APPLICATION OF THE MACANDREW ALCOHOLISM SCALE TO ALCOHOLICS WITH PSYCHIATRIC DIAGNOSES

by

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ABSTRACT

The MacAndrew Alcoholism Scale (MAC: MacAndrew, 1965) has demonstrated significant discriminative power in separating male alcoholics from male psychiatric patients, but there are two different interpretations of MAC scale scores. Apfeldorf and Hunley (1981) have proposed that high MAC scores measure an alcoholic response pattern and low scores measure a psychiatric response pattern. In contrast, MacAndrew (1981) has proposed that high MAC scores measure a reward seeking orientation, and low scores measure an orientation to avoid punishment. These researchers concur, however, in questioning the MAC's ability to detect alcoholism which coexists with psychiatric diagnosis. Therefore, the present study examined the MAC's performance with alcoholic psychiatric patients.

Subjects were 140 male V. A. Hospital patients assigned to one of five diagnostic groups (Alcoholics, Alcoholic Personality Disorders, Alcoholic Neurotics, Personality Disorders, or Neurotics) based on DSM-III diagnoses. All patients completed a valid MMPI which was used to determine MAC scores.

MAC scale scores successfully differentiated the Alcoholic group from the combined psychiatric groups which was consistent with previous research. However, the MAC scale did not effectively discriminate alcoholics from patients with character disorder diagnoses.

The MAC scale failed to differentiate either of the alcoholic-psychiatric groups from its psychiatric counterpart. The alcoholic-

psychiatric groups did not obtain intermediate MAC scores as Apfeldorf and Hunley's ideas would suggest. In fact, the Alcoholic Personality Disorder group scored significantly higher than the Alcoholic Neurotic group, which would suggest that these psychiatric diagnoses influence the MAC scale in different ways.

Further investigation revealed that the majority of patients in the highest scoring group did not appear to possess a reward-seeking orientation. At present, MacAndrew's theory has not been tested adequately. Specifically, future research needs to assess whether high and low scorers actually possess the characteristics proposed by MacAndrew. Recommendations for other research and for the clinical application of the MAC scale are discussed.

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CHAPTER I

INTRODUCTION

The abuse of alcohol is an increasing source of concern in the United States as well as many other countries today. In a review of the scope of our nation's current alcohol problem, Schoolar (1984) points out that alcoholism and its sequelae constitute the third leading cause of death in America. This status reflects the growing awareness that alcohol abuse is implicated in more than half of traffic fatalities, and is associated with at least two-thirds of all homicides and suicides (Califano, 1982). In addition, the physiological degeneration which results from chronic alcohol abuse claims the lives of thousands of alcoholics each year.

The seriousness and magnitude of alcohol abuse warrants research directed at understanding issues such as prevention, detection, and treatment. It is not surprising then that the most active area in personality inventory research today is the assessment of alcoholism and drug abuse (Butcher & Owen, 1978). The research conducted in this study is directed towards the area of detection or identification of alcoholism. The measure which is to be examined is the MacAndrew Alcoholism Scale (MAC: MacAndrew, 1965), which was empirically derived from the Minnesota Multiphasic Personality Inventory Item Pool (MMPI: Hathaway & McKinley, 1940). This investigation of the MAC scale highlights issues concerning the validity of the scale. In addition,

an examination of moderator variables which may influence the performance of the MAC scale will be emphasized. After 19 years, the literature which addresses the MAC scale is fairly extensive. A comprehensive review of this literature will be presented in order to familiarize the reader with the current body of research.

Alcoholism and MMPI Scales

The MMPI is the most frequently encountered objective personality measure in the literature on alcoholism. In a review of this literature, Clopton (1978) identified four major areas of MMPI research in the study of alcoholism: marital interaction and alcoholism; prediction of response to treatment; alcoholic profile configurations; and special alcoholism scales. The MMPI item pool has been a spawning ground for no less than nine scales designed to detect alcoholism (Atsaides, Neuringer, & Davis, 1977; Bruder, 1982; Conley & Kammeier, 1979; Hampton, 1953; Holmes, 1956; Hoyt & Sedlacek, 1958; MacAndrew, 1965; Rich & Davis, 1969; Rosenberg, 1972). The area most pertinent to this study relates to the use of these special scales, particularly the MAC Scale.

The three earliest alcoholism scales (Hampton, 1953; Holmes, 1953; Hoyt & Sedlacek, 1958) were empirically derived by contrasting the MMPI responses of normal groups with those provided by various alcoholic groups. Hampton (1953) developed and validated the earliest scale by comparing the responses of a group from Alcoholics Anonymous with a "normal" group of individuals seeking vocational guidance. There are several studies which support this scale's ability to discriminate successfully between alcoholics and normals (Apfeldorf &

Hunley, 1975; Rich & Davis, 1969; Vega, 1971). However, only one study supports the Hampton scale's effectiveness in a psychiatric setting (Vega, 1971). In fact, the literature strongly suggests that this scale has very little validity in psychiatric settings (Apfeldorf & Hunley, 1975; Holmes, Dungan, & McLaughlin, 1982; Rich & Davis, 1969; Rotman & Vestre, 1964; Uecker, Kish, & Ball, 1969).

Research regarding Hoyt and Sedlacek's (1958) alcoholism scale is more mixed than for Hampton's scale. Rotman and Vestre (1964) divided newly admitted psychiatric patients into two groups (alcoholic and nonalcoholic). They initially required only one of three possible criteria to designate a patient as having an alcohol problem. With this classification system, they found no significant difference between the groups on the Hoyt/Sedlacek scale. They then required all three of their criteria (social history, self-report, and diagnosis) to identify alcoholics, and found a significant difference between the groups' Hoyt/Sedlacek scores. Two additional studies reported that the scale was able to differentiate between male alcoholics and male psychiatric inpatients in a State Hospital (Rich & Davis, 1969) and in an Army hospital (Uecker et al., 1969). Other evidence (Apfeldorf & Hunley, 1975; Holmes et al., 1982; Vega, 1971) indicates that the Hoyt/Sedlacek scale may be unable to discriminate between inpatient alcoholics and nonalcoholics in V.A. Hospital settings. Thus, the overall performance of the Hoyt/Sedlacek scale suggests that it is unable to reliably differentiate between alcoholic and psychiatric inpatients.

Holmes (1953) developed his alcoholism scale by constrasting the MMPI item responses of the original normative sample with the responses of institutionalized alcoholics. The classification accuracy (alcoholic versus nonalcoholic) for the Holmes scale varies between 62% and 78% (Apfeldorf & Hunley, 1975; Atsaides, Neuringer, & Davis, 1977; Hays & Stacy, 1983; Rhodes & Chang, 1978; Rich & Davis, 1969; Rotman & Vestre, 1964; Vega, 1971). The literature reveals that the only reliable differentiation the Holmes scale performs is with inpatient psychiatric populations (Atsaides et al., 1977; Navarro, 1979; Vega, 1971), and that even this discrimination is not always successful (Holmes et al., 1982).

All three of these scales were compared by MacAndrew and Geertsma (1964) in order to determine their relative effectiveness in outpatient populations. The MMPI was administered to two male outpatient groups consisting of alcoholics and nonalcoholic psychiatric patients with no history of drug involvement. None of the existing scales (Hampton, Hoyt/Sedlacek, and Holmes) was able to discriminate between these two groups. MacAndrew and Geertsma noted that all three scales had been developed by contrasting the responses of alcoholics with those of normals. They reasoned that the scales were measuring general psychological maladjustment rather than alcoholism. Therefore, MacAndrew developed a scale which was specifically designed to detect alcoholism rather than general psychological maladjustment.

The MacAndrew Alcoholism Scale

The MAC scale has yielded the most promising findings of all the alcoholism scales derived from the MMPI, and has proven to be the most

robust scale upon cross-validation (Apfeldorf & Hunley, 1981; Svanum, Levitt, & McAdoo, 1982).

MacAndrew developed his scale by contrasting the MMPI responses of 300 male outpatient alcoholics with those of 300 male psychiatric outpatients who had no history of alcohol or drug abuse. When the response patterns of these two groups were compared, MacAndrew (1965) discovered that 51 items discriminated between the two groups. When the scale was cross-validated, there was very little shrinkage in classification accuracy (from 81.75% to 81.5%). MacAndrew deleted two items (MMPI items 215 and 460) which inquired directly about drinking practices. This decision was consistent with his intent to develop a scale which did not simply measure drinking behavior. The resulting 49-item scale has been the most commonly used version in the literature. Many studies, however, report classification accuracy rates utilizing both versions.

MacAndrew (1965) originally suggested that a cutting score of 24 be used as the criterion at, or above which, an individual should be considered likely to abuse alcohol. He found that this score provided the optimal cutting point in his particular population and setting. Subsequent studies have indicated that the optimal cutting score may vary depending upon such variables as treatment setting (DeGroot & Adamson, 1973; Huber & Danahy, 1975; Uecker, 1970; Vega, 1971; Whisler & Cantor, 1966), age (Apfeldorf & Hunley, 1975; Friedrich & Loftsgard, 1978; Svanum et al., 1982), and sex (Clopton & Klein, 1978; Rich & Davis, 1969; Schwartz & Graham, 1979; Svanum et al., 1982). Where reported, the optimal score has ranged from 22 (DeGroot & Adamson,

1973) to 28, a score which has been reported by numerous investigators (e.g., Whisler & Cantor, 1966). This range of scores suggests that the MAC's effectiveness can be maximized when the optimal cutting score is derived for each setting (Greene, 1980).

Research Parameters

Before proceeding to a discussion of research on the MAC scale, it is important to acknowledge the variable interpretations of significance which occur throughout the literature. Significance, like beauty, is often in the eye of the beholder. Statistical significance may receive a lukewarm reception from the clinician who is more interested in the practical application of information. The literature on the MAC scale contains conflicting interpretations of the same objective data for this reason. In some studies which report a significant difference between the means of alcoholic and non-alcoholic groups (e.g., Whisler & Cantor, 1966) the overall correct classification rate (61.5%) may be described by other researchers either as evidence that the MAC scale is robust upon cross-validation (e.g., MacAndrew, 1981), or as evidence that the MAC scale is not very effective (e.g., Uecker, 1970).

Conflicting reports also result from differences in the way researchers present their outcomes. Using MacAndrew's original study as an example, it is clear that there are four possible classificatory outcomes: true positives; true negatives; false positives; and false negatives. True positives are the alcoholics who were correctly classified as alcoholics. False positives are the psychiatric patients who were misclassified as alcoholics. True negatives are the

psychiatric patients who were correctly classified, and false negatives are the alcoholics who were misclassified.

Researchers who wish to derive an overall classification accuracy figure include both the true positives and true negatives. This information represents a balanced type of reporting because it considers both types of correct classification (positive and negative). However, when only true positives are reported, this "detection rate" can be deceptive. For example, a measure which calls everyone alcoholic will have a detection rate of 100%. However, this measure would be useless as a discriminatory tool, and quite misleading because of its high number of false positives. No study is guilty of reporting only a detection rate on the MAC scale. However, in several studies (Atsaides, et al., 1977; MacAndrew, 1981; Rhodes & Chang, 1978), the detection rate is overemphasized in order to support the conclusions.

Finally, there are those researchers who report only the mean scores obtained for each group and whether the difference is statistically significant. Additional information pertaining to the classification accuracy is useful in order to evaluate fully the scale's performance. For example, Vega (1971) compared three groups: alcoholics; psychiatric patients; and control subjects who were non-psychiatric inpatients. The MAC scale was able to discriminate between the alcoholic and psychiatric patients, yet was unable to discriminate the alcoholics from the control subjects. Although there was a significant difference between the means of the alcoholic and the control groups, more than half of the control subjects scored above the cutting score. Thus, despite the significant mean

difference, over half of the controls were misclassified--a fact which only became apparent when the classification accuracies were reported. The advantage of this type of comprehensive reporting is apparent. However, studies which report only the classification accuracy or a significant difference between means, do contribute important information and are included in this review. It is suggested that future researchers provide both types of information, and refrain from emphasizing only the detection rate.

Cross-Validation Studies

Although the magnitude of the effect size varies considerably, cross-validation studies have reported that the MAC scale demonstrates significant discriminative power in separating male alcoholics from various nonalcoholic control populations (Apfeldorf & Hunley, 1975, 1981; Bruder, 1982; Burke & Marcus, 1977; Clopton & Klein, 1978; Clopton, Weiner, & Davis, 1980; Conley & Kammeier, 1980; DeGroot & Adamson, 1973; Kranitz, 1972; Lachar, Berman, Grisell, & Schooff, 1976; Rhodes, 1969; Rhodes & Chang, 1978; Rich & Davis, 1969; Rohan, 1972; Rosenberg, 1972; Svanum et al., 1982; Uecker, 1970; Vega, 1971; Whisler & Cantor, 1966; Williams, McCourt & Schneider, 1971; Willis, Wehler & Rush, 1979). Although the bulk of the literature supports the MAC's robustness upon cross-validation, there are two studies (Ruff, Ayers & Templer, 1975; Schwartz & Graham, 1979) in which the MAC scale failed to discriminate between male alcoholics and psychiatric patients. It is difficult to determine why the MAC scale failed to differentiate alcoholic patients from psychiatric patients in these two studies. Schwartz and Graham (1979) reported that the MAC's

failure to discriminate between these groups did not appear to be a result of demographic variables or their subject selection procedure. However, they failed to report the age, education level, or racial composition of their groups. They did acknowledge the possibility that a significant number of the nonalcoholic males may have had alcohol problems which they concealed from hospital personnel. Thus, it remains unclear why the MAC scale failed to discriminate between alcoholics and psychiatric patients in this study.

Although Ruff et al. (1975) report in their abstract that the MAC failed to differentiate alcoholic patients from psychiatric patients, they neither discuss nor document this finding in their article. Their alcoholic and psychiatric patients were obtained within the same facility and do not appear to differ in age. However, Ruff et al. (1975) do not provide information regarding other potential moderator variables. Overall, there is insufficient information to evaluate the MAC's performance in this study.

Numerous investigators have examined the MAC scale's effectiveness with inpatient populations. The overall classification accuracy with male inpatient populations has ranged from 61.5% to 81.5%. Studies on the MAC scale in state hospitals (Clopton et al., 1980; Rich & Davis, 1969; Williams, et al., 1971; Willis, et al., 1979) general hospitals (DeGroot & Adamson, 1973), and special alcohol treatment facilities (Conley & Kammeier, 1980; Svanum et al., 1982) have demonstrated the validity of the MAC scale with psychiatric inpatients. Overall, this research suggests that the MAC effectively

discriminates between alcoholics and nonalcoholics in a wide variety of inpatient settings.

There are three studies (Atsaides et al., 1977; Bruder, 1982; Conley & Kammeier, 1980) in which the MAC scale was not as successful in discriminating between alcoholic and nonalcoholic inpatients as other measures. Atsaides et al. (1977) compared alcoholic and neurotic groups. They reported that the MAC correctly classified only 65% of the alcoholics, whereas the Institutionalized Chronic Alcoholic Scale (ICAS) classified 85% of the alcoholics. However, they preset the cutting score at 28, instead of using 24 as suggested by MacAndrew (1965), or an optimal score based upon their subject pool. Rhodes and Chang (1978) replicated the study of Atsaides et al. (1977) and used a cutting score of 24. The classification accuracy of the MAC increased from 65% to 80%, and was superior to the ICAS classification accuracy of 77%.

Another study in which the MAC's classification accuracy was surpassed by another measure was conducted by Bruder (1982). He created a multi-dimensional device which included the MAC scale, two scales of anomie, and the California F scale (a measure of authoritarianism). This scale (DAAP) achieved a greater classification accuracy than the MAC in his sample of inpatients. However, Bruder derived an optimal cutting score for the DAAP, but did not derive an optimal cutting score for the MAC. It is not surprising that the DAAP's performance was superior, when the optimal score was derived for the DAAP based upon the sample being tested, and set for the MAC based upon research with an entirely different sample.

The final study in which the MAC was outperformed was conducted by Conley and Kammeier (1980). They derived a 7-item scale (Conley & Kammeier, 1979) by contrasting the responses of alcoholics in a private treatment center with those of psychiatric patients and two groups of normals. In contrast to the two studies previously mentioned, Conley and Kammeier (1980) derived the optimal cutting score for both measures based on the scores of patients in their sample. The discrimination task involved differentiating an alcoholic group from a psychiatric group. Although the MAC was effective at discriminating (averaged male and female accuracy was 66%), their item set was superior (averaged accuracy of 80%). Interestingly enough, six of their seven items are on the MAC scale. They propose that these items be used as a core stem to which additional items can be added in order to suit the discriminatory demands of various settings. No subsequent information is available on the performance of this item set.

There is one study which combined alcoholics from inpatient and outpatient programs (Tarter, McBride, Buonpane, & Schneider, 1977). All alcoholics exhibited chronic drinking patterns which significantly impaired either their health, social or economic functioning. Alcoholics were then divided into two groups. Primary alcoholics were patients who stated no precipitating cause for their drinking and endorsed at least six questionnaire items concerned with drinking characteristics. Secondary alcoholics were patients who endorsed fewer than six questionnaire items, and were able to state reasons for their drinking behavior. The MAC scores of these two alcoholic groups were then compared to those obtained by an inpatient psychiatric

group. The MAC scores of the secondary alcoholics (M = 23.3) and the psychiatric patients (M = 20.0) did not differ significantly from each other, but were both significantly different from the mean of the primary alcoholic group (M = 28.5, t = 4.54, p <.001). The results of this study suggest that the MAC's effectiveness may vary with different types of alcoholics.

There have been only two studies which cross-validated the MAC with outpatient groups (Lachar et al., 1976; Rhodes, 1969). In both of these studies, male alcoholics were successfully differentiated from their psychiatric counterparts. These results confirm the validity of the MAC with outpatient populations.

Construct Validity

Overall, cross-validation studies with the MAC have demonstrated the scale's ability to differentiate alcoholics from various non-alcoholic comparison populations. Although the MAC is successful at detecting alcoholics, questions remain regarding what the MAC scale is actually measuring. As Apfeldorf and Hunley (1981) point out, the significant differences which have been reported between alcoholics who drink excessively, and psychiatric patients who do not drink excessively (e.g., MacAndrew, 1965), may reflect either the diagnostic or the drinking dimension. It is difficult to determine which of these dimensions the MAC assesses because of the varied criteria used by researchers in diagnosing alcoholism. According to Apfeldorf (1978), many clinicians regard excessive drinking and alcoholism as synonymous because they are so intimately related. However, there are others (e.g., Califano, 1982; Rosenberg, 1972) who believe the

quantity of liquor consumed does not always determine whether a person is alcoholic.

Future research in this area would be aided if investigators would adopt a standard diagnosis of alcoholism. This standard would insure that the groups under investigation were as homogeneous as diagnostically possible. The criteria employed by the Diagnostic and Statistical Manual of Mental Disorders (DSM-III; APA, 1980) are suggested because DSM-III is endorsed by the professional community, and because it offers a diagnosis of alcohol dependence (alcoholism) which is comparatively objective and easily assessed. According to DSM-III, there are two components of alcohol dependence. The first criterion involves either a pattern of pathological alcohol abuse or impairment in social or occupational functioning caused by alcohol use. The second criterion involves the existence of either tolerance to increased amounts of alcohol or withdrawal symptoms in the absence of alcohol consumption. The DSM-III diagnosis of alcohol dependence was used in this study.

Returning to the question of which dimension (excessive drinking or diagnosis) the MAC detects, it is clear that a comparison of MAC scores of alcoholics and heavy drinkers would provide useful information. There are two such studies (Apfeldorf & Hunley, 1975; Williams et al., 1971), and both reported that the MAC was unable to discriminate between alcoholics and heavy drinkers.

Williams et al. (1971) compared the responses of alcoholics, heavy drinkers, and a combined group of moderate drinkers, light drinkers, and nondrinkers. The classification system used to

designate alcoholics was not specified. However, the other groups were determined by scores on a quantity-frequency index of drinking, and a preoccupation-with-alcohol scale. The information provided does not indicate whether patients in the heavy drinker group had psychiatric diagnoses. The alcoholic mean (28.7) was significantly higher than the combined mean of the moderate, light, and nondrinker groups (25.5) on the MAC scale. However, the alcoholic mean did not differ significantly from the heavy drinker mean (27.7).

Apfeldorf and Hunley (1975) compared the scores of alcoholics, nonalcoholics without drinking problems (nonoffenders), and non-alcoholics with records of offenses indicating problem drinking (problem drinkers). The specific criteria used to diagnose the alcoholics were not provided. This study was conducted with domiciliary residents, and it appears that none of the groups included patients who had psychiatric diagnoses.

The problem drinker group was composed of subjects who had records of offenses related to alcohol intoxication, whereas subjects in the nonoffender group had no such records. The mean MAC scores of the alcoholic and the problem drinker groups (28.10 and 27.72, respectively) were significantly higher than the nonoffender group (24.98). However, there was no significant mean difference between the alcoholic and problem drinker groups.

In the research by Williams et al. (1971), and by Apfeldorf and Hunley (1975), the MAC detected heavy drinkers as well as alcoholics. These results suggest that the MAC is sensitive to the dimension of excessive drinking. The items on the MAC scale do not measure

drinking behavior per se; instead, they appear to measure stable personality characteristics which are commonly associated with alcoholism. The fact that the groups of heavy drinkers obtained high MAC scores suggests that these people may share many of the personality characteristics associated with alcoholism.

Sher and McCrady (1984) correlated MAC scores with severity of alcohol abuse within a sample of alcoholics. The subjects' severity of alcoholism was not based on any objective measure of alcohol consumption, but was instead determined by their self-reported alcohol problem areas on the Michigan Alcohol Screening Test. Sher and McCrady found that severity of alcohol abuse was positively correlated with scores on the MAC scale for both male (r = .29, $p < .05$) and female (r = .44, $p < .05$) alcoholics.

The results of these three studies indicate that there is a positive relationship between MAC scores and alcohol consumption in alcoholic and nonalcoholic samples.

Apfeldorf and Hunley (1981) suggested that there were two relevant dichotomies to address: (a) alcoholism versus other psychiatric diagnosis; and (b) excessive versus nonexcessive drinking. They selected three groups of domiciliary residents with different diagnoses (alcoholics, psychiatric patients, and normal controls). Within each of these groups, excessive and nonexcessive drinkers were obtained. The assessment of excessive drinking was based on records of alcohol related offenses in the domiciliary. Although this is not a direct measure of alcohol consumption, it is an objective assessment of the consequences of alcohol consumption which does not rely on

self-report. There were six groups designated as follows: alcoholics who drink excessively (A+); alcoholics who do not drink excessively (A-); and two comparable groups, both for psychiatric patients (P+) and (P-); and normal controls (N+) and (N-). The criteria used to diagnose alcoholic and psychiatric patients were not provided. The normal group was composed of domiciliary residents who had no alcoholic or psychiatric diagnosis.

Apfeldorf and Hunley (1981) found that the alcoholic group had the highest mean score (30.48), the normal group had an intermediate mean (27.35), and the psychiatric group had the lowest mean (23.95). The mean of each diagnostic group was significantly different from the mean of the other two groups. There was no significant effect for drinking behavior, and there was no significant interaction between diagnosis and drinking behavior. Thus, Apfeldorf and Hunley's (1981) results indicated that the MAC was a measure of diagnosis, not of excessive drinking.

These results appear to be discrepant with the evidence presented earlier regarding the MAC scores of heavy drinkers. It is unclear whether the patients in Apfeldorf and Hunley's (1975) and Williams et al.'s (1971) nonalcoholic samples had additional psychiatric diagnoses or were "normal" except for their heavy drinking. It is difficult to draw conclusions about the contradictions in the studies with excessive drinkers when two of the three studies failed to provide sufficient diagnostic information about their groups of heavy drinkers. It is possible that the MAC detects certain types of heavy drinkers and fails to detect others (e.g., heavy drinkers with

psychiatric diagnoses). Apfeldorf and Hunley (1981) concluded that the MAC scale measures alcoholism at the high end, and severe psychiatric diagnosis at the low as a consequence of the way the scale was constructed. MacAndrew (1965) composed the scale by selecting items which discriminated between alcoholics and psychiatric patients. As a result, Apfeldorf and Hunley propose that a high score reflects an alcoholic response pattern, and a low score represents a pattern of responses typical of psychiatric patients.

If high and low MAC scores are related to these two diagnostic groups as Apfeldorf and Hunley suggest, the scale may be unable to detect alcoholism in patients with combined alcoholic-psychiatric diagnoses. There are only two studies which have applied the MAC to patients with combined alcoholic-psychiatric diagnoses. Rohan, Tatro, and Rotman (1969) reported that the MAC was unable to detect alcoholism in patients who had a diagnostic history of schizophrenia. In contrast, Burke and Marcus (1977) found that the MAC successfully discriminated between a group of alcoholic schizophrenics (M = 25.8) and a group of schizophrenics (M = 21.2). The evidence regarding the MAC's performance with alcoholic schizophrenics is contradictory. Furthermore, it remains to be determined whether the MAC is capable of detecting alcoholism when it coexists with other forms of psychiatric diagnoses.

Factor and Item Analyses of the MAC

Studies which conducted factor and item analyses also have provided information about the construct validity of the MAC scale. Based upon the item content of the MAC, Finney, Smith, Skeeters, and

Auvenshine (1971) reported that high scores seemed to be bold, self-confident people who were sociable, yet had rebellious urges. These people were drawn to religion, and appeared to use repression and faith to temper their antisocial impulses.

The first factor analysis of the MAC was reported by MacAndrew (1967) and was based on 200 male alcoholics. MacAndrew identified factors which reflected physical conditions (blackouts and somatic complaints), and psychological dimensions (interpersonal skillfulness, freedom from parental control, feminine identification, religiousness and guilt, school difficulties, and chronic deterioration).

Schwartz and Graham (1979) analyzed the MAC responses of 389 male and female patients with various diagnoses (including 64 alcoholics). They found six factors which accounted for 22% of the total variance. Based on these factors, they reported that high scorers were impulsive, interpersonally shallow, and characterized by general psychological maladjustment.

Burke (1983) obtained MMPI's from 94 male veterans (including 19 substance abusers) and scored 32 MMPI scales and formulas. He intercorrelated these scores and subjected them to a principal components factor analysis which yielded five orthogonal factors. Burke reported that the MAC scale appeared to be positively related to measures of impulsivity, and negatively related to measures of control. These results appear to be congruent with Schwartz and Graham's (1979) description of high MAC scorers.

Using a sample of 1,856 male and female alcoholics, Svanum and Hoffman (1982) found six factors which statistically replicated four

of the factors described by MacAndrew (1967). Svanum and Hoffman pointed out that their six factors accounted for only 17% of the common item variance. Svanum and Hoffman (1982) concluded that the item heterogeneity of the MAC contributes to its success as a screening device for alcoholics, but limits its utility as a basis for identifying dimensions of behavior and personality within alcoholics.

Correlational Studies of the MAC

Pfost, Kunce, and Stevens (1984) utilized a Q-factor analysis and derived three prototypic alcoholic profiles based on the MMPI's of 38 male alcoholics. They reported that the Type II profile was positively correlated with MAC scores, and described it as representing a temperamental, driving, and grandiose orientation. This profile was characterized by high scores on the MMPI scales F, K, 4, and 9. It is not surprising that this profile type correlates positively with the MAC scale because of the large number of items the MAC scale shares with the MMPI scales on the profile. Studies which correlate the MAC scale with criteria which are independent of the MMPI are superior to studies which correlate MAC scores with MMPI scales. The MAC scale shares many items with other clinical scales of the MMPI, which leads to problems with interpretation. For example, the item overlap between the MAC scale and MMPI scale 9 (Ma: Hypomania), makes it debatable whether the high correlation between these two scales reflects a real relationship or merely a statistical artifact. When the MAC scale is evaluated with criteria independent of the MMPI, this problem with interpretation does not arise. This type of study was done by Lachar et al. (1976) who used a psychiatric sample and

examined the relationship between high MAC scores (>23), and clinical ratings which were independent of the MMPI. They found that excessive alcohol use, marital conflict, assaultiveness, and immaturity were correlated with high scores on the MAC.

Moore (1984) reported that the MAC scale detected 79% (true positives) of a group of adolescent substance abusers. He found significant character differences between the true positives and the false negatives on the California Personality Inventory. The group profile of the true positives indicated that they were impulsive, resentful of authority, aggressive, self-indulgent, and pleasure seeking. The group profile of the false negatives revealed that they had many adolescent characteristics (e.g., non-conforming) but appeared to be more inhibited than the true positives. Unlike the true positives, the false negatives expressed interest in developing meaningful relationships with other people, and did not appear to be interested in antisocial behavior.

The results of studies which correlated MAC scores with other criteria are consistent with evidence from studies using item and factor analyses of the MAC scale. Overall, these studies present evidence which portrays high MAC scorers as bold, pleasure-seeking people, who are rebellious and impulsive yet drawn to religion.

MacAndrew's Theory

MacAndrew (1981) reviewed the literature on the MAC scale and concluded that the characteristics assessed by the MAC were not specific to alcoholism, drug abuse, or addiction, but instead reflected a bipolar dimension of character. MacAndrew's theory is

grounded in a somewhat sophisticated theoretical construct (i.e., the Eysenck-Gray two space, Gray, 1972). Although the information presented here has been simplified, it does not misrepresent MacAndrew's ideas and is adequate for the purposes of this study.

MacAndrew proposes that the MAC is tapping a dimension of differential sensitivity to reward or punishment. He asserts that high MAC scores reflect a reward seeking orientation, and low scores indicate an orientation to avoid punishment. MacAndrew reports that there is a consistent 17-3 ratio of true positives to false negatives on the MAC in both alcoholic and substance abuse populations. He does not interpret the false negatives as an indication of error. Instead, he believes that this ratio reflects the approximate proportion of two different types of substance abusers. Within an alcoholic population, MacAndrew suggests the labels of "primary alcoholics" for true positives, and "secondary alcoholics" for false negatives on the MAC scale. In other words, he suggests that the character orientation (reward seeking) indexed by high scorers is present in approximately 85% of alcoholic samples, and the orientation to avoid punishment (low scores) represents about 15% of alcoholics.

MacAndrew (1981) cites several types of evidence to support his contention that the true positives have a reward seeking orientation. His interpretation is largely based on the item content of the MAC (Finney et al., 1971), descriptions of high scorers provided by factor analytic studies (MacAndrew, 1967; Schwartz & Graham, 1979; Svanum & Hoffman, 1982), and the study of Lachar et al. (1976) which correlated independent clinical ratings with MAC scores. These studies paint a

picture of high scorers which is consistent with MacAndrew's theory that these people have a reward seeking orientation.

MacAndrew's (1981) assertion that the false negatives are people oriented towards avoiding punishment is primarily based on an analysis of the MMPI item response frequencies of false negatives and true negatives. The groups were identical except for six significantly different items which would be expected by chance in such a comparison. MacAndrew concluded that the false negatives appeared to be "neurotics-who-drink-too-much." The validity of this conclusion is based on the assumption that the psychiatric group was composed entirely of neurotics. However, MacAndrew failed to provide a diagnostic breakdown of the psychiatric group. Furthermore, MacAndrew makes two additional assumptions which he does not support with evidence. First, he assumes that a central component of neuroticism is an orientation to avoid punishment. Second, he assumes that the lack of a significant difference between these two groups indicates that the groups are identical except for the drinking behavior of the alcoholics. Additional evidence which substantiates these assumptions would strengthen MacAndrew's hypothesis.

Although both Apfeldorf and Hunley (1981) and MacAndrew (1981) propose that high and low scorers on the MAC differ, they do not have the same interpretations of what high and low scores are measuring. Apfeldorf and Hunley (1981) suggest that the MAC assesses two types of diagnoses (alcoholism versus psychiatric diagnosis). In contrast, MacAndrew (1981) proposes that the MAC is a bipolar measure of character (reward seekers versus avoiders of punishment). These

researchers, however, do concur in questioning the MAC's ability to detect alcoholism when it coexists with various types of psychopathology. A more detailed discussion of this issue will be presented later when the influence of psychopathology as a moderator variable is examined.

Discriminant Validity

There are two broad areas in which the MAC scale has shown an inability to discriminate between alcoholics and other groups. One of these areas involves problems such as drug abuse, and the other involves an antisocial orientation.

With the exception of one study (Sutker, Archer, Brantley, & Kilpatrick, 1979), the MAC scale has failed to discriminate between alcoholics and various types of drug addicts (Burke & Marcus, 1977; Fowler, 1975; Kranitz, 1972; Lachar, Berman, Grisell, & Schoof, 1976; Rathus, Fox, & Ortins, 1980; Rhodes & Chang, 1978). For example, Lachar et al. reported data on 48 outpatient heroin addicts, 65 inpatient alcoholics, 52 inpatient polydrug misusers, and 165 control patients (64 of whom had a history of substance misuse). A matching procedure assured that there were no significant differences between the addicts and controls on the variables of race, age, or education. The MAC scores of the alcoholics, herion addicts, and polydrug misusers did not differ. However, all three of these groups were significantly different from their matched controls. The mean MAC score of the 64 controls with histories of substance misuse fell between the means of the identified substance abusers and the true controls.

In view of the evidence just presented, it is not surprising that the MAC scale has been employed to differentiate substance abuse groups from psychiatric groups. For example, Wolfson and Erbaugh (1984) examined the ability of the MAC to indicate drug abuse among adolescents. They reported that the MAC was able to differentiate male and female substance abuse groups from a normal control group of psychiatric outpatients. The MAC was unable to differentiate between male groups of substance abusers and psychiatric inpatients, but successfully discriminated between these two groups of females.

Several investigators have examined the MAC's performance more broadly in populations characterized by compulsive behavior patterns such as bulimia, overeating, anorexia, smoking, and gambling. Leon, Kolotkin, and Korgeski (1979) examined the MAC's ability to differentiate obese, anorexic, and smoking groups from normal control groups of men and women. Neither the obese nor the anorexic group means (Ms = 20.3 and 20.1, respectively) differed significantly from the means of the control groups. Although the female smokers group (M = 21.7) did not obtain a MAC score which was significantly different from the female control group, the mean of the male group of heavy smokers (24.8) was significantly higher then the male control group mean. Additional support for the impact of smoking on the MAC is demonstrated by Willis et al. (1979) who found that male alcoholics who smoked scored significantly higher on the MAC than male alcoholics who did not smoke.

Hatsukami, Owen, Pyle, and Mitchell (1982) contrasted the mean MAC scores of a group of bulimic women with those obtained by a group

of women defined as substance abusers (alcohol and various drugs). They reported that the substance abuse group scored significantly higher on the MAC than the bulimic group. Thus, the MAC was successful at differentiating these two groups of women.

In the only study of gamblers, Graham (cited in Leon et al., 1979) reported a mean MAC score of 27.65 for a group of 100 non-alcoholic compulsive gamblers and a mean score of 28.06 for a comparison group of alcoholics. Leon et al. fail to report whether these means were significantly different.

Overall, the results indicate that for both sexes, people with eating disorders do not obtain significantly different MAC scores from normal groups. In contrast, the evidence suggested that males who smoke heavily or are compulsive gamblers may score significantly higher on the MAC scale than normal controls.

There is only one study which has assessed the MAC's sensitivity to juvenile delinquency. Rathus et al. (1980) found that an abbreviated form of the MAC (20 items from the MMPI-168) was able to predict self-reported alcohol abuse and marijuana smoking in high school students. Scores from the abbreviated scale also were related to self-reports of petty crimes and other indications of delinquent behavior. The results of this study must be viewed with caution because this abbreviated scale has not received any other empirical investigation.

There are three additional studies (Ruff et al., 1975; Schwartz & Graham, 1979; Zagar & Megargee, 1981) which address the issue of the MAC's sensitivity to an antisocial dimension. Ruff et al. (1975)

reported that the MAC failed to differentiate groups of alcoholics and criminally charged psychiatric patients from other psychiatric patients. They concluded that the MAC was assessing the dimension of acting out behavior rather than addictive tendencies. There are two problems with this conclusion: (a) although three groups were included in the study, the MAC scores of the nonalcoholic psychiatric patients were not reported; and (b) a more suitable comparison would have been to contrast alcoholic criminals with nonalcoholic criminals (Clopton, 1978). This comparison would have assessed the MAC's ability to discriminate within this population. In addition, it would have controlled for extraneous variables which may have moderated the alcoholic-criminal comparison.

Zagar and Megargee's (1981) study examined the MAC's ability to discriminate between different groups within a prison population. They divided 1,048 inmates into five groups based upon interview data: nonsignificant users; moderate and heavy alcohol users; and moderate and heavy drug users. The MAC was unable to discriminate between any of these groups of criminal offenders. These results indicate that the MAC is unable to discriminate between alcoholics and people with acting-out tendencies as suggested by Ruff et al. (1975). The MAC's failure to differentiate the alcoholic and substance abuser groups is consistent with research discussed previously.

Schwartz & Graham (1979) compared MAC scores of male and female psychiatric patients divided into alcoholic, antisocial psychiatric, and general psychiatric groups. The antisocial psychiatric group consisted of patients who were hospitalized because of aggressive or

antisocial behavior. There is no indication that these people were diagnosed as antisocial personality disorders. The means of the three female diagnostic groups were significantly different. In contrast, the group means for the male patients were not significantly different. Although factor analysis indicated that the MAC was sensitive to impulsivity, high energy levels, interpersonal shallowness, and general psychological maladjustment, Schwartz and Graham concluded that the MAC was not sensitive to a general dimension of antisociality. This is a surprising conclusion because these characteristics closely parallel the DSM-III diagnostic criteria for the Antisocial Personality Disorder. Schwartz and Graham appear to disregard this information and form conclusions based on the MAC's failure to discriminate between any of their diagnostic groups.

In two of the three studies with adult antisocial patients (Ruff et al., 1975; Schwartz and Graham, 1979) the MAC failed to differentiate the alcoholic group from either the antisocial group or the psychiatric group. Thus it is difficult to determine whether the MAC scale was sensitive to the antisocial dimension, or was influenced by extraneous variables which prevented it from performing any discrimination between these three diagnostic groups. Additional research is needed in light of the ambiguous results concerning the MAC sensitivity to an antisocial dimension.

Predictive Validity

Saunders and Schuckit (1981) reported that the MAC's ability to discriminate between alcoholics and controls also may be extended to differentiate nonalcoholic subjects at high risk for future

development of alcoholism from controls. Saunders and Schuckit designated 30 young men (ages 21-25) at high risk for future development of alcoholism as determined by positive family histories of alcoholism. Each of these subjects was matched on several variables (e.g., drinking history) with a control subject who had no family history of alcoholism. A comparison of the two group's MAC scores revealed that the high risk group had a significantly higher MAC score ($\underline{M}$ = 18.86) than the control group ($\underline{M}$ = 16.82).

The most impressive evidence of the MAC's predictive validity has been demonstrated by its ability to predict future problems with alcohol based upon prealcoholic MMPI item response patterns. A group of investigators (Hoffman, Loper, & Kammeier, 1974; Kammeier, Hoffman & Loper, 1973; Loper, Kammeier, & Hoffman, 1973) obtained MMPI scores of male alcoholics who had been tested during their freshman year in college. An average of 13 years had elapsed between college entrance and the beginning of treatment for alcoholism. A cutting score of 26 accurately classified 72% of the prealcoholics and misclassified 28% of the nonalcoholic peers as alcoholic. As Hoffman et al. (1974) point out, these results suggest that MAC is measuring some stable dimension of personality which exists prior to the development of alcoholism.

Additional evidence that MAC measures a stable dimension has been provided by studies which indicate that MAC is not sensitive to either the short or long term consequences of alcohol abuse. According to MacAndrew (1981), there are three types of evidence which suggest that the MAC does not simply measure the long-term effects of alcohol

abuse. First, the MAC is able to predict alcoholism before it has occurred which indicates a sensitivity to aspects of alcoholism which are not a function of the actual abuse of alcohol. Second, Uecker et al. (1980) correlated MAC scores with years of repeated heavy drinking. The absence of a strong positive correlation (r = .002) suggests that the MAC is not measuring the long-term effects of alcohol abuse. Third, evidence is provided by studies which correlated alcoholics' MAC scores with age (Apfeldorf & Hunley, 1975, 1981; Friedrich & Loftgard, 1978; Svanum et al., 1982; Thornton, Gellens, Alterman, & Gottheil, 1979). If the MAC is sensitive to the long-term effects of alcohol abuse, the results should reveal significant positive correlations between age and MAC scores. Only three studies, however, reported significant correlations, one positive (Friedrich & Loftsgard, 1978), and two negative (Apfeldorf & Hunley, 1975; Svanum et al., 1982). Overall, the evidence indicates that the MAC is not merely measuring the long-term consequences of alcohol abuse.

A comparison of alcoholics' pre- and post-treatment MAC scores suggests that the MAC is not simply measuring the short-term consequences of alcohol abuse. Six such studies are available and all indicate stable scores over a period of presumably enforced abstinence. Three of these investigators (Huber & Danahy, 1975; Rohan, 1972; Rohan et al., 1969) reported mean pre- and post-treatment scores for their samples with respective non-significant t ratios of -.30, -.38, and -.80. The length of treatment represented in these studies ranged from an average of 68 days to 90 days. Three other investigators (Chang, Caldwell, & Moss, 1973; Lanyon, Primo, Terrell, & Wener,

1972; Vega, 1971) failed to reveal the actual pre- and post-treatment scores, but reported that the differences between the means were nonsignificant.

Moderator Variables

The literature on the MAC scale suggests that there are a number of variables which may influence a person's score. The effects of age, sex, education, and race will be reported.

Age

The effect of age on the MAC is unclear because studies which have assessed this relationship report mixed results. Thornton et al. (1979) reported that there was no significant correlation (r = .01) between MAC scores and age in their sample of 25 male alcoholics. Apfeldorf and Hunley (1981) also reported no significant correlation between MAC scores and age, yet failed to provide the coefficient. Two studies found significant negative correlations between age and MAC scores (Apfeldorf & Hunley, 1975: r = -.61; Svanum et al., 1982: r = -.15). Friedrich and Loftsgard (1978) found a significant positive correlation (r = .25) between MAC scores and age.

Indirect evidence about the influence of age on the MAC is provided by several studies which used young subjects. Zagar and Megargee (1981) reported that the MAC's failure to differentiate alcoholics from nonalcoholic controls in their study may have been due to the scale's inability to discriminate within the young sample of subjects they utilized. However, there are three studies (Klinge,

1983; Rathus et al., 1980; Wolfson & Erbaugh, 1984) which support the MAC's ability to detect alcoholism in adolescents.

The evidence regarding the MAC's relationship with age is inconsistent. Full reporting of such correlations and the range of age in future research may help delineate these relationships.

Sex

There are two studies (Rich & Davis, 1969; Svanum et al., 1982) which reported that female alcoholics scored significantly lower than male alcoholics. In addition, Wolfson and Erbaugh (1984) reported that the optimal cutting score derived for their female sample (>23) was lower than that derived for their male sample (>25), but did not indicate that this difference was significant. Sher and McCrady (1984) obtained lower MAC means for their female groups than for their male groups, but failed to indicate if this difference was significant. In contrast to these four studies, Schwartz and Graham (1979) reported that their female alcoholics scored higher than the male alcoholics. The remaining mixed sex studies (Conley & Kammeier, 1980; Rathus et al., 1980) failed to report the separate mean MAC scores of male and female subjects. Overall, the evidence indicates that men and women score differently on the MAC. Thus, the literature suggests that the MAC can make better discriminations when separate optimal cutting scores are derived for men and women.

With the exception of one study (Navarro, 1979), research has demonstrated the MAC's ability to discriminate between female alcoholic or substance abuse groups, and female psychiatric patients and normals (Rich & Davis, 1969; Sher & McCrady, 1984; Svanum et al.,

1982; Wolfson & Erbaugh, 1984). Thus, the MAC scale appears to be useful in both male and female patient samples.

Educational Level

There are two studies which found a significant negative correlation between MAC scores and education level (Friedrich & Loftsgard, 1978: $r = -.24$, $p < .05$; Thornton et al., 1979: $r = -.35$, $p < .05$). It is suggested that future researchers correlate MAC scores with education in order to provide more information about this relationship.

Race

There have been four studies which have examined the impact of race on the MAC. Two studies (Page & Bozlee, 1982; Uecker, Boutilier, & Richardson, 1980) support MacAndrew's (1981) conclusion that the MAC detects alcoholism in minority groups. Uecker et al. (1980) compared 40 American Indian veterans and 40 White veterans who were in an alcohol treatment program. Their data analysis revealed no significant group differences on the MAC. The MAC correctly identified 85% of the Indians and 80% of the Whites as alcoholic. Page and Bozlee (1982) compared alcoholic groups of Caucasians, Hispanics, and American Indians. They found no significant differences between these groups on the MAC.

Although the MAC performs well with some minority groups, evidence indicates that it may be unable to discriminate between alcoholics and nonalcoholics in Black samples. For example, Walters, Greene, Jeffrey, Kruzich, and Haskin (1983) found that the MAC did not discriminate well between Black alcoholics and nonalcoholics (55.5%),

but made this discrimination, albeit poorly, in White groups (66.3%). The subjects in this study were alcoholic and nonalcoholic psychiatric inpatients in an active duty military sample. Walters et al. suggest caution when using the MAC with Black patients in this setting.

Zagar and Megargee (1981) also compared the MAC's performance on Black and White prisoners and reported that the MAC failed to detect alcoholics regardless of race. They divided inmates into groups of drug abusers, alcohol abusers, and non-significant users, and compared the mean scores of White and Black samples within these groups separately. Zagar and Megargee found no indication of racial differences on the scale. It is important to note that in both of these studies, the MAC performed poorly with the White groups as well as with the Black groups. In sum, additional evidence regarding the impact of the race on the MAC scale is needed before definitive conclusions can be drawn.

In addition to the variables which have been examined in the literature, there are others, such as intelligence, socioeconomic status or religious affiliation, which have not received empirical attention with respect to the MAC scale. One of the most important of these potential moderator variables is psychopathology.

Rationale for the Dissertation Study

The influence of psychopathology on MAC scores has never been directly assessed. The MAC's ability to detect alcoholism has generally been evaluated by contrasting relatively "pure" diagnostic groups--that is, contrasting alcoholics, who have no secondary psychiatric diagnosis with psychiatric patients who have no history

of substance abuse. This point returns us to a question which was posed earlier: Is the MAC capable of detecting alcoholism which coexists with other forms of psychopathology? An investigation of the scale's performance in this context is important for several reasons. The MAC is routinely administered in settings where many individuals have combined alcoholic-psychiatric diagnoses. The MAC's reported accuracy rate, however, is primarily based on studies which contrast two relatively pure diagnostic groups. An altogether different accuracy rate may result when the MAC is employed to detect alcoholism which coexists with psychopathology. If the MAC's accuracy rate does alter significantly when used within this population, clinicians may need to reconsider its appropriateness with this type of clientele.

It is also important to determine which specific types of psychopathology influence MAC scores in such a way as to affect the detection of alcoholism. Clearly defining the parameters of the MAC's utility will enable clinicians to interpret scores with greater accuracy. In addition, this information can be used to assess the ideas expressed by MacAndrew (1981) and by Apfeldorf and Hunley (1981) concerning the nature of the scale. As outlined earlier, MacAndrew (1981) hypothesized that his scale measures reward seeking on the high end, and avoidance of punishment on the low end. When applied specifically to a population of alcoholics, MacAndrew suggests that the MAC detects primary alcoholics (reward seeking orientation) and fails to detect secondary alcoholics (orientation to avoid punishment) who appear to be "neurotics-who-also-happen-to-drink-too-much." In contrast, Apfeldorf and Hunley (1981) suggest that high MAC scores

measure alcoholism and low scores measure psychiatric diagnoses. They question whether the MAC will be able to detect alcoholism which coexists with any form of psychopathology due to the way in which the scale was constructed. An evaluation of the MAC's performance with different types of psychopathology should begin to clarify which of these ideas corresponds best with the data.

CHAPTER II

METHODOLOGY

Subjects and Selection

Subjects were 140 male patients from two inpatient wards of the V.A. hospital in Houston, Texas, a psychiatric ward and an alcohol treatment ward. These two wards were primarily selected because of their staff's adherence to DSM-III criteria when assigning diagnoses. On the inpatient psychiatric ward, patient discharge summaries were reviewed from 1981 to 1984 to select patients with appropriate diagnoses. In addition to diagnosis, these summaries provided information about demographic variables and each patient's history of substance abuse. The MMPI's of patients who met the diagnostic criteria were then obtained and screened for validity.

On the alcohol treatment ward, a different patient selection procedure was adopted. MMPI's were not routinely administered on this ward. Therefore, patients with the appropriate diagnoses were selected from those who were currently undergoing treatment. Ample detoxification time prior to MMPI administration was observed for alcoholic patients. Libb and Taulbee (1971) reported that alcoholics exhibit more psychotic features on the MMPI before, during, and immediately after detoxification. Claiborn and Greene (1981) tested a group of alcoholics 1 week after detoxification and noted very few "toxic" neuropsychological effects. In the current study, a minimum of 3

weeks was required to elapse after detoxification before MMPI's were administered. Two classes of psychiatric diagnoses, Personality Disorders and Neurotics, were selected for this study. Although the MAC's ability to detect alcoholism has been evaluated with schizophrenic groups, it has not been examined with either of these diagnostic groups. In addition, these groups were selected to evaluate whether the MAC scale would be sensitive to the fundamental differences which characterize these two diagnostic groups. As discussed previously, high MAC scores are consistently associated with characteristics (e.g., impulsivity, immaturity, and rebelliousness) which are common attributes of many Personality Disorders. In contrast, these characteristics appear to be unrelated, or directly opposed, to many components of Neurotic Disorders. Including these two psychiatric groups made it possible to examine the influence of two diverse classes of psychopathology on the MAC scale.

Five diagnostic groups of patients were included in the current study. Three groups contained subjects with a single diagnosis: alcoholics (A), neurotics (N), and personality disorders (PD). Subjects in the two remaining groups had a diagnosis of alcohol dependence as well as a psychiatric diagnosis, either alcoholic neurotics (AN) or alcoholic personality disorders (APD). The diagnosis of alcohol dependence in these two groups could be either the primary or secondary diagnosis.

The DSM-III was used to designate the criteria for group classification for several reasons. The DSM-III is endorsed by the professional community and is routinely used for diagnoses of this kind.

DSM-III provides a standard of diagnosis which is reliable and widely available to researchers. In addition, DSM-III offers criteria which are generally objective, and it provides guidelines for assigning multiple diagnoses. These latter features made it especially suitable for the proposed study.

The DSM-II was used to designate diagnoses into the Neurotic category for several reasons. DSM-II offers the advantage of classification guidelines which are independent of the MMPI. In addition, DSM-II recognized neurotic diagnoses whereas DSM-III no longer maintains this classification. DSM-III does, however, provide a comparative listing of DSM-II and DSM-III diagnoses which are equivalent (DSM-III, Appendix C). The specific DSM-III diagnoses which were included in the neurotic and the personality disorder categories are outlined in Appendix C.

Measures

The MacAndrew Alcoholism Scale

The MacAndrew (1965) alcoholism scale (MAC) is one of many special scales developed from the MMPI item pool. The MAC consists of 51 items which significantly discriminated male alcoholics from nonalcoholic outpatients. MacAndrew (1965) suggested that the two items which referred directly to alcohol use (i.e., 215 & 460) be deleted. In accordance with the majority of research, the present investigation will employ the 49-item MAC scale (see Appendix A). As outlined previously, this scale has demonstrated its validity in a wide variety of treatment settings.

MMPI Validity Indices

The MAC was administered in the context of the MMPI and several MMPI validity indices were used to select MMPI's with complete, consistent, and honest responses. Two different measures, the Test-Retest index and the Carelessness scale, were used to assess the consistency of item endorsement. The Test-Retest index (Dahlstrom, Welsh, & Dahlstrom, 1972) was designed to detect inconsistent or erratic response sets. This index is the number of 16 repeated items which have been inconsistently endorsed. Dahlstrom et al. (1972) suggest that a score of four or higher indicates questionable response reliability, but they offer no evidence for this decision rule. Greene (1979) found that the mean number of inconsistent responses for a V.A. psychiatric sample was 1.90 (SD = 1.71). This finding indicates that in a V.A. sample, it is reasonable to discard MMPI's with a Test-Retest index of four or greater.

The Carelessness scale (Greene, 1978) consists of 12 pairs of items which are psychologically opposite in content. Patients receive one point for each item pair which is inconsistently endorsed. Greene suggested that a cutting score of four or more on this scale is optimal to identify invalid profiles. Although Greene did not use any external criteria to validate this score, he did report that the mean number of inconsistent responses in a V.A. sample was 1.76 (SD = 1.45). Thus, it seemed reasonable to adopt his criteria for validity for the subjects in this study.

The Cannot Say (?) scale consists of the number of items which the patient fails to answer. Several researchers (Clopton &

Neuringer, 1977; Greene, 1980) point out the impact that item omission may have on profile configuration. However, this is not directly related to the MAC scale. The integrity of MAC scores will depend, in part, on how many of its 49 items are endorsed. If a subject omitted more than two MAC items, his score could be significantly altered because the effect size for the mean comparisons was approximately three points. Therefore, subjects who omitted three or more MAC items were excluded from this research.

Wiener's (1948) subtle and obvious items were used in order to identify fake-good and fake-bad response sets. Research with these items has demonstrated their ability to detect both of these response sets (Anthony, 1971; Harvey & Sipprelle, 1976). However, there are no explicit criteria for defining a fake-good or fake-bad response set with these scales (Greene, 1980). In the present study, MMPI's were designated as fake-bad, fake-good, or acceptable based on the sum of the differences across the five Obvious-Subtle subscales. If the score on an Obvious subscale exceeded the corresponding score of its Subtle scale, the difference was scored in a positive direction and indicated a fake-bad response set. In other words, the patient was endorsing items which were obviously related to psychopathology more often than items which were related to psychopathology in a subtle way. Conversely, when the score on a Subtle subscale exceeded the Obvious subscale, the difference was scored in a negative direction, and indicated a fake-good response set. Greene (1983) demonstrated that the cutting scores of -58 (fake-good) and 148 (fake-bad) identified the top and bottom 10% of the range of Obvious-Subtle

scores in a sample of 448 community clinic outpatients. These criteria were adapted in order to exclude patients whose MMPI's revealed extreme differences on the Obvious-Subtle subscales.

In sum, if any one of the following criteria occurred, the MMPI was considered invalid and was eliminated from the study:

Rule 1: TR Index > 3 (raw score).

Rule 2: Carelessness > 3 (raw score).

Rule 3: MAC Omit > 2 (raw score).

Rule 4: Sum of Obvious-Subtle differences exceeds 148 or -58.

Chart Audit Form

A revised version of the chart audit form was used to code demographic and diagnostic information (see Appendix B). The information collected on this form included age, education level, race, diagnoses, and any history of drug abuse. In addition, each patient's MAC score and relevant MMPI validity indices were recorded on this form. The relationship of demographic variables and MAC scores was examined.

Hypotheses

Hypothesis I

The mean MAC score of the alcoholic group will be significantly higher than the combined mean of the psychiatric groups (personality disorders and neurotics). This hypothesis is based upon the fact that, with only two exceptions (Ruff et al., 1975; Schwartz & Graham, 1979), numerous studies have found alcoholics to have significantly higher MAC scores than psychiatric patients.

Hypothesis II

The mean MAC scores of subjects with a single diagnosis of alcoholism will differ from the scores of subjects with a combined alcoholic-psychiatric diagnosis. This hypothesis is primarily designed to test Apfeldorf and Hunley's (1981) suggestion that high MAC scores measure alcoholism and low MAC scores measure psychiatric diagnoses. Apfeldorf and Hunley noted that the MAC items were selected on the basis of how well they discriminated between alcoholic and psychiatric patients and reasoned that the scale measures alcoholism and psychiatric diagnoses.

Although there is reason to expect the MAC scores of the single and multiple diagnostic groups to differ, it is difficult to predict the direction of the differences. The moderating influence of a diagnosis of personality disorder or neurosis on the MAC has never been examined. In addition, MacAndrew's theory (see pages 20-22) would suggest that these two classes of psychiatric diagnosis may influence MAC scores in different directions.

Hypothesis III

The mean of the alcoholic personality disorder group will be significantly higher than the alcoholic neurotic group mean. This hypothesis will address MacAndrew's theory that the MAC is a bipolar measure of character. Confirmation of this hypothesis would support MacAndrew's theory by demonstrating that the MAC scale is differentially influenced by personality characteristics within a sample of alcoholics.

Data Analysis

Mean Comparisons

A one-way analysis of variance was used to assess whether the mean MAC scores of the five diagnostic groups differed significantly. Scheffe's multiple comparison procedure was used to examine the five mean comparisons which were directly related to the hypotheses (see Figure 1). This procedure was also employed to perform additional mean comparisons in order to supplement the initial results. Scheffe's procedure allows for all possible multiple comparisons to be performed without an increase in the experiment-wise error-rate.

Hypothesis I states that the MAC scale will be able to differentiate the alcoholics from the personality disorders and neurotics. This hypothesis would be supported if the mean of group A is significantly greater than the combined mean of groups PD and N.

Hypothesis II is that the MAC scores of subjects with a single diagnosis of alcoholism, will differ from the scores of subjects with a combined alcoholic-psychiatric diagnosis. This hypothesis would be supported if the A mean is significantly different than the combined mean of the APD and AN groups. Two additional mean comparisons contrasting A with APD, and A with AN were performed. The results would offer support for Apfeldorf and Hunley's (1981) ideas if the A mean was significantly higher than the APD and AN means, in combined as well as individual comparisons with A. In contrast, MacAndrew's (1981) theory would be supported if there was no difference between

Hypothesis	Diagnosis				
	A	PD	N	APD	AN
I	X	Y	Y		
II	X			Y	Y
	X			Y	
	X				Y
III				X	Y

FIGURE 1. Mean Comparisons. In each row, group means denoted by the same letter will be combined. The means which will be contrasted are indicated with different letters (X and Y).

the A mean and the APD mean, and if the A mean was significantly higher than an AN mean.

Hypothesis III was designed to clarify the results of Hypothesis II, and test MacAndrew's theory. Hypothesis 3 states that the APD mean will be significantly higher than the AN mean. This result would confirm that the MAC is differentially influenced by personality characteristics within a sample of alcoholics.

Classification Accuracies

Classification accuracies were determined for all comparisons of alcoholic and nonalcoholic groups. In order to determine classification accuracies, each diagnostic group was randomly divided in half, forming a derivation group and a cross-validation group. The derivation groups were used to find the optimal cutting scores. The optimal

cutting score was the MAC score which maximized correct classification and minimized incorrect classification in each group comparison. Once derived, these cutting scores were then applied to the cross-validation groups in order to determine the classification accuracies. Each classification accuracy represented the percentage of correct classification (true positives and true negatives) achieved by the MAC. Five classification accuracies were determined: (a) A, APD, and AN versus PD and N; (b) A versus PD and N; (c) APD and AN versus PD and N; (d) APD versus PD; and (e) AN versus N.

These classification accuracies were examined to determine if they were significantly different from each other as well as from what could be expected by chance. These evaluations were performed using chi-square analysis.

CHAPTER III

RESULTS

The findings of this study are presented in the following order: (a) characteristics of the subjects, (b) data analyses for the hypotheses, (c) supplemental analyses, (d) chi-square analyses of classification accuracies, and (e) the association of demographic variables and MAC scores.

Subject Characteristics

The 140 male patients in this study ranged in age from 19 to 67 years with a mean age of 41.7 years. There were three races represented in this sample, 115 Caucasians, 20 Blacks, and 5 Hispanics. The patients' education level ranged from 6 to 21 years, with a mean of 12.1 years. A description of the age, race, and education level of the subjects in each diagnostic group is provided in Table 1. These groups did not differ significantly with respect to race or education level, but did differ significantly in age, $F(4,135) = 6.46$, $p < .001$. The A group was significantly older than the PD group and the APD group. The AN group was also significantly older than the PD group.

All patients in the A group had a DSM-III diagnosis of alcohol dependence. In contrast, the other four groups included a variety of DSM-III diagnoses. Patients in these groups were designated as personality disorders or neurotics based upon their DSM-III diagnosis. Appendix D depicts the specific DSM-III diagnoses which were

TABLE 1

Means and Frequencies for Demographic Variables in Each Diagnostic Group

	Age[a]		Education		Race		
	M	SD	M	SD	Frequencies		
Group					White	Black	Hispanic
A	48.36	9.79	11.93	2.42	19	8	1
APD	38.57	11.37	12.04	1.23	27	1	0
AN	43.29	9.85	12.50	2.15	25	2	1
PD	36.00	8.47	11.71	1.08	22	4	2
N	42.43	9.57	12.43	2.04	22	5	1
Test Statistic:	$F = 6.46$*		$F = .90$		$\chi^2 = 11.13$		

[a]Significant differences: A > APD; A > PD; AN > PD
* $p < .05$

represented in each group, as well as the number of patients who received each diagnosis.

The MAC scores of the 140 patients who were retained as subjects and the 92 patients who were excluded from the study (see page 39) did not differ significantly, $F(1,230) = .38$, $p > .05$. Furthermore, the status of patients (retained or excluded by validity criteria) did not interact significantly with diagnostic group or race in influencing MAC scores. Differences in age and education level between the subjects who were retained and those who were excluded were evaluated with t-tests. There was no significant difference in education level between these subject groups. However, the patients who were excluded

were significantly younger (M = 37.58) than those who were retained (M = 41.73), t(230) = 2.86, p <.005. The number of patients excluded by each validity criterion is described in Appendix E.

Although power was estimated when selecting the sample size for the study, additional analyses were conducted to determine the actual power. For the mean comparisons, Scheffe's procedure required the difference between means to exceed 3.48 points to be considered a significant difference. This difference is .77 of the standard deviation of the MAC scale (4.53) in this study. Power analyses following Cohen (1977) indicated that with an alpha level of .05, 140 subjects provided power in excess of .995 to detect a difference greater than 3.48 points on the MAC scale. For the chi-square analyses, power was determined for detecting a classification accuracy of 70% or greater. Power differed for these analyses because the number of subjects varied across comparisons. For the majority of the chi-square analyses (i.e., 18 of the 24 analyses), power ranged from .60 to .94; however, for 6 analyses, power was less than .50.

Data Analyses

The mean MAC scores of the five diagnostic groups were compared with a one-way analysis of variance (ANOVA). Means and standard deviations for the five groups are presented in Table 2. Mean MAC scores were 30.32 for the A group, 30.42 for the APD group, 27.14 for the PD group, 26.75 for the AN group, and 26.07 for the N group. The MAC scores of the five groups differed significantly, F(4,135) = 6.87, p <.001. Cochran's test (Myers, 1966, p. 73) indicated that the assumption of hemogeniety of variance had not been violated. Specific

TABLE 2

Diagnostic Group Mean Comparisons
Descriptive Statistics

Group[a]	Mean	SD
A	30.32	3.66
APD	30.43	4.02
PD	27.14	4.03
AN	26.75	4.42
N	26.07	4.72
Test Statistic	F = 6.87*	

[a]N = 28 in each group.
*p < .0001

mean contrasts were evaluated with Scheffe's procedure for multiple comparisons.

Multiple Comparisons for the Hypotheses

As described earlier, the purpose of this dissertation was to examine the influence of psychopathology on the MAC scale and to evaluate two explanations of what the scale is measuring. The three hypotheses for this study were introduced in Chapter II (p. 40-41). Each hypothesis will be restated and followed immediately by reporting the relevant multiple comparisons.

Hypothesis I

The mean MAC score of the alcoholic group will be significantly higher than the combined mean of the psychiatric groups. This hypothesis was supported because the A mean (30.32) was significantly higher than the combined mean (26.60) of the PD and N groups.

Hypothesis II

The mean MAC score of patients with a single diagnosis of alcohol dependence will differ from the scores of patients with a combined alcoholic-psychiatric diagnosis. Three comparisons were performed to test this hypothesis. Two of these (A versus APD and AN, and A versus APD) yielded differences which were not statistically significant. In the third comparison, the A mean (30.32) was significantly higher than the AN mean (26.75). Thus, this hypothesis received partial support.

Hypothesis III

The mean MAC score of the APD group will be significantly higher than the AN group mean. This hypothesis was supported because the APD mean (30.42) was significantly higher than the AN mean (26.75).

Supplemental Analyses

The results of the analyses for the hypotheses prompted further evaluation of the data. Four additional mean comparisons were performed. The rationale for each is discussed briefly and followed by the results.

Although the MAC scale was able to differentiate a group of diagnostically "pure" alcoholics from a group of psychiatric patients, its ability to discriminate between a group of diagnostically heterogeneous alcoholics and a group of psychiatric patients had not been evaluated. The MAC's performance with these groups was examined by contrasting the combined mean of all the alcoholic groups (A, APD, and AN; M = 29.16) with the combined mean of the psychiatric groups (PD

and N; M = 26.60). There was no significant difference between these groups.

One of the central questions in this study was whether the MAC scale could detect alcoholism in patients with alcoholic psychiatric diagnoses. The original analyses did not provide sufficient evidence to answer this question. Therefore, two additional analyses were performed comparing the MAC scores of the APD group with the PD group, and the AN group with the N group. Although the mean difference between the APD group and the PD group approached significance ($p < .10$), there was no significant difference in either comparison.

The nonsignificant difference between the APD and PD groups prompted further analyses directed at examining the MAC's ability to discriminate alcoholic patients from patients with personality disorders. No significant difference was found between the A group and the PD group, although the difference approached significance.

Primary Versus Secondary Diagnoses

The subjects in the AN and APD diagnostic groups had a diagnosis of alcohol dependence and a psychiatric diagnosis. For the majority of these patients (45 out of 56 patients), the psychiatric diagnosis was the primary diagnosis. However, there were 11 patients in these two groups who had a primary diagnosis of alcohol dependence. Differences in the MAC scores of patients with a primary versus a secondary diagnosis of alcohol dependence were examined within each diagnostic group. Patients with primary and secondary diagnoses of alcoholism

were not combined across diagnostic groups (APD and AN) because the mean MAC scores of APD and AN were significantly different.

In the AN group, there were three patients with a primary diagnosis of alcohol dependence (M = 24.6, range 22-28), and 25 patients with a secondary diagnosis of alcohol dependence (M = 27.0, range 19-37). The patients with a primary diagnosis had MAC scores which fell in the lower range of the secondary group's MAC scores. A statistical comparison of these groups was not performed due to the small sample size in the primary diagnostic group. Although definitive conclusions are not justified, there does not appear to be a significant difference between these two groups.

In the APD group, the MAC scores of the eight patients with a primary diagnosis of alcohol dependence (M = 31.12, range 26-36) did not differ significantly from the MAC scores of the 20 patients with a secondary diagnosis of alcohol dependence (M = 30.15, range 22-35), $F(1,26) = .33$, $p < .05$.

Chi-Square Analysis of Classification Accuracies

Classification accuracies were determined for 5 comparisons: (1) A versus PD and N; (2) APD and AN versus PD and N; (3) APD versus PD; (4) AN versus N; and (5) A, APD, and AN versus PD and N. In each of these comparisons, a derivation, cross-validation, and overall classification accuracy was determined. The classification accuracies for each comparison were based on an optimal cutting score which was set in the corresponding derivation sample. The optimal cutting scores ranged from 26 to 29, depending on the groups involved in the

discrimination task. Chi-square analysis were applied to each classification accuracy to determine if it differed significantly from what could be expected by chance. There was insufficient power to perform most of the chi-square analyses for the separate derivation and cross-validation samples. The power was adequate, however, for chi-square analyses with the overall group comparisons. Table 3 depicts the optimal cutting score, overall classification accuracy, and the chi-square value for the five comparisons. Two of these comparisons were significant: (1) A versus PD and N, $\chi^2(1, N = 84) = 4.12$, $p < .05$; and (2) A, APD and AN versus PD and N, $\chi^2(1, N = 140) = 5.70$, $p < .05$.

A chi-square test was also conducted to assess whether significant differences existed between any two of these five classification accuracies. None of these comparisons yielded a significant difference.

Classification accuracies for these five comparisons, using a cutting score of 24, are also depicted in Table 3. Chi-Square analyses revealed that none of these classification accuracies were significantly higher than chance. The frequencies for MAC scores in each diagnostic group are presented in Appendix F.

Demographic Variables

The relationship of MAC scores and three demographic variables (age, race, and education) was examined. The correlation of age and MAC scores was computed for the entire sample and within each diagnostic group. The overall correlation between age and MAC scores was nonsignificant ($r = -.05$; $p > .05$). However, in the APD group, there

TABLE 3

Chi-Square Analyses for Group Comparisons With Cutting Scores and Classification Accuracies

Contrast[a]	Cutting Score	Classification Accuracy	Chi-Square	Score	Classification Accuracy
1	29	65.4%	4.12*	24	46.4%
2	28	55.3%	.62	24	54.4%
3	28	62.5%	1.76	24	57.1%
4	26	53.5%	.12	24	51.7%
5	26	64.2%	5.70*	24	61.4%

[a]Contrasts designated as follows:
(1) A versus PD and N
(2) APD and AN versus PD and N
(3) APD versus PD
(4) AN versus N
(5) A, APD, and AN versus PD and N
*$p < .05$

was a significant positive correlation between age and MAC scores (r = .49; $p < .01$). There were also two significant negative correlations between age and MAC scores; one occurred in the PD group (r = -.39; $p < .05$) and the other was found in the N group (r = -.45, $p < .05$).

ANOVA's were employed to determine whether MAC scores differed for patients of different races or educational levels. Patients were assigned to one of three education levels; less than 12 years (N = 37), 12 years (N = 72), and more than 12 years (N = 31). The relationship of each of these demographic variables and MAC scores was examined for the entire sample as well as within each of the five diagnostic groups. There was no significant effect for race or

education in any of these analyses. Additional analyses revealed that the MAC scale was unable to discriminate between the combined group of Black alcoholics (M = 29.27, SD = 4.42) and the combined group of Black psychiatric patients (M = 27.00, SD = 4.50), $t(18) = 1.13$, $p > .05$. Furthermore, the MAC was unable to differentiate the Alcoholic Blacks (M = 29.44, SD = 4.87) from the combined group of Black psychiatric patients, $t(16) = 1.10$, $p > .05$. These results are consistent with previous research on the MAC's performance with Black groups.

CHAPTER IV

DISCUSSION

The results of the present study will be integrated with the evidence presented in Chapter I. Furthermore, this information will be used to evaluate the meaning of high and low MAC scores. Following this discussion, directions for future research will be presented.

Evidence From the Present Study

Hypothesis I

The literature surveyed in Chapter I indicates that with few exceptions, alcoholic groups obtain significantly higher MAC scores than psychiatric groups. In the present study, the MAC scale was cross-validated with patient groups to which it has been most often applied in the past--alcoholics without psychiatric diagnoses and psychiatric patients with no history of substance abuse. Hypothesis I was confirmed because the mean MAC scores of these two groups were significantly different. Although the MAC's classification accuracy with these groups (65.4%) was significantly higher than chance, it was not impressive.

The MAC's discriminative ability decreased when it was applied to the combined group of alcoholics (A, APD, and AN) to differentiate them from the psychiatric patients. The mean MAC scores of these two groups were not significantly different. The MAC's classification accuracy with these groups (64.2%), however, was comparable to the

classification accuracy obtained in the initial comparison. These results indicate that the MAC scale's ability to discriminate alcoholic groups from psychiatric groups may have been weakened by the psychiatric diagnoses in the alcoholic-psychiatric groups.

Hypothesis II

The influence of psychiatric diagnosis on the MAC scale's ability to detect alcoholism was further examined by comparing the MAC scores of alcoholics with those obtained by alcoholic-psychiatric patients. Hypothesis II predicted that the MAC scores of the alcoholic-psychiatric groups would differ significantly from the MAC scores of the Alcoholic group. The results did not fully support this hypothesis. Although the Alcoholic Neurotic group scored significantly lower than the Alcoholic group, there was no significant difference between Alcoholic group mean and the means of Alcoholic Personality Disorder group, or the combined alcoholic-psychiatric group (APD and AN).

The results for each of the three predictions based on Hypothesis II will be discussed in turn. The first prediction was that there would be a significant difference between the MAC scores of the Alcoholic group and the MAC scores of the combined alcoholic-psychiatric group. This prediction was not confirmed. Further investigation revealed that the two alcoholic-psychiatric groups obtained significantly different MAC scores. Because the combined group mean did not accurately represent the MAC scores of either group, the most appropriate evaluation of the MAC's performance with

alcoholic-psychiatric groups is provided when these groups are examined separately.

The second prediction was that there would be a significant difference between the Alcoholic group and the Alcoholic Personality Disorder group. The fact that this prediction was not confirmed suggests that Apfeldorf and Hunley's (1981) ideas concerning high and low MAC scores may not be correct. If Apfeldorf and Hunley's ideas were valid, patients with alcoholic-psychiatric diagnoses would be expected to obtain MAC scores which were between the scores of the alcoholic patients and psychiatric patients. This relationship was not observed. In fact, the Alcoholic Personality Disorder group had a slightly higher mean score than the Alcoholic group. This evidence is inconsistent with the assumption that high MAC scores measure alcoholism and low MAC scores measure psychiatric diagnosis.

Supplemental analyses revealed that the mean difference between the Alcoholic Personality Disorder group and the Personality Disorder group approached significance ($p < .10$). The MAC's classification accuracy in this comparison was 62.5%. Similar results were obtained when the Alcoholic group mean was compared to the Personality Disorder group mean ($p < .10$; classification accuracy 66%). The fact that the differences between these groups approached significance, suggests that conclusions regarding the MAC's ability to discriminate between personality disorder groups and alcoholic groups (with and without personality disorder diagnoses) be withheld pending further investigation.

The third prediction based on Hypothesis II was confirmed because the means of the Alcoholic Neurotic group and the Alcoholic group were significantly different. Although the Alcoholic Neurotic group obtained a significantly lower mean score, the results are inconsistent with Apfeldorf and Hunley's ideas concerning high and low MAC scores. The mean of the Alcoholic Neurotic group did not fall between the means of the psychiatric patients and the alcoholic patients as Apfeldorf and Hunley's ideas would suggest. Further analysis revealed that there was no significant difference between the means of the Alcoholic Neurotic group and the Neurotic group (classification accuracy 53.5%). Thus, the MAC scale is unable to detect alcoholism which coexists with the psychiatric diagnosis of neurosis.

Apfeldorf and Hunley (1981) expressed concern about the MAC scale's ability to detect alcoholism which coexisted with psychiatric diagnoses. This concern was based on their idea that high and low MAC scores measure alcoholism and psychiatric diagnosis, respectively. Although Apfeldorf and Hunley's ideas regarding high and low MAC scores are not supported by the results of Hypothesis II, the evidence does indeed support their suggestion that the MAC scale would be unable to detect alcoholism in alcoholic-psychiatric patients.

Hypothesis III

Hypothesis III was specifically designed to test MacAndrew's theory and predicted that the Alcoholic Personality Disorder group would score significantly higher on the MAC scale than the Alcoholic Neurotic group. As discussed earlier, this prediction was confirmed. This evidence indicates that patients with alcoholic-psychiatric

diagnoses obtain different MAC scores depending upon their specific type of psychiatric diagnosis.

Conclusions From the Present Study

Overall, the results of this study lead to the following conclusions about the MAC scale. Although the MAC scale is able to discriminate "pure" alcoholics from psychiatric patients, the scores of alcoholic-psychiatric patients do not differ significantly from their psychiatric counterparts. Although the MAC scale failed to detect alcoholism in either alcoholic-psychiatic group, the reasons it failed to make this dicrimination appear to be different for each group. Different types of psychiatric diagnoses influence the MAC scores of alcoholics in different ways. In this study, for example, the Alcoholic Personality Disorder group obtained a significantly higher MAC score than the Alcoholic Neurotic group.

Alcoholic Neurotics obtained low MAC scores which were almost identical to the scores obtained by the Neurotic group. The MAC's classification accuracy in this comparison was little better than chance. This evidence suggests that the MAC scale is unable to detect alcoholism among neurotic patients.

Although the Alcoholic Personality Disorder group and the Alcoholic group obtained the highest MAC scores in the study, the mean scores for these two groups were not significantly different from the Personality Disorder group mean. The mean differences in these two comparisons (APD vs. PD, A vs. PD), however, did approach significance. Additional research is necessary in order to determine whether the MAC scale can effectively discriminate between personality

disorder groups and alcoholic groups (with or without personality disorder diagnoses).

MacAndrew's Theory Regarding High and Low MAC Scores

The evidence provided by the current study will be used in conjunction with the literature surveyed in Chapter I in order to examine MacAndrew's theory regarding what the MAC scale measures.

High Scores

MacAndrew (1981) proposed that high MAC scores measure a reward-seeking orientation, and that low scores measure an orientation to avoid punishment. The majority of the evidence in the literature appears to be consistent with MacAndrew's theory. Studies which have used item analysis (Finney et al., 1971) and factor analysis (Burke, 1983; MacAndrew, 1967; Schwartz & Graham, 1979; Svanum & Hoffman, 1982), in addition to those which have correlated MAC scores with other criteria (Lachar et al., 1976; Moore, 1984; Pfost et al., 1984) consistently portray high MAC scorers as impulsive, interpersonally shallow, pleasure-seeking people, who are immature, rebellious and temperamental. General clinical impressions of the patient groups which obtain high MAC scores (alcoholics, substance abusers, and people with an antisocial orientation) are consistent with MacAndrew's hypothesis that these people possess a reward-seeking orientation.

In the present study, two groups (Alcoholics and Alcoholic Personality Disorders) obtained high MAC scores. Although it is not possible to demonstrate whether the Alcoholic group had a reward-seeking orientation, some interesting information about the Alcoholic

Personality Disorder group is provided by the psychiatric diagnoses in this group (see Appendix D). The diagnostic criteria for two of these diagnoses--Antisocial and Narcissistic personalities--suggest that these patients have a reward-seeking orientation. In contrast, the criteria for the diagnoses of Dependent, Schizoid and Passive-Aggressive personalities indicate that it is unlikely that these patients would possess a reward-seeking orientation. The remaining diagnoses (Borderline and Mixed personality disorders) have criteria which appear to neither refute nor support the suggestion that these patients have a reward-seeking orientation. In sum, it appears that only five patients in the Alcoholic Personality Disorder group had psychiatric diagnoses (Antisocial or Narcissistic Personality) which were clearly associated with a reward-seeking orientation. Thus, the Alcoholic Personality Disorder group obtained a high MAC score despite evidence which suggests that most of these patients did not possess a reward-seeking orientation.

This evidence is difficult to reconcile with MacAndrew's theory because he proposes that high MAC scores measure a reward-seeking orientation. It is possible that the drinking behavior of the Alcoholic Personality Disorder patients was pleasure-seeking in nature. However, previous research has demonstrated that MAC scores are not associated with patients' "reasons for drinking" in this manner. Moore (1984) found that both high and low scoring substance abusers reported that they drank to gain pleasure, and that patients with high MAC scores reported drinking to avoid negative feelings significantly more often than low scorers did. Thus, there does not

appear to be a relationship between drinking which is pleasure-seeking in nature, and scores on the MAC scale.

How can the evidence which suggests that high MAC scores are often associated with pleasure-seeking be reconciled with the fact that one of the high scoring groups in this study did not appear to possess a reward-seeking orientation? The most plausible explanation appears to be that high MAC scores measure a variety of characteristics, one of which is a reward-seeking orientation. This interpretation is consistent with evidence reviewed earlier which indicates that high MAC scores are consistently associated with several characteristics (i.e., impulsivity, immaturity, rebelliousness, and superficial interpersonal relationships).

The diagnostic criteria of the Personality Disorder group were examined to determine whether differences existed between this group and the Alcoholic Personality Disorder group in terms of the number of patients with reward-seeking orientations. The majority of Personality Disorder patients had diagnoses (e.g., Borderline personality) which were difficult to interpret with respect to a reward-seeking orientation. Several patients had diagnoses which appeared to be inconsistent with this orientation, and one patient's diagnosis (Narcissistic personality) revealed a reward-seeking orientation. Thus, the Personality Disorder group had fewer patients with a reward-seeking orientation than the Alcoholic Personality Disorder group. Furthermore, there did not appear to be any obvious differences between these groups on other characteristics which are commonly associated with high MAC scores. Why then did the Alcoholic

Personality Disorder group obtain a somewhat higher MAC score? The information is insufficient to warrant speculation. Additional research which clarifies the meaning of high MAC scores is necessary before conclusions can be drawn.

Low Scores

The results of the present study also can be used to examine MacAndrew's theory that low MAC scores measure an orientation to avoid punishment. MacAndrew suggests that an orientation to avoid punishment is a chief component of neuroticism, and predicts that the MAC scale will fail to detect alcoholic neurotics for this reason. This prediction was upheld in the present study and offers some support for his ideas. Neurotic groups, however, are not the only psychiatric groups which obtain low MAC scores. Evidence reviewed in Chapter I reveals that psychiatric groups with a variety of diagnoses (e.g., psychiatric groups with mixed diagnoses and groups of schizophrenic patients) obtain low MAC scores. In addition, the Personality Disorder group in the present study had a relatively low MAC score.

Overall, this evidence could support MacAndrew's theory if two assumptions were verified. The first assumption is that the patient groups with low MAC scores possess an orientation to avoid punishment. The second assumption is that these groups obtain low scores because of this orientation.

At present, it is impossible to determine whether low MAC scores indicate one characteristic which is shared by different psychiatric groups as suggested by MacAndrew, or, instead measure a variety of characteristics which are associated with a range of psychiatric

diagnoses. Additional research is necessary in order to clarify what low MAC scores measure.

Recommendations for Clinical Application of the MAC Scale and Future Research

The present study examined the MAC scale's ability to detect alcoholism in two different alcoholic-psychiatric groups. The MAC scale was unable to differentiate the Alcoholic Neurotic group from the Neurotic group based on an optimal cutting score or on group mean differences. Clinicians are advised to consider an alternative measure when screening for substance abuse in neurotic populations. Further research is necessary to determine whether the MAC scale's inability to detect alcoholic neurotics in a V.A. sample can be generalized to other clinical settings. The MAC scale's ability to discriminate between a group of personality disorders and two alcoholic groups (one with additional personality disorder diagnoses) approached significance. Additional research is necessary in order to examine and verify the scale's performance when applied to these groups. Furthermore, research is needed to clarify whether the MAC scale is able to detect alcoholism which coexists with schizophrenia. The two studies (Burke & Marcus, 1977; Rohan et al., 1969) which have applied the MAC to these patients report conflicting results.

In the present study, the optimal cutting score varied with the discrimination task. Clinicians are encouraged to derive separate cutting scores for alcoholic patients and alcoholic-psychiatric patients in their setting. Although the MAC's classification accuracy in many studies is high enough to indicate that the cutting score can

be used with confidence to detect alcoholics, this is not true for all research on the MAC scale. For example, in the present study, the MAC's classification accuracy (65.4%) does not really provide adequate discriminative power to be clinically useful despite its statistical significance. Clinicians are encouraged to evaluate the MAC's classification accuracy in their own settings in order to establish the degree of confidence they wish to place on this measure.

Research is needed to supplement the information regarding the relationship between MAC scores and an antisocial or acting-out dimension. An examination of the MAC scores of patients with an antisocial personality disorder would be particularly valuable because these patients possess all of the characteristics which are commonly associated with high MAC scores.

At present, MacAndrew's (1981) theory about the meaning of high and low MAC scores has not been adequately tested. Although there are many avenues of investigation available, research directed at defining the empirical correlates of high and low MAC scores appears to be most promising.

The information regarding moderator variables on the MAC scale is in need of clarification. For example, in the present study, there did not appear to be a meaningful relationship between the groups in which MAC scores were significantly correlated with age, and the groups which differed significantly in age. The fact that MAC scores were uncorrelated with age in some diagnostic groups, yet were positively or negatively correlated with age in other groups, suggests that the relationship between MAC scores and age may vary across

diagnostic groups. Additional research may substantiate this result and provide useful information about the relationship between MAC scores, age, and diagnoses. Researchers are encouraged to examine the influence of potential moderator variables in their patient samples and report their findings.

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APPENDIX A

THE MACANDREW ALCOHOLISM SCALE

	MMPI NO.	ALCOHOLIC RESPONSE	ITEM
1.	156	T	I have had periods in which I carried on activities without knowing later what I had been doing.
2.	294	F	I have never been in trouble with the law.
3.	61	F	I have not lived the right kind of life.
4.	140	T	I like to cook.
5.	263	T	I sweat very easily even on cool days.
6.	224	T	My parents have often objected to the kind of people I went around with.
7.	419	T	I played hookey from school quite often as a youngster.
8.	529	T	I would like to wear expensive clothes.
9.	56	T	As a youngster I was suspended from school one or more times for cutting up.
10.	482	T	While on trains, busses, etc., I often talk to strangers.
11.	488	T	I pray several times every week.
12.	413	T	I deserve severe punishment for my sins.
13.	251	T	I have had blank spells in which my activities were interrupted and I did not know what was going on around me.
14.	34	T	I have a cough most of the time.
15.	378	F	I do not like to see women smoke.
16.	120	F	My table manners are not quite as good at home as when I am out in company.
17.	243	T	I have few or no pains.

	MMPI NO.	ALCOHOLIC RESPONSE	ITEM
18.	94	T	I do many things which I regret afterwards (I regret things more often than others seem to).
19.	6	T	I like to read newspaper articles on crime.
20.	179	F	I am worried about sex matters.
21.	50	T	My soul sometimes leaves my body.
22.	483	T	Christ performed miracles such as changing water into wine.
23.	127	T	I know who is responsible for most of my troubles.
24.	128	T	The sight of blood neither frightens me nor makes me sick.
25.	335	F	I cannot keep my mind on one thing.
26.	118	T	In school, I was sometimes sent to the principal for cutting up.
27.	562	T	The one to whom I was most attached and whom I most admired as a child was a woman (mother, sister, aunt, or other women).
28.	356	F	I have more trouble concentrating than others seem to have.
29.	57	T	I am a good mixer.
30.	116	T	I enjoy a race or game better when I bet on it.
31.	446	T	I enjoy gambling for small stakes.
32.	186	T	I frequently notice my hand shakes when I try to do something.
33.	58	T	Everything is turning out just like the prophets of the Bible said it would.

	MMPI NO.	ALCOHOLIC RESPONSE	ITEM
34.	477	T	If I were in trouble with several friends who were equally to blame, I would rather take the whole blame than give them away.
35.	445	T	I was fond of excitement when I was young (or in childhood).
36.	426	T	I have at times had to be rough with people who were rude or annoying.
37.	283	T	If I were a reporter, I would very much like to report sporting news.
38.	86	F	I am certainly lacking in self-confidence.
39.	507	T	I have frequently worked under people who seem to have things arranged so that they get credit for good work, but are able to pass off mistakes onto those under them.
40.	500	T	I readily become one hundred percent sold on a good idea.
41.	81	T	I think I would like the kind of work a forest ranger does.
42.	27	T	Evil spirits possess me at times.
43.	320	F	Many of my dreams are about sex matters.
44.	173	F	I liked school.
45.	235	T	I have been quite independent and free from family rule.
46.	278	F	I have often felt that strangers were looking at me critically.
47.	149	F	I used to keep a diary.
48.	309	T	I seem to make friends about as quickly as others do.
49.	130	F	I have never vomited blood or coughed up blood.

APPENDIX B

REVISED CHART AUDIT FORM

Subject Number _____

Accepted Yes No

MAC Score

Education Level:

Race W B H O

TR Index

Carelessness

Obvious Subtle Sum

MAC Omit

Diagnoses/Diagnostic Category: A N PD AN APD

1. (Primary)

2. (Secondary)

History of Drug Abuse: Yes No File Year

Other Relevant Information:

APPENDIX C

DSM-III DIAGNOSES OF PERSONALITY DISORDERS AND NEUROSES

Personality Disorders

Paranoid	Schizoid
Histrionic	Schizotypal
Antisocial	Narcissistic
Avoidant	Borderline
Dependent	Compulsive
Passive-Aggressive	

Neuroses

In DSM-III, neuroses are included in the affective, anxiety, somatoform, dissociative, and psychosexual disorders. Specific diagnoses include:

Panic Disorder	Generalized Anxiety Disorder
Conversion Disorder	Psychogenic Pain Disorder
Phobic Disorders	Somatization Disorder
Psychogenic Fugue	Psychogenic Amnesia
Hypochondriasis	Depersonalization Disorder
Multiple Personality	Post-Traumatic Stress Disorder
Major Depression	Obsessive Compulsive Disorder

APPENDIX D

DSM-III DIAGNOSES IN EACH GROUP

Number of Patients by Group

Diagnosis	Group A	APD[a]	AN[a]	PD	N
Alcohol Dependence	28				
Antisocial Personality		2			
Avoidant Personality				1	
Borderline Personality		8		12	
Dependent Personality		6			
Dysthymic Disorder			22		21
Explosive Personality		2			
Generalized Anxiety Disorder					3
Mixed Personality Disorder		5		8	
Narcissistic Personality		3		1	
Paranoid Personality				3	
Passive-Aggressive Personality		1		2	
Phobia (simple)					1
Post-Traumatic Stress Disorder			6		3
Schizoid Personality					
Schizotypal Personality				1	

[a]All patients in these groups had diagnosis of alcohol dependence in addition to the diagnosis specified in this table.

APPENDIX E

NUMBER OF PATIENTS EXCLUDED BY EACH MMPI VALIDITY INDEX

Index[a]	Number Excluded
Obvious-Subtle Scale	77
Carelessness Scale	9
Test-Retest Index	6
MAC Items Ommitted	0

[a]The validity indices were screened in the order presented above for each MMPI. Once an MMPI was found invalid, the remaining indices were not scored.

APPENDIX F

MAC SCORE FREQUENCIES FOR EACH DIAGNOSTIC GROUP

MAC Scores	A	APD	AN	PN	N
13					1
18					1
19			1		
20			1	2	
21			2	1	1
22	1	1	1	2	3
23			2		2
24			1	1	2
25	1	1	2	2	2
26	1	5	5	3	2
27	5	3	3	6	3
28	1		1		2
29	2	2	1	3	3
30	4	1	2	4	1
31	4	2	2	1	1
32	1	2	1	1	3
33	1	1	1		
34	2	4	1		
35	3	5		1	1
36	1	1		1	
37	1		1		