjustment disorders, or Axis II disorders.

The data from the MCMI-II's were subjected to two types of cluster analyses, K-Means and Complete Linkage, to check the congruence of these two methods. Donat et al. (1992) selected five clusters as the cutoff in the K-Means analysis and the results were as follows. The first group was characterized by peak scores on the Compulsive and Dependent scales. They had valleys on the Avoidant, Negativistic, and Borderline scales. This first group represented 16% of the patients. The second cluster of profiles derived from the data represented 34% of the patients in the study by Donat et al. (1992). This group peaked on the Dependent scale and
the other scales were relatively flat. The third group of profiles represented 18% of the sample and had peaks on the Dependent, Avoidant, Schizoid, and Negativistic scales of the MCMI-II. This group had low scores on the Compulsive scale. The fourth cluster of profiles scored highly on the Negativistic, Borderline, Self-Defeating, Avoidant, and Antisocial subscales. On the Compulsive scale, this group scored relatively low. The fifth cluster from Donat et al. (1992) scored highest on the Narcissistic, Antisocial, Histrionic, and Aggressive-Sadistic scales. This group had valleys on the Schizoid and Dependent scales. The fifth cluster represented 14% of the patients in the sample.

Donat et al. (1992) also conducted a Chi-Square analysis to determine if there was any systematic relationship between diagnostic grouping and cluster membership. Consistent with other studies, they did not find a significant relationship. Donat, et al. (1992) reported that their clusters were quite similar to those found earlier by Lorr and Strack (1990) who used similar methodology.

Corbisiero and Reznikoff (1991) examined the relationship between personality type (MCMI) and style of alcohol abuse. The authors had a sample of 250 male inpatients who completed the measures at three different Department of Veterans Affairs medical centers (VA). The average age was 40, and the ethnic breakdown was 62% White, 31% African-American, and 7% Hispanic.
Corbisiero and Reznikoff (1991) used Euclidean distance as their interprofile distance measure but they did not mention which method (i.e., Ward’s, Average linkage) they used. Blashfield (1980) criticized this practice since the results are then not comparable to other studies. In an interesting follow up, the authors used the clusters as grouping variables in "multiple one-way analyses of variance" of the scales to measure drinking behavior and to measure group differences on all of the MCMI scales.

Two things were striking about this. First, conducting more than one ANOVA (Analysis of Variance) increases the likelihood of finding significance as error accumulates. Second, it is somewhat curious to conduct an ANOVA on the personality scales of the MCMI since they were the variables which went into the clustering algorithm, and, as expected, there were significant differences between groups on the personality scales. However, it is also interesting that every clinical symptom scale (i.e., Anxiety, Dysthymia, etc.) was significantly different across groups at the $p<.0001$ level. The authors also conducted post-hoc Scheffe’s analysis to compare groups with each other.

Given the large sample ($n=250$) it is rather curious that Corbisiero and Reznikoff ended up with only three clusters of subjects, with one cluster containing 165 individuals or 66% of the sample. The other two clusters contained 24 and 58 subjects each. The only details on the
exact procedures used to form the clusters was that Euclidean distance on the Statistical Package for the Social Sciences (SPSS-X) was used and that three outliers were dropped from the sample.

The authors (Corbisiero & Reznikoff, 1991) found that the smallest cluster had a relatively flat profile and no scales reached significant levels. The second largest cluster scored highly on the Narcissistic and Antisocial personality scales. The largest group scored highly on the Passive-Aggressive, Avoidant, and Schizoid personality scales.

From the previous studies, it is clear that the MCMI and MCMI-II have been used successfully in research aimed at finding personality subtypes of psychiatric patients. Most of these studies contained in their discussion of the results the notion that this type of research is important if researchers are going to develop more refined treatment strategies based upon the individual personality of patients. For example, Donat et al. (1992) stated that "We anticipate that an understanding of a patient's personality features will be useful in understanding reactions to hospitalization and discharge and in developing more effective methods of presenting and encouraging rehabilitative tasks" (p. 49).

The current study is an extension of the previous research. The aim here is to conduct cluster analyses on
the MCMI-II personality profiles of individuals with the following Axis-I diagnoses: paranoid schizophrenia, non-paranoid schizophrenia, unipolar affective disorder, bipolar affective disorder, and alcohol/substance abuse. Inclusion of an "other" subset of individuals with mixed or unknown diagnostic groups as has been done in the past severely limits any conclusions one may draw from the results. One cannot communicate effectively, nor draw conclusions from data if the group being studied has no parameters.

This study will be most like that of Corbisiero and Reznikoff (1991), however, some of the weaknesses of that study will be addressed in the methodology. Also, a general psychiatric population, not just alcoholics, will be used in the current study.

HYPOTHESES

(1) It is predicted that there are several distinct personality clusters as measured by the MCMI-II in the current psychiatric population and (2) these prototypical patterns will be comparable across clustering methods. In addition (3) these personality clusters are predicted to score differently on the clinical symptom scales of the MCMI-II.
CHAPTER 5

METHOD

Subjects

The current study involved MCMI-II’s which were completed by psychiatric inpatients of a large metropolitan VA medical center. The instruments were collected between 1990 and 1993. All subjects were previously given the MCMI-II as part of a regular, on-going effort to collect information about psychiatric inpatients at the VA. There were a total of 356 profiles on the computer archives of the Psychology Service of the VA. After screening to eliminate (1) invalid profiles, (2) subjects who did not meet the diagnostic categories of interest, (3) female subjects (only males were used in the current study), and (4) subjects whose diagnosed psychiatric conditions were inconsistent across time, the final sample consisted of 172 former male inpatients of the VA medical center. During cluster analyses, one subject was eliminated because his scores were extremely deviant from the rest of the sample and as a result, the solutions were extremely distorted. The final number of subjects was 171.

Demographic data on the subjects was as follows: the average age was 47.1, (SD = 10.9). The age range was from
29 to 77. There were 92 (53.8%) Caucasian subjects, 76 (44.4%) African-American subjects, and 3 (1.8%) Latino/Hispanic subjects. In all subsequent analyses, ethnicity was collapsed into two groups, Caucasian and Non-Caucasian, because of the small number of Latino/Hispanic subjects.

If the subject had been diagnosed with more than one Axis I disorder (alcohol or substance abuse excluded) in the medical records (i.e., one time diagnosed with bipolar affective disorder and then at another time diagnosed with schizophrenia) he was excluded from the sample. All of the subjects had one of the following primary discharge diagnoses in the medical records during the stay in which the patient was given the MCMI-II: Paranoid Schizophrenia (n=18), Non-Paranoid Schizophrenia (n=25), Unipolar Affective Disorder (n=72), and Bipolar Affective Disorder (n=23). The remaining subjects (n=33) had a primary diagnosis of alcohol or substance abuse/dependence.

The diagnoses were made by the ward staff, and final discharge diagnoses were made or supervised by the attending psychiatrist. The MCMI-II's were available to the staff, but the final diagnoses were reached with behavioral observations, reactions to pharmacological interventions, history, and other information.

Procedure

In the current study, Base Rate scores of the 13 MCMI-
II personality scales were used in the cluster analysis. A decision to use Base Rate scores was made for several reasons. First, previous research suggests that use of raw scores (weighted and unweighted) and Base Rate scores (Strack, Lorr, Campbell, & Lamnin, 1992) leads to comparable results. Strack et al. (1992) concluded that use of Base Rate scores "... may have an edge over raw scores in most circumstances since they are the values that clinicians use" (p. 48).

Three algorithms were used in the analysis of the scores due to the finding that different methods of analysis may lead to different solutions (Morey, Blashfield, & Skinner, 1983; Scheibler & Schneider, 1985). As mentioned, Ward's, Complete Linkage, and Average Linkage have performed well in a number of studies, so they were the methods chosen for the current study. In all three methods, squared Euclidean distance was the interprofile distance measure.

Setting the criteria for delimiting "natural" groupings of the data was based upon two commonly used methods. Previous research with similar populations was used as a guide and consequently solutions for each method (Ward's, Average Linkage Within, and Complete Linkage) based upon three to seven clusters were used. First, solutions that yielded clusters with less than ten members each were deemed unacceptable. In each method, solving for six or seven clusters yielded at least one group with fewer than ten
members therefore those solutions were rejected leaving solutions with five or fewer clusters.

A second common rule used to decide what clusters are natural, or when to stop making divisions between groups, is to examine the coefficients for the proximity measure (squared Euclidean distance) at each step in the combination of cases. Hierarchical cluster analysis involves successive grouping of subjects such that in the beginning the two subjects whose profiles are most similar are combined into one cluster. The squared Euclidean distance between them is computed and reported. The distance is quite small because the subjects are very similar to each other. As subjects are combined from small groups which are quite similar, finally into one large group which is quite dissimilar, the coefficient of their proximity increases. The key is then is to find out at which stage in the combinations a large jump in the proximity coefficient occurs, indicating that subjects which are very dissimilar from each other have been combined into one group. However, in the current study, there was not a substantial difference in cluster coefficients between the three, four, and five cluster solutions (see Table 1). Therefore, because the six cluster solutions contained clusters with less than ten subjects, and because there were significant differences in the shape of the profiles if the clusters were reduced to four, it was decided that a five cluster solution using each
Table 1

Agglomeration Schedule of Squared Euclidean Distance between Base Rate Scores for Ward’s, Complete Linkage, and Average Linkage Within Groups Methods

<table>
<thead>
<tr>
<th>CLUSTERING METHOD</th>
<th>Ward’s</th>
<th>Complete Linkage</th>
<th>Average Linkage Within Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 Clusters</td>
<td>641397.6</td>
<td>28177.0</td>
<td>9051.3</td>
</tr>
<tr>
<td>6 Clusters</td>
<td>684011.3</td>
<td>30213.0</td>
<td>9202.8</td>
</tr>
<tr>
<td>5 Clusters</td>
<td>734630.0</td>
<td>34667.0</td>
<td>9966.7</td>
</tr>
<tr>
<td>4 Clusters</td>
<td>800943.4</td>
<td>50598.0</td>
<td>10239.5</td>
</tr>
<tr>
<td>3 Clusters</td>
<td>946146.2</td>
<td>52190.0</td>
<td>13264.7</td>
</tr>
</tbody>
</table>

Note: Squared Euclidean distance was the proximity measure in all methods.
In addition, a third common rule is to stop combining clusters if clinically different profiles emerge from the data which are combined. In the current study, reducing the solution to four clusters eliminated some differences which helped differentiate profiles and may have clinical significance. Therefore, a solution with five clusters seemed most appropriate for this data set, but as Hair et al. (1992) noted, this is a difficult decision to make.
CHAPTER 6
RESULTS

All results were obtained using SPSS/PC+ 4.0 (Norusis, 1990). As mentioned previously, a solution with five clusters was derived from the data using Ward's, Average Linkage Within Groups, and Complete Linkage methods. Comparison of Profiles by Clustering Algorithm

Visual comparisons of profile similarity across methods indicated that the results were largely equivalent. There was striking visual comparability across methods of cluster analysis in terms of profile elevation and shape (see Figures 1-5). Some have concluded that cluster analysis is of questionable validity because different clustering algorithms may produce significantly different results. In the current study, the results were similar.

One way to compare results across clustering methods is to compute Pearson Product-Moment correlation coefficients for the mean profiles derived in the clustering solutions (Donat, Walters, & Hume, 1991; Overall, Gibson, & Novy, 1993). Pearson coefficients are sensitive to profile shape, not elevation.

In the current sample, the average profiles derived from each clustering solution were compared, and the
Fig. 1 First Clusters of MCMI-II Profiles
Fig. 2 Second Clusters of MCMI-II Profiles
Fig. 3 Third Clusters of MCMI-II Profiles
Fig. 4 Fourth Clusters of MCMI-II Profiles
Fig. 5 Fifth Clusters of MCMI-II Profiles
resulting Pearson coefficients were quite high, suggesting that the average profiles across methods were comparable. The Pearson Coefficients ranged from .894 to .975 for Cluster One of Ward's, Complete Linkage, and Average Linkage Within Groups methods. All Pearson Coefficients were significant, p < .001 (see Table 2). These coefficients suggest a high degree of similarity across clustering methods.

Cluster Two was nearly identical in shape and elevation across methods (see Figure 2). Pearson coefficients comparing Cluster Two ranged from .975 to .999 (see Table 2). All coefficients were significant, p < .001. Again, this high degree of association suggests that the clustering algorithms did lead to similar results.

Cluster Three was comparable in shape and elevation across the clustering methods (see Figure 3). Pearson coefficients for Cluster Three across methods were quite high, ranging from .931 to .969 (see Table 2). All coefficients were significant, p < .001.

Cluster Four was nearly identical in shape and elevation across clustering methods (see Figure 4). Pearson coefficients for the fourth clusters ranged from .930 to .981 (see Table 2). All values were significant, p < .001.

Cluster Five of Ward’s method and of Complete Linkage method was similar. The Pearson coefficient comparing these two profiles was .935, p < .001 (see Table 2). This suggests
Table 2

Pearson Product-Moment Correlation Coefficients, Pairwise Comparisons of Equivalent Clusters Across Methods

<table>
<thead>
<tr>
<th></th>
<th>AL1</th>
<th>CL1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ward1</td>
<td>.894</td>
<td>.975</td>
</tr>
<tr>
<td>AL1</td>
<td>.941</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AL2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ward2</td>
<td>.976</td>
<td>.975</td>
</tr>
<tr>
<td>AL2</td>
<td>.999</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AL3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ward3</td>
<td>.931</td>
<td>.965</td>
</tr>
<tr>
<td>AL3</td>
<td>.969</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AL4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ward4</td>
<td>.979</td>
<td>.981</td>
</tr>
<tr>
<td>AL4</td>
<td>.930</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AL5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ward5</td>
<td>.934</td>
<td>.935</td>
</tr>
<tr>
<td>AL5</td>
<td>.790</td>
<td></td>
</tr>
</tbody>
</table>

*AL=Average Linkage Within Groups
CL=Complete Linkage

**All Pearson product-moment correlation coefficients were significant, p < .001
considerable similarity in profile shape. In addition, the
coefficient comparing Cluster Five of Average Linkage Within
Groups method with the fifth cluster of Ward's method was
.934 and this value was also significant, \( p < .001 \).

Cluster Five of Average Linkage Within Groups method
and Complete Linkage method was less similar than the other
clusters derived from the data. The Pearson Coefficient
comparing the fifth clusters of Average Linkage Within
Groups and Complete Linkage methods was .790, \( p < .001 \).

Overall, there was considerable congruence between the
clustering solutions. There were 15 possible comparisons to
be made and of these observed Pearson coefficients, 13
values were above .930, and all were statistically signifi-
cant. These results are comparable to those of Donat,
Walters, and Hume (1991) who reported Pearson coefficients
ranging from .73 to .99 in their study.

Pearson coefficients can assess one dimension of the
solutions derived from clustering algorithms, namely the
degree of profile similarity. A second method has been used
to assess the results of clustering algorithms. In addition
to the overall shape of average profiles derived from
various clustering algorithms, it is of interest to know how
individual subjects were grouped across methods. Cohen's
Kappa (Cohen, 1960) has been used to assess the placement of
individual subjects across clustering methods. Kappa was
originally intended to assess the degree of agreement
between independent raters who classified subjects into nominal categories. However, when there are equal numbers of clusters across clustering solutions, Kappa has been used to assess the agreement of clustering methods where the placement of individual subjects is concerned (Lorr, 1983; Morey & Agresti, 1984; Overall, et al., 1993).

In the current study, Kappa coefficients comparing the placement of individual subjects across methods were computed and all were statistically significant (see Table 3). These results are not particularly robust. However, they are significant and further support the conclusion that researchers can use different methods of cluster analysis and achieve similar results.

**Cluster Descriptions**

There was support for the hypothesis that several personality clusters would be found in the data. As mentioned, solutions with five clusters were found in all three methods of cluster analysis: Ward's, Complete Linkage and Average Linkage. Descriptions of the clusters are as follows.

Cluster One is typified by individuals who would be described as Dominant. Narcissistic, Antisocial, and Aggressive-Sadistic scales (5, 6A, & 6B) were elevated (see Tables 4, 5, & 6) for this group. This cluster comprised 24% of the sample using Ward's method, 18% of the sample using Complete Linkage method, and 16% of the sample using
Table 3
Kappa Coefficients Comparing Solutions Derived from Three Clustering Methods

<table>
<thead>
<tr>
<th></th>
<th>Complete Linkage</th>
<th>Average Linkage Within</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ward's</td>
<td>.629 (T=16.3)</td>
<td>.636 (T=15.9)</td>
</tr>
<tr>
<td>Complete Linkage</td>
<td>.539 (T=14.2)</td>
<td></td>
</tr>
</tbody>
</table>

Note: All k values were significant; p<.05 (1), two-tailed.
Average Linkage Within Groups method.

Cluster Two is representative of people who would be described as Detached-Dependent (see Tables 4, 5, & 6). The notable elevations for this group were on scales for Schizoid, Avoidant, Dependent, and Self-Defeating traits (1, 2, 3, & 8B). Cluster Two using Ward's method comprised 12% of the sample, as did the second cluster of Complete Linkage and Average Linkage Within Groups methods.

Cluster Three would be described as Compulsive-Defensive profile. Cluster Three is a common profile among psychiatric inpatients and is representative of individuals who frequently deny problems or weaknesses (Choca et al., 1992) (see Tables 4, 5, & 6). The only notable elevation was on the Compulsive (7) scale, but across clustering methods it was below a Base Rate of 70. Cluster Three using Ward's method comprised 12% of the sample, while the third cluster using Average Linkage Within Groups method and Complete Linkage method comprised 8% and 9% of the sample respectively.

Cluster Four is representative of Angry individuals who manifested extreme personality disturbance (see Tables 4, 5, & 6). The profile was elevated on the Negativistic, Antisocial, Borderline, Avoidant, Self-Defeating, Aggressive-Sadistic, Schizotypal, Paranoid, and Narcissistic scales (8A, 6A, 10, 2, 8B, 6B, 9, 11, & 5). The fourth cluster of Ward's method comprised 26% of the sample. The
Table 4

Mean MCMI-II Personality Scale Scores Using Ward’s Method of Cluster Analysis

<table>
<thead>
<tr>
<th></th>
<th>WARD’S CLUSTER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=41</td>
</tr>
<tr>
<td></td>
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<tr>
<td>MCMI-II SCALE</td>
<td></td>
</tr>
<tr>
<td>SCHIZOID</td>
<td>67.7</td>
</tr>
<tr>
<td>AVOIDANT</td>
<td>63.7</td>
</tr>
<tr>
<td>DEPENDENT</td>
<td>55.8</td>
</tr>
<tr>
<td>HISTRIONIC</td>
<td>72.9</td>
</tr>
<tr>
<td>NARCISSISTIC</td>
<td>88.3**</td>
</tr>
<tr>
<td>ANTISOCIAL</td>
<td>82.6*</td>
</tr>
<tr>
<td>AGG/SADISTIC</td>
<td>81.9*</td>
</tr>
<tr>
<td>COMPULSIVE</td>
<td>72.9</td>
</tr>
<tr>
<td>PASSIVE-AGG</td>
<td>69.6</td>
</tr>
<tr>
<td>SELF-DEFATING</td>
<td>64.9</td>
</tr>
<tr>
<td>SCHIZOTYPAL</td>
<td>67.2</td>
</tr>
<tr>
<td>BORDERLINE</td>
<td>66.5</td>
</tr>
<tr>
<td>PARANOID</td>
<td>74.0</td>
</tr>
</tbody>
</table>

Note: Values are Base Rate Scores
* Value greater than 74
**Value greater than 84
Table 5

Mean MCMI-II Personality Scale Scores Using Complete Linkage Method of Cluster Analysis

<table>
<thead>
<tr>
<th>SCALE</th>
<th>n=31</th>
<th>n=20</th>
<th>n=16</th>
<th>n=24</th>
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<tbody>
<tr>
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<td>58.9</td>
<td>85.2**</td>
<td>45.9</td>
<td>72.9</td>
<td>82.1*</td>
</tr>
<tr>
<td>AVOIDANT</td>
<td>53.8</td>
<td>88.4**</td>
<td>23.9</td>
<td>93.3**</td>
<td>95.3**</td>
</tr>
<tr>
<td>DEPENDENT</td>
<td>50.3</td>
<td>82.6*</td>
<td>55.6</td>
<td>63.5</td>
<td>75.2*</td>
</tr>
<tr>
<td>HISTRIONIC</td>
<td>68.8</td>
<td>31.7</td>
<td>47.1</td>
<td>76.2*</td>
<td>56.6</td>
</tr>
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<td>86.6**</td>
<td>16.8</td>
<td>43.1</td>
<td>85.6**</td>
<td>63.4</td>
</tr>
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<td>56.9</td>
<td>47.3</td>
<td>102.5**</td>
<td>79.4*</td>
</tr>
<tr>
<td>AGG/SADISTIC</td>
<td>79.6*</td>
<td>26.3</td>
<td>45.2</td>
<td>97.8**</td>
<td>71.8</td>
</tr>
<tr>
<td>COMPULSIVE</td>
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<td>67.1</td>
<td>49.0</td>
<td>57.3</td>
</tr>
<tr>
<td>PASSIVE-AGG</td>
<td>65.2</td>
<td>45.7</td>
<td>18.6</td>
<td>109.9**</td>
<td>87.9**</td>
</tr>
<tr>
<td>SELF-DEFEATING</td>
<td>60.0</td>
<td>80.0*</td>
<td>38.3</td>
<td>94.0**</td>
<td>90.2**</td>
</tr>
<tr>
<td>SCHIZOTYPAL</td>
<td>60.2</td>
<td>69.1</td>
<td>44.3</td>
<td>88.9**</td>
<td>87.3**</td>
</tr>
<tr>
<td>BORDERLINE</td>
<td>63.0</td>
<td>53.9</td>
<td>36.1</td>
<td>101.5**</td>
<td>82.3*</td>
</tr>
<tr>
<td>PARANOID</td>
<td>71.9</td>
<td>48.9</td>
<td>39.6</td>
<td>81.1*</td>
<td>66.5</td>
</tr>
</tbody>
</table>

Note: Values are Base Rate Scores
* Value greater than 74
**Value greater than 84
Table 6
Mean MCMI-II Personality Scale Scores Using Average Linkage Within Groups Method of Cluster Analysis

<table>
<thead>
<tr>
<th>AVERAGE LINKAGE WITHIN GROUPS CLUSTER</th>
<th>n=28</th>
<th>n=20</th>
<th>n=14</th>
<th>n=64</th>
<th>n=45</th>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>SCHIZOID</td>
<td>48.6</td>
<td>88.4**</td>
<td>44.5</td>
<td>79.4*</td>
<td>83.3*</td>
</tr>
<tr>
<td>AVOIDANT</td>
<td>46.0</td>
<td>89.8**</td>
<td>29.9</td>
<td>96.4**</td>
<td>89.0**</td>
</tr>
<tr>
<td>DEPENDENT</td>
<td>52.4</td>
<td>85.6**</td>
<td>52.4</td>
<td>63.9</td>
<td>80.9*</td>
</tr>
<tr>
<td>HISTRIONIC</td>
<td>77.1*</td>
<td>30.8</td>
<td>45.2</td>
<td>63.1</td>
<td>54.0</td>
</tr>
<tr>
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<td>88.3**</td>
<td>16.9</td>
<td>41.5</td>
<td>74.2*</td>
<td>59.9</td>
</tr>
<tr>
<td>ANTISOCIAL</td>
<td>83.0*</td>
<td>57.9</td>
<td>42.9</td>
<td>95.4**</td>
<td>65.8</td>
</tr>
<tr>
<td>AGG/SADISTIC</td>
<td>77.3*</td>
<td>27.7</td>
<td>39.7</td>
<td>88.0**</td>
<td>64.5</td>
</tr>
<tr>
<td>COMPULSIVE</td>
<td>70.1</td>
<td>50.5</td>
<td>64.1</td>
<td>50.1</td>
<td>67.4</td>
</tr>
<tr>
<td>PASSIVE-AGG</td>
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<td>15.8</td>
<td>106.0**</td>
<td>70.8</td>
</tr>
<tr>
<td>SELF-DEFEATING</td>
<td>56.8</td>
<td>80.2*</td>
<td>40.9</td>
<td>94.7**</td>
<td>82.6*</td>
</tr>
<tr>
<td>SCHIZOTYPAL</td>
<td>60.4</td>
<td>70.5</td>
<td>40.6</td>
<td>93.5**</td>
<td>76.1*</td>
</tr>
<tr>
<td>BORDERLINE</td>
<td>61.7</td>
<td>54.4</td>
<td>36.6</td>
<td>96.6**</td>
<td>69.3</td>
</tr>
<tr>
<td>PARANOID</td>
<td>72.1</td>
<td>50.4</td>
<td>35.4</td>
<td>74.7*</td>
<td>62.2</td>
</tr>
</tbody>
</table>

Note: Values are Base Rate Scores
* Value greater than 74
**Value greater than 84
fourth cluster of Complete Linkage method comprised 14% of the sample, while the fourth cluster of Average LinkageWithin Groups method comprised 37% of the sample.

Cluster Five is not as consistent across methods as the previous four clusters (see Figure 5). This group would be described as Detached-Obstructive-Disorganized for both Ward's and Complete Linkage methods. The peak elevations were on the Avoidant, Schizoid, Dependent, Passive-Aggressive, Self-Defeating, Schizotypal, and Borderline scales (1, 2, 3, 8A, 8B, 9, 10). Individuals in Ward’s Cluster Five comprised 26% of the sample (see Table 4), while those in Complete Linkage Cluster Five comprised 47% of the sample (see Table 5). This profile is similar to Cluster Two in shape, but is more elevated across variables suggesting similar personality style, but more pronounced traits.

The fifth cluster of the Average Linkage Within Groups method was somewhat different than the fifth cluster of the other two methods. This cluster would be called a Detached-Self-Defeating profile (see Figure 5). The elevations on Average Linkage Within Groups Cluster Five (26% of the sample) were on the Avoidant, Schizoid, Self-Defeating, Dependent, and Schizotypal scales (2, 1, 8B, 3, & 9) (see Table 6). Average Linkage Within Groups Cluster Five was most notably different than the fifth cluster of the other two methods in that the elevations on Scales 8A, 8B, 9, and 10 were lower. As with the fifth clusters of the other two
methods, this profile was similar in shape to Cluster Two, but more elevated across variables.

**Symptom Scale Elevations and Cluster Membership**

It was predicted that there would be differences on the clinical symptom scales of the MCMI-II based upon cluster membership as determined by the clustering solution. This finding was supported by the data. Once the personality cluster solutions were derived from the data, those cluster groups were used to determine the average elevations on the symptom scales of the MCMI-II. As was noted with the personality clusters, there was significant congruence across methods when comparing the average symptom scale elevations.

Subjects in Cluster One (Dominant) did not have an average clinical symptom scale score above the Base Rate score of 75. The symptom scale scores were generally in the 60’s, with the highest scale across clustering methods being Drug Dependence (see Tables 7, 8, and 9).

Cluster Two (Detached-Dependent) subjects scored above a Base Rate score of 75 on two clinical symptom scales; Anxiety and Dysthymia. In general, the other symptom scales were low (40’s and 50’s) (see Tables 7, 8, and 9). The subjects in Cluster Three (Compulsive-Defensive) did not
Table 7

Mean MCMI-II Symptom Scale Scores Using Personality Clusters from Ward's Method of Cluster Analysis

<table>
<thead>
<tr>
<th>MCMI-II SCALE</th>
<th>WARD'S CLUSTER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=41</td>
</tr>
<tr>
<td>ANXIETY</td>
<td>67.3</td>
</tr>
<tr>
<td>SOMATOFORM</td>
<td>60.5</td>
</tr>
<tr>
<td>BIPOLAR/MANIC</td>
<td>63.1</td>
</tr>
<tr>
<td>DYSTHYMIA</td>
<td>63.9</td>
</tr>
<tr>
<td>ALCOHOL DEP</td>
<td>74.0</td>
</tr>
<tr>
<td>DRUG DEP</td>
<td>74.6*</td>
</tr>
<tr>
<td>THOUGHT DIS</td>
<td>65.3</td>
</tr>
<tr>
<td>MAJ DEPRESSION</td>
<td>62.0</td>
</tr>
<tr>
<td>DELUSIONAL DIS</td>
<td>68.1</td>
</tr>
</tbody>
</table>

\[ F(4,166) = 2.15, \ p < .001 \ (Pillais) \]

Note: Values are Base Rate Scores
* Value greater than 74
**Value greater than 84
Table 8

Mean MCMI-II Symptom Scale Scores Using Personality Clusters from Complete Linkage Method of Cluster Analysis

<table>
<thead>
<tr>
<th>COMPLETE LINKAGE CLUSTER</th>
<th>n=31</th>
<th>n=20</th>
<th>n=16</th>
<th>n=24</th>
<th>n=80</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>63.2</td>
<td>74.7*</td>
<td>62.4</td>
<td>86.3**</td>
<td>83.2*</td>
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<td>60.6</td>
<td>55.6</td>
<td>54.9</td>
<td>64.3</td>
<td>61.8</td>
</tr>
<tr>
<td>3</td>
<td>59.2</td>
<td>38.9</td>
<td>39.3</td>
<td>73.2</td>
<td>55.1</td>
</tr>
<tr>
<td>4</td>
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<td>81.5*</td>
<td>57.0</td>
<td>93.5**</td>
<td>85.3**</td>
</tr>
<tr>
<td>5</td>
<td>68.1</td>
<td>61.2</td>
<td>39.8</td>
<td>92.0**</td>
<td>80.5*</td>
</tr>
<tr>
<td></td>
<td>69.8</td>
<td>46.7</td>
<td>36.4</td>
<td>97.2**</td>
<td>76.3*</td>
</tr>
<tr>
<td></td>
<td>62.6</td>
<td>62.7</td>
<td>38.1</td>
<td>89.8**</td>
<td>77.9*</td>
</tr>
<tr>
<td></td>
<td>60.2</td>
<td>69.2</td>
<td>46.5</td>
<td>92.1**</td>
<td>80.5*</td>
</tr>
<tr>
<td></td>
<td>64.2</td>
<td>40.0</td>
<td>31.5</td>
<td>71.5</td>
<td>63.6</td>
</tr>
</tbody>
</table>

$F(4,166) = 1.99, \ p < .001$ (Pillais)

Note: Values are Base Rate Scores

* Value greater than 74

** Value greater than 84
<table>
<thead>
<tr>
<th>AVERAGE LINKAGE WITHIN GROUPS CLUSTER</th>
<th>n=28</th>
<th>n=20</th>
<th>n=14</th>
<th>n=64</th>
<th>n=45</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MCMI-II SCALE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANXIETY</td>
<td>55.4</td>
<td>77.1*</td>
<td>64.0</td>
<td>86.0**</td>
<td>81.9*</td>
</tr>
<tr>
<td>SOMATOFORM</td>
<td>60.4</td>
<td>57.2</td>
<td>52.4</td>
<td>62.4</td>
<td>62.1</td>
</tr>
<tr>
<td>BIPOLAR/MANIC</td>
<td>64.1</td>
<td>39.0</td>
<td>39.4</td>
<td>62.2</td>
<td>51.0</td>
</tr>
<tr>
<td>DYSTHYMIA</td>
<td>50.9</td>
<td>82.2*</td>
<td>63.0</td>
<td>90.5**</td>
<td>82.4*</td>
</tr>
<tr>
<td>ALCOHOL DEP</td>
<td>67.4</td>
<td>62.7</td>
<td>38.9</td>
<td>89.3**</td>
<td>71.5</td>
</tr>
<tr>
<td>DRUG DEP</td>
<td>74.2*</td>
<td>48.7</td>
<td>31.7</td>
<td>89.4**</td>
<td>64.4</td>
</tr>
<tr>
<td>THOUGHT DIS</td>
<td>62.0</td>
<td>64.0</td>
<td>35.7</td>
<td>87.8**</td>
<td>67.9</td>
</tr>
<tr>
<td>MAJ DEPRESSION</td>
<td>56.4</td>
<td>69.8</td>
<td>50.4</td>
<td>90.2**</td>
<td>71.0</td>
</tr>
<tr>
<td>DELUSIONAL DIS</td>
<td>66.0</td>
<td>43.3</td>
<td>25.5</td>
<td>68.9</td>
<td>58.3</td>
</tr>
</tbody>
</table>

\( F(4,166) = 2.20, p< .001 \) (Pillais)

Note: Values are Base Rate Scores
* Value greater than 74
**Value greater than 84
Cluster Four is quite different than Cluster Three. The subjects in the Angry (Cluster Four) group scored highly on most clinical symptom scales, and the extreme differences between Clusters Three and Four are highlighted in Tables 10-12. Average elevations above Base Rate scores of 75 were present for the following scales: Anxiety, Dysthymia, Alcohol Dependence, Drug Dependence, Thought Disorder, and Major Depression (see Tables 7, 8, and 9).

Ward's Cluster Five (Detached-Obstructive-Disorganized) subjects scored highly on many of the clinical symptom scales. Average elevations above Base Rate scores of 75 were present on the following scales: Anxiety, Dysthymia, Alcohol Dependence, Thought Disorder, and Major Depression (see Table 7).

Complete Linkage Cluster Five (Detached-Obstructive-Disorganized) subjects also scored highly on most of the clinical symptom scales. The following scales showed average elevations above Base Rate scores of 75 (see Table 8) Anxiety, Dysthymia, Alcohol Dependence, Drug Dependence, Thought Disorder, and Major Depression. Average Linkage Cluster 5 (Detached-Self-Defeating) subjects were quite similar to those in Cluster 2 (Detached-Dependent). Both had elevations above 75 only on scales measuring Anxiety and Dysthymia (see Table 9).

Cluster membership as defined by each method of cluster
analysis was used as a grouping variable in Multiple Analyses of Variance (MANOVAs). The dependent variables were the clinical symptom scales of the MCMI-II. In all three cases, the main effect as well as all univariate effects were significant with the exception of the Somatoform disorder scale which was not significantly different across groups (see Tables 10, 11, and 12). In addition, Post Hoc Scheffe's analyses were conducted. Consistently, the statistically significant differences between personality clusters on symptom scales was highlighted. Typically, subjects in Cluster Three (Compulsive-Defensive) scored lowest on the symptom scales while Cluster Four (Angry) subjects scored highest on the symptom scales.

**Diagnosis and Cluster Membership**

The relationship between cluster membership and primary discharge diagnosis was assessed as a speculative inquiry into the relationship between personality and Axis I syndromes. The results were mixed on this issue.

The relationship between personality cluster and Axis I diagnosis was assessed since other studies addressing this issue included other or unknown Axis I diagnostic group. Despite negative findings in the literature, this study indicated that there was a pattern observed which was somewhat unlikely when grouping subjects by Ward's clusters and primary discharge diagnosis, $\chi^2(16) = 25.8, p < .056$ (Pearson, see Table 13). This has not been found in other
studies. It may reflect the disproportionate number of subjects in the Major Depression group, yet it may reflect a trend toward certain diagnostic groups not being equally represented across clusters.

As with the solution from Ward's method of cluster analysis, the clusters derived from the Complete Linkage method were compared with discharge diagnosis. The clusters derived from Complete Linkage showed no association with discharge diagnosis, $\chi^2(16) = 18.5(16)$, n.s. (Pearson, see Table 14).

The grouping of subjects by discharge diagnosis and cluster membership as defined by the Average Linkage Within Groups method was assessed. The results were significant: $\chi^2(16) = 27.1(16)$, $p < .04$, (Pearson, see Table 15). Based upon these results, it is difficult to draw a firm conclusion. Further research is necessary to help determine if Axis I diagnosis has Axis II correlates which are more predictable than chance association.

**Ethnicity and Cluster Membership**

It is advisable in studies of personality inventories to determine if race is a variable which affects the results. Given previous studies with the MCMI and MCMI-II which suggested different profiles based upon race or ethnicity (Choca, Shanley, Peterson, & Van Denburg, 1990; Davis, Greenblatt, & Choca, 1991), the relationship between personality cluster and ethnicity was assessed. In
Table 10

Univariate F-Values of MANOVA Using Ward's Personality Clusters as Grouping Variables and Symptom Scales as Dependent Variables

<table>
<thead>
<tr>
<th>MCMI-II SCALE</th>
<th>F-VALUE*</th>
<th>SCHEFFE'S</th>
</tr>
</thead>
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<tr>
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<tr>
<td>SOMATOFORM</td>
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<td></td>
</tr>
<tr>
<td>BIPOLAR/MANIC</td>
<td>16.01**</td>
<td>3 2 5 1 4</td>
</tr>
<tr>
<td>DYSTHYMIA</td>
<td>23.57**</td>
<td>3 1 2 5 4</td>
</tr>
<tr>
<td>ALCOHOL DEP</td>
<td>43.83**</td>
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</tr>
<tr>
<td>DRUG DEP</td>
<td>76.07**</td>
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</tr>
<tr>
<td>THOUGHT DIS</td>
<td>29.37**</td>
<td>3 2 1 5 4</td>
</tr>
<tr>
<td>MAJ DEPRESSION</td>
<td>31.64**</td>
<td>3 1 2 5 4</td>
</tr>
<tr>
<td>DELUSIONAL DIS</td>
<td>25.14**</td>
<td>3 2 5 1 4</td>
</tr>
</tbody>
</table>

*Note: F(4,166) = 2.15, p< .001 (Pillais)

**Note: All Univariate tests were significant; p< .001, except those for the Somatoform disorder scale which was non-significant
Table 11

Univariate F-Values of MANOVA Using Complete Linkage Personality Clusters as Grouping Variables and Symptom Scales as Dependent Variables

<table>
<thead>
<tr>
<th>MCMI-II SCALE</th>
<th>F-VALUE*</th>
<th>SCHEFFE’S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANXIETY</td>
<td>7.66**</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>3 1 2 5 4</td>
</tr>
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<td></td>
</tr>
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<td>BIPOLAR/MANIC</td>
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<td>2 3 5 1 4</td>
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<tr>
<td></td>
<td></td>
<td>2 3 5 1 4</td>
</tr>
<tr>
<td>DYSTHYMIA</td>
<td>19.07**</td>
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</tr>
<tr>
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<td></td>
<td>3 1 2 5 4</td>
</tr>
<tr>
<td>ALCOHOL DEP</td>
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</tr>
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<td>3 2 1 5 4</td>
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<tr>
<td>DRUG DEP</td>
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<td>3 2 1 5 4</td>
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<tr>
<td></td>
<td></td>
<td>3 2 1 5 4</td>
</tr>
<tr>
<td>THOUGHT DIS</td>
<td>25.50**</td>
<td>3 1 2 5 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 1 2 5 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 1 2 5 4</td>
</tr>
<tr>
<td>MAJ DEPRESSION</td>
<td>22.17**</td>
<td>3 1 2 5 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 1 2 5 4</td>
</tr>
<tr>
<td>DELUSIONAL DIS</td>
<td>24.57**</td>
<td>3 2 5 1 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 2 5 1 4</td>
</tr>
</tbody>
</table>

*Note: F(4,166) = 1.99, p< .001 (Pillais)

**Note: All Univariate tests were significant; p< .001, except those for the Somatoform disorder scale which was non-significant
Table 12

Univariate F-Values of MANOVA Using Average Linkage Within Group Personality Clusters as Grouping Variables and Symptom Scales as Dependent Variables

<table>
<thead>
<tr>
<th>MCMI-II SCALE</th>
<th>F-VALUE*</th>
<th>SCHEFFE'S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANXIETY</td>
<td>12.48**</td>
<td>1 3 2 5 4</td>
</tr>
<tr>
<td>SOMATOFORM</td>
<td>1.35ns</td>
<td>1 3 2 5 4</td>
</tr>
<tr>
<td>BIPOLAR/MANIC</td>
<td>11.21**</td>
<td>2 3 5 4 1</td>
</tr>
<tr>
<td>DYSTHYMIA</td>
<td>26.73**</td>
<td>1 3 2 5 4</td>
</tr>
<tr>
<td>ALCOHOL DEP</td>
<td>26.09**</td>
<td>3 2 1 5 4</td>
</tr>
<tr>
<td>DRUG DEP</td>
<td>59.13**</td>
<td>3 2 5 1 4</td>
</tr>
<tr>
<td>THOUGHT DIS</td>
<td>33.89**</td>
<td>3 1 2 5 4</td>
</tr>
<tr>
<td>MAJ DEPRESSION</td>
<td>27.57**</td>
<td>3 1 2 5 4</td>
</tr>
<tr>
<td>DELUSIONAL DIS</td>
<td>28.80**</td>
<td>3 2 5 1 4</td>
</tr>
</tbody>
</table>

*Note: F(4,166) = 2.20, p < .001 (Pillais)

**Note: All Univariate tests were significant; p < .001, except those for the Somatoform disorder scale which was non-significant
Table 13
Ward’s Cluster Membership and Diagnosis

<table>
<thead>
<tr>
<th>DIAGNOSIS</th>
<th>n=33</th>
<th>n=25</th>
<th>n=18</th>
<th>n=23</th>
<th>n=72</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALCOHOL/DRUG</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>SCHIZOPHRENIA</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>PAR SCHIZ</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>BIPOLAR</td>
<td>6</td>
<td>1</td>
<td>7</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>UNIPOLAR</td>
<td>13</td>
<td>11</td>
<td>7</td>
<td>18</td>
<td>23</td>
</tr>
</tbody>
</table>

\[ \chi^2(16) = 25.8, \ p < .056 \text{ (Pearson)} \]
Table 14

Complete Linkage Cluster Membership and Diagnosis

<table>
<thead>
<tr>
<th>COMPLETE LINKAGE CLUSTER</th>
<th>n=31</th>
<th>n=20</th>
<th>n=16</th>
<th>n=24</th>
<th>n=80</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>15</td>
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<tr>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>12</td>
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<td>3</td>
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<td>4</td>
<td>1</td>
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<td>10</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>3</td>
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<tr>
<td>5</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>10</td>
<td>37</td>
</tr>
</tbody>
</table>

**DIAGNOSIS**

- ALCOHOL/DRUG, n=33
- SCHIZOPHRENIA, n=25
- PAR SCHIZ, n=18
- BIPOLAR, n=23
- UNIPOLAR, n=72

\[ \chi^2 = 18.5(16), \text{ ns (Pearson)} \]
Table 15
Average Linkage Within Groups Cluster Membership and Diagnosis

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>n=28</th>
<th>n=20</th>
<th>n=14</th>
<th>n=64</th>
<th>n=45</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALCOHOL/DRUG n=33</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>SCHIZOPHRENIA n=25</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>PAR SCHIZ n=18</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>BIPOLAR n=23</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>UNIPOLAR n=72</td>
<td>5</td>
<td>8</td>
<td>7</td>
<td>27</td>
<td>25</td>
</tr>
</tbody>
</table>

χ²(16) = 27.1, p < .04, (Pearson)
addition, previous studies examining the MCMI-II and cluster analysis have often underrepresented ethnic minorities in the sample. As mentioned previously, the ethnic groups were broken down into Caucasian and non-Caucasian because there were only three Hispanic/Latino subjects in the sample. There was no significant relationship between ethnicity and clusters derived from Ward’s method; $\chi^2(4) = 5.1, \text{ns}$ (Pearson). Also, there was no significant association between ethnicity and cluster membership as defined by the Complete Linkage method; $\chi^2(4) = 5.8, \text{ns}$ (Pearson). As with the other methods, there was not a significant relationship between ethnicity and cluster membership using the Average Linkage Within Groups method; $\chi^2(4) = 6.2, \text{ns}$ (Pearson). These findings suggest that there is not a significant interaction of race and prototypical personality profile as measured by the MCMI-II.
CHAPTER 7
DISCUSSION

There was support for the hypothesis that several distinct clusters of personality profiles would be found among a male inpatient psychiatric population and these prototypical clusters were consistent across the three methods of cluster analysis. There was also support for the hypothesis that these personality clusters would show differences on the clinical symptom scales of the MCMI-II. Based upon the data, it appears that there was a high degree of overlap between methods of cluster analysis; Ward's, Complete Linkage, and Average Linkage Within Groups. The results of this study support the hypothesis that prototypical personality profiles can reliably be derived from MCMI-II data administered to male psychiatric inpatients with a variety of diagnoses. The results of this study were stable across methods and congruent with the findings of previous research (see Table 16).

In all three methods, a solution yielding five clusters was derived. One cluster could be described as Dominant, the second could be described as Detached-Dependent, the third could be described as Compulsive-Defensive and the fourth cluster could be described as Angry profiles. The
Table 16

Current Clusters and Similarity to Previous Studies

| Cluster 1 | Bartsch & Hoffman (1985), MCMI-I  
|          | Corbisiero & Reznikoff (1991), MCMI-I  
|          | Craig, Verinis, & Wexler (1991), MCMI-I  

| Cluster 2 | Bartsch & Hoffman (1985), MCMI-I  
|          | Corbisiero & Reznikoff (1991), MCMI-I  
|          | Donat, Geczy, Helmrich, & LeMay (1992), MCMI-II  

| Cluster 3 | Bartsch & Hoffman (1985), MCMI-I  
|          | Craig, Verinis, & Wexler (1985), MCMI-I  
|          | Corbisiero & Reznikoff (1991), MCMI-I  
|          | Donat, Walters, & Hume (1991), MCMI-I  
|          | Donat, Geczy, Helmrich & LeMay (1992), MCMI-II  

| Cluster 4 | Lorr & Strack (1990), MCMI-II  
|          | Donat, Geczy, Helmrich & LeMay (1992), MCMI-II  

| Cluster 5 | Lorr & Strack (1990), MCMI-II  


fifth cluster was somewhat different across clustering methods Complete Linkage and Ward's method calculated a profile which might be described as a Detached-Obstructive-Disorganized profile, while the fifth cluster derived from Average Linkage Within Groups method might be called a Detached-Self-Defeating profile. Despite this difference, there was general support for the existence of stable profile clusters in the data, and that these personality clusters had differences associated with them on the clinical symptom scales of the MCMI-II.

To insure that the current research is comparable to others and was conducted in a reliable and valid manner, Blashfield's (1980) criteria were used in the design of this study. Specifically, criterion one indicated that the method of cluster analysis should clearly be communicated. In the current study, the methods were Ward's, Complete Linkage, and Average Linkage Within Groups. Criterion two identified the need to specify the similarity measure. In the current study, the measure of proximity was Squared Euclidean Distance. The third criterion was that the computer program should be specified. In the current study the program used was the Statistical Package for Social Sciences (SPSS/PC+ 4.0) by Norusis (1990). The fourth criterion of Blashfield (1980) was to describe the method used to determine the number of clusters in the solution. In the current study, the method was to solve for three to
seven clusters (based upon similar research in the past) and eliminate solutions which had less than 10 subjects per cluster (all solutions greater than five clusters). The next step was to determine if the agglomeration schedules were largely different between solutions, and this was not the case. The fifth criterion was to determine if some clinical differences were eliminated by selecting a solution with a smaller number of clusters (i.e. less than five). Based upon these criteria, a solution with five clusters was selected. The final criterion according to Blashfield (1980) is to establish the validity of the solution. One method he mentioned is to use different clustering solutions. This was done in the current study; three methods were used and the resulting data was analyzed in two different ways. The first was to compute Pearson coefficients for the average profiles across methods, and the second was to compute Kappa coefficients for the placement of subjects across methods. In both instances, the results were statistically significant. Thus, having met all of Blashfield's (1980) criteria, this study is seen as a contribution to both the study of personality and to the use of cluster analysis.

**Cluster Characteristics**

The first cluster (Dominant) represented individuals with personality profiles similar to those of Cluster B in DSM-III-R. The elevations were on scales measuring the
following traits: Narcissistic, Antisocial, Aggressive-Sadistic, and Histrionic. These individuals have difficulty conforming to societal rules because they feel special or unique. Consequently, they do not feel obliged to conform to the expectations of others. They are likely to think only of themselves in interpersonal relationships, and are likely to project weaknesses or faults onto others. These people are quick to take offense and have difficulty receiving criticism. People with similar profiles assume that they are special and expect others to view them as such. While able to make good first impressions, these people frequently act out if frustrated. They have difficulty showing concern for the welfare of others, and may intentionally harm others. Emotional outbursts are common for individuals with this type of personality style. Thoughtfulness and altruism are typically not associated with these people. In Millon's (Millon & Foley, 1992) system, these individuals utilize replication strategies which are self-focused, as opposed to other-focused. Namely, the individual is focused on preserving him or her self, not nurturing others. Ward's first cluster represented 41 subjects; Complete Linkage 31, and Average Linkage 28.

The subjects in Cluster One did not report high levels of clinical symptoms. There were mild elevations on symptom scales measuring alcohol and drug abuse. These results are
similar to those of Strack et al. (1992) who found that the factor measuring substance abuse positively correlated with personality factors of aggressiveness and assertiveness.

The stability of the first cluster across studies has been replicated. It similar to the second cluster of Corbisiero and Reznikoff (1991) and the second cluster of Bartsch and Hoffman (1985) who employed the MCMI-I in their study. In addition, Cluster One parallels Cluster IV-A of the Craig et al. (1985) study. These findings support the notion that there are stable personality profiles which have cross-method stability and cross-study stability.

Cluster Two represented individuals who would be described as Detached-Dependent personalities in Millon’s system (Millon & Foley, 1992). This group had elevations on the following personality scales: Schizoid, Avoidant, Dependent, and Self-Defeating. These individuals are socially anxious, but needy. They have great discomfort in dealing with others and may adopt a "loner" stance in order to avoid the anxiety that accompanies interpersonal relationships. These people are typically cooperative and submissive and do not usually have aggressive or hostile outbursts. They are shy around others, but will do what others want for fear of being rejected, or to avoid conflict. These individuals are often quiet and unobtrusive and their interpersonal relationships are not egalitarian because they are willing to sacrifice their needs for the
needs of their partner. These people do not anticipate positive and satisfying relationships with others, so they attempt to avoid the anxiety they expect. Cluster Two contained 21, 20, and 20 subjects using Ward's, Complete Linkage, and Average Linkage methods respectively.

The symptoms endorsed by subjects in the second cluster were quite consistent across methods. Elevations on scales measuring Anxiety and Dysthymia were noted. Given the amount of social anxiety these types of individuals experience, it is not surprising that they would report anxiety and dysthymia. They are focused on others and very tentative in relationships, an uncomfortable position to be in. These results parallel those of Strack et al. (1992) who found that the MCMI-II factor they labelled as dependency-acquiescence was positively correlated with anxiety and depression.

As with the first cluster, Cluster Two was analogous to profiles described in previous research. The second cluster of this study was similar to the third cluster of Corbisiero and Reznikoff (1991) and the fifth cluster of Bartsch and Hoffman (1985). Cluster II of Donat, Geczy, Helmrich, and LeMay (1992) was similar to the second cluster of the current study. Again, this cluster has been found with different populations, and using different methods of cluster analysis, highlighting its stability.

The third cluster is one which is commonly seen in
clinical practice and in the previous literature on cluster analysis and the MCMI. This profile can represent a person who is intentionally lying to make themselves look good on the test, or it is indicative of a subject who consciously does not see personal problems. This profile is relatively flat with only mild elevations on the Compulsive personality scale. These persons may have learned in the past that if one makes a mistake or admits to a fault, it will be met with harsh punishment. In order to prevent negative consequences, this person intentionally or unintentionally denies shortcomings or faults. This type of person will have great difficulty trusting others and opening up; giving the impression that everything is under control and that their problems are in-hand. In order to deal with feelings of anxiety and insecurity, these individuals maintain strict control over their emotions and behavior, especially when confronted by authority figures. They fear negative evaluations by others and try to present themselves as 'having it together'. Others may see these individuals as rigid, indecisive, and unimaginative. This profile included 20, 16, and 14 subjects using Ward’s, Complete Linkage, and Average Linkage Within Groups methods respectively.

Similarly, the third cluster of profiles was asymptomatic on the clinical symptom scales of the MCMI-II. None of the symptom scale scores were above Base Rate scores of 75, and many were in the 30-40 range. This is obviously
problematic since all subjects were inpatients of a psychiatric facility when the instruments were completed. Again, the interpretation of these profiles was that they represented defensive, perfectionistic subjects who have difficulty admitting faults or problems. They have found it adaptive to present superficial and defensive fronts.

Cluster Three was similar to clusters found by previous researchers who utilized various methods of cluster analysis and who studied different populations. Corbisiero and Reznikoff (1991) had a similar finding in their study of alcoholic VA patients who had completed the MCMI-I. Others with similar findings are: the first cluster of Donat et al. (1991), Cluster III-A of Craig et al. (1985), Cluster I of Donat et al. (1992), and the first cluster of Bartsch and Hoffman (1985).

The fourth cluster (Angry) had a number of significant elevations on the personality scales. The fourth cluster was representative of individuals who presented a large number of problem areas, both on Axis I and Axis II. These patients are typically angry, hostile, and obstructionistic with rapid vacillation between moods. Individuals with this profile experience ambivalence about relationships, leading to moodiness and unpredictable behavior. These people are likely to suppress feelings of vulnerability and kindness, believing that their weaknesses will be exploited. They scan the environment to detect threats from others, over-
interpreting seemingly innocuous behavior and perceiving criticism where others might not. Individuals with this personality profile are typically mistrustful of others and blame others when things go wrong. Emotions are very intense and unpredictable for this group. These people tend to elicit negative or conflicting reactions from others, leading to the hostile interaction they predict and unconsciously provoke in many situations.

Cluster Four subjects had elevations on the following clinical symptom scales: Anxiety, Dysthymia, Alcohol Dependence, Drug Dependence, Thought Disorder, and Major Depression.

The fourth cluster of personality profiles in the current study are quite similar to the first cluster of Lorr and Strack (1990) who characterized them as "Antisocial, Aggressive-Sadistic and Passive-Aggressive." In addition, the fourth cluster of Donat et al. (1992) was nearly the same as the fourth cluster in the present study. As with the other clusters in the current study, Cluster Four had a number of similarities with those of previous research.

The fifth cluster of Ward’s method and of the Complete Linkage method of cluster analysis were similar and paralleled the results of previous research. The second cluster of Lorr and Strack (1990) is comparable to the fifth cluster in the current study. This profile represents individuals who might be described as Detached-Obstructive-Disorganized.
Passivity is the feature which binds this group together, whether it is passivity to express angry feelings or passivity due to perceived helplessness. These people are typically afraid of rejection and confrontation and are lacking in self-confidence. They often long for social interaction but are very anxious about being around others. These people are likely to be exploited by others and may become angry and hostile, but feel guilty for getting angry afterwards. These individuals are intrapunitive and debase themselves when things do not go as they would like. Interpersonal relationships are chaotic, complex, and confusing to people in this group and avoiding relationships may be the easiest way to dispel anxiety created by the confusion. Moreover, when in relationships, these people are unable to put forth the effort to make it a satisfying relationship. At times, they may appear to purposely cause themselves pain and hardship. The fifth cluster based upon Ward's method represented 45 subjects while representing 80 subjects using Complete Linkage.

The fifth cluster of the Average Linkage Within Groups method of cluster analysis shared features of the fifth cluster of the other two methods and shared features with the second cluster of profiles. It would be classified as a Detached-Self-Defeating profile. This group would be less likely to rely on passive-aggressive behavior to express angry or negative feelings, but in general is quite similar
to the fifth cluster of the other two methods.

**Axis I and Axis II**

In general, there has been little evidence which suggests a causal link between personality types and clinical symptoms. However, there is a growing body of evidence that character traits or types often do coexist with clinical symptomatology. These results are in line with that trend. The subjects in Cluster One (Dominant) were somewhat elevated on symptom scales measuring alcohol and drug dependence. Based upon clinical experience and predictions from the MCMI-II (Choca et al., 1993; Millon, 1981) a combination of narcissistic and antisocial personality characteristics are often associated with drug and alcohol abuse.

The group described as Detached-Dependent was elevated on scales measuring Anxiety and Dysthymia. This was congruent with the predictions of Choca et al. (1993) who based their views upon Millon's theory and previous information about personality, Axis I, and the MCMI. In addition, Millon (1981) noted that individuals with Dependent-Avoidant personality styles may have an underlying mood of depression and anxiety. The findings of this study support these notions.

Compulsive-Defensive subjects were mildly elevated on the Anxiety scale of the MCMI-II. It is consistent with previous literature on compulsive personality types to
expect increased levels of anxiety given their propensity for worrying and ruminating. Moreover, mild elevations for anxiety are consistent with the underlying theory of the MCMI-II (Millon, 1987) and with previous literature (Millon, 1981). Compulsive-Defensive personality styles are adaptable in many situations (jobs requiring attention to detail) thus, this personality style can be functional and serve as a viable buffer between stress and symptomatology.

In contrast to those subjects with Compulsive-Defensive personality styles (Cluster Three), Angry (Cluster Four) subjects scored highly on a number of dysfunctional personality traits, in addition to most clinical symptom scales. The relationship between severe personality disturbance and significant symptomatic complaints is consistent with Millon’s theory. If personality is a buffer between stress and clinical symptomatology, individuals in Cluster Four are then theoretically deficient in their ability to manage stressors due to character problems. As the result of this, high levels of clinical symptoms are not surprising.

Scheffe’s post-hoc analyses highlighted the differences between Cluster Three and Cluster Four regarding symptom formation. For nearly every clinical symptom scale, Cluster Three subjects scored the lowest, and Cluster Four subjects scored the highest, and the differences between the two were significant.

Subjects in the fifth cluster using Ward’s and Complete
Linkage endorsed a number of symptomatic complaints but not as many as those in Cluster Four. This pattern is consistent with a high level of character pathology. Average Linkage Within Groups Cluster Five was not elevated across as many clinical symptom scales as the subjects in Cluster Five of the other two methods. Recall that this group was generally less elevated on the severe personality disorder scales as well. Again, this correlation is consistent with Millon's theory. The underlying assumption is that as level of personality pathology increases, so should vulnerability to stress, and consequently symptoms should be more prevalent.

The relationship between clinical diagnosis as determined by ward staff, and personality cluster was weak. However, some tentative conclusions may be drawn. First, individuals with Paranoid Schizophrenia, Non-Paranoid Schizophrenia, or Substance Abuse were generally not in the cluster described as Defensive-Perfectionistic. Subjects with these severe Axis I disorders reported a number of situational and chronic variables consistent with more severe levels of personality disturbance, something which is consistent with clinical experience.

Second, individuals with the diagnosis of Paranoid Schizophrenia were generally not in the most severe Personality Cluster (Four) relative to those subjects with Non-Paranoid Schizophrenia. This is consistent with previous
literature which suggests that individuals with Paranoid Schizophrenia generally show better personality organization than those with Non-Paranoid Schizophrenia. However, because this cluster was composed of a small number of subjects, conclusions are tenuous. Overall, the results are consistent with previous literature which has generally failed to find reliable associations between personality and Axis I. The subjects grouped according to one method of cluster analysis (Average Linkage Within Groups) were associated with particular diagnostic groups. However these results must be replicated before any firm conclusions can be drawn.

Across Method Agreement

There was considerable evidence for the stability of the profiles across clustering methods. Visual inspection of the clusters shows quite striking stability across methods. This was statistically supported through the use of Pearson's product-moment correlation coefficient. Of the 15 possible pair-wise comparisons, all were statistically significant, \( p < .001 \). Also, of the 15 possible comparisons, 13 were above .93, lending strong support to the hypothesis that there are stable profiles in the data. This finding is contradictory to those of others (Morey, Blashfield, & Skinner, 1983; Scheibler & Schneider, 1985) who have noted that use of different clustering methods may lead to quite divergent results. Given the similarity in average profiles
across methods, the assertion that clustering methods yield disparate results was not supported.

As mentioned, one way to compare resulting clustering solutions across methods is to compute the Pearson correlation coefficient based upon average profiles. Another method is to determine the agreement between clustering solutions regarding the placement of individual profiles. Statistical assessment regarding the placement of individual subjects into the clusters was significant although not robust. Cohen’s Kappa was computed to quantify the degree of agreement regarding placement of individual subjects across clustering methods. The results indicated that the placement of subjects across methods was not likely due to chance. Cohen’s Kappa values computed from the degree of overlap between clustering solutions ranged from .539 to .636. While these values are statistically significant (p < .05) they are not particularly robust, and results should be interpreted with caution. Conventional interpretations of Kappa indicate that approximately .70 is the level needed to indicate a modest relationship between grouping methods. Donat, Walters, and Hume (1991) reported a Kappa of .70 in their study of 200 alcoholic and substance abusing patients who had completed MCMI’s which were subjected to two methods of cluster analysis. Consequently, across samples there is support for the observed grouping of subjects by various clustering methods.
There are a number of potential explanations for the similarity in clustering solutions. One hypothesis is that there were five prototypical personality types in the inpatient male population under consideration, and that the MCMI-II accurately accounted for these groups and that the clustering methods accurately grouped the individuals. A second explanation for the results is that the MCMI-II is a test with considerable item overlap in its subscales. Therefore, the association between particular personality scales and other personality scales, as determined in the cluster analysis, may be an artifact of the way the test was constructed and not an accurate representation of the personality traits of the subjects. Still another explanation might be that the clustering algorithms have biases toward grouping data in particular ways such that stable clusters do not truly reflect conditions in "reality" but reflect biases in the way the data were analyzed. Skinner and Blashfield (1982) warned that clustering methods may "impose structure rather than find it", and therefore one must be cautious not to treat personality profiles as reified constructs. These clusters should be treated as prototypical classes with variations inherent in their nature. Finally, another explanation for the results might be that all of the factors above interacted to produce the findings.

The interpretation that it is merely the clustering
algorithms that are responsible for the observed profiles is not likely given the data. First, there is considerable congruence between the profiles of the current study and those of numerous other methods (see Table 16). Second, the observed profiles are frequently encountered in clinical practice; hence, the postulation that the data were artifacts of the clustering methods does not appear valid.

Two methods were used to assess the similarity of the clustering solutions. The Kappa Coefficients partially reflect the fact that while the corresponding average profiles across clustering methods may be nearly identical, the number of subjects represented by this average profile may be quite different. For instance, the fourth cluster using Ward's and Complete Linkage methods yielded a Pearson Correlation of .981. However, the fourth cluster of Ward’s method represents 44 subjects, while the fourth cluster of the Complete Linkage method represents only 24 subjects. Thus, it may be possible that the average profile represented by each clustering solution does not actually reflect the underlying population but reflects interscale correlations which interact with the clustering algorithm to produce common profiles. However, further research is indicated to bear this out.

Conclusions

The results of this study highlight the usefulness of cluster analysis in personality research. There was
significant agreement between the methods employed, something which is encouraging given the current controversy regarding the reliability and validity of clustering methods. Ward’s, Complete Linkage, and Average Linkage Within Groups were the three types of cluster analysis employed, and the pattern of profiles derived was nearly identical across methods. These three methods have been found to be the most robust clustering algorithms available and further research utilizing these procedures is indicated.

Second, the results of the current study are consistent with previous research based upon a similar population, namely male psychiatric inpatients of various races and diagnoses. Extending the methods employed to study this population will enhance the validity of the findings which have been reported in previous literature. The personality clusters reported in the current study are similar to those of others, and, consequently, we can conclude that they are probably accurate representations of typical personality types in this population.

However, there is a need for further research in this area. One can not rule out the possibility that the observed personality clusters which have been reported a number of times in the literature are the result of item overlap among the various scales of the MCMI-II. If this is the case, then one would expect to find essentially the same
profiles in any population. Future research should be designed to answer the questions, "Is it the test, or is it an accurate reflection of the population at large, or are the results only accurate reflections of this population?"

This leads to a second area of further research. Generally, research on personality clusters and the MCMI-I and MCMI-II has been conducted on severely disturbed individuals who are often inpatients in psychiatric settings. Future research could be used to determine the salient personality profiles among other, seemingly less pathological populations. This type of research has been conducted with the Minnesota Multiphasic Personality Inventory and the study of headache patients, lower back pain patients, and others. If different personality profiles were found in these populations, it would help answer questions regarding scale overlap and patient population specificity related to cluster analysis.

Broadening this line of research could begin to address issues related to treatment and/or theoretical understanding of various personality types. Research can begin to ask questions related to treatment efficacy based upon knowledge of personality style. Also, research could begin to examine the behavioral correlates of various personality types. How do different types of individuals respond to staff and treatment options at psychiatric facilities? Who has a higher chance of repeatedly becoming hospitalized or treated
at a psychiatric institution? These types of questions will greatly contribute to our knowledge of personality and psychopathology.

The study of personality in relationship to various demographic variables is indicated. Personality research involving female subjects is very necessary since the current results are applicable only to male psychiatric patients. In addition, several of the individuals who are actively publishing research with the MCMI-II are at Veterans Affairs medical centers where large numbers of female subjects are often difficult to find. One strength of the current study is that a large number of non-caucasian subjects were included, something not always done in previous research.

Based upon the current study, it is clear that there are stable personality profiles in a male, psychiatric inpatient population tested using the MCMI-II. The profiles reported in the current study are similar to those reported by others despite a balanced ethnic representation and the exclusion of unknown or mixed Axis I groups. The profiles of the current study were comparable across methods and this level of agreement was statistically significant. These improvements in methodology have furthered our knowledge of cluster analysis and of personality types using the MCMI-II. As with most studies, there are many more questions raised than answered and further research is warranted in order to
answer some of these questions. As Blashfield (1980, p. 458) said, "A cluster analysis solution is the beginning of a research process, not the end."
REFERENCES

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VITA

The author, Kevin Wayne Miller, was born in Fort Knox, Kentucky on March 3, 1966. Mr. Miller entered the University of Dayton in August, 1984 and received the Bachelor of Arts Degree in April, 1988. He graduated Magna Cum Laude with a major in Psychology and a minor in Religious Studies.

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Dissertation Approval Sheet

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

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

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