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A STUDY OF VERBALLY-MEDIATED CONCEPT FORMATION IN PSYCHOPATHY

by

LAURENCE MILLER

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, the City University of New York.

1988

This manuscript has been read and accepted for the Graduate Faculty in Psychology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

April 18, 1988
Date

Louis J. Gerstman
Chair of Examining Committee

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Abstract

A STUDY OF VERBALLY-MEDIATED CONCEPT FORMATION IN PSYCHOPATHY

by

Laurence Miller

Advisor: Professor Louis J. Gerstman

The psychopath's impulsive, nonreflective behavior and failure to learn from experience have prompted analogies between this clinical syndrome and that seen in patients with organic frontal lobe impairment. Attempts to use neuropsychological tests to elicit frontal-like deficits in psychopaths have achieved mixed results. A review of the literature on psychopathy suggests that antisociality and behavioral dyscontrol frequently occur in the context of language disturbances. A model of psychopathic cognition, behavior and personality is elaborated, based on the observations of Luria, Vygotsky and the literature on frontal and interhemispheric control systems, as well as on self-theory within the field of personality. In this model, the failure to use language - particularly, inner speech - to guide behavior results in the attenuated development of a self-referential conceptual classification system and, consequently, a stunted sense of identity and autonomy. This in turn accounts for the absence of a stable personal point of reference from which to self-regulate thoughts, feelings and actions. It is this pattern that is hypothesized to

characterize the psychopath's cognitive style.

A group of male psychiatric/substance abuse inpatient subjects, divided into High, Medium and Low Psychopathy groups, were administed a set of measures designed to discriminate verbal-conceptual from general-conceptual ability. It was hypothesized that level of psychopathy would correlate with impairment in verbal conceptualization, but not with general conceptualization. This hypothesis was not confirmed with regard to psychopathy. It therefore appears that the psychopaths in the present sample do not suffer a differential deficit in verbal-conceptual ability versus general-conceptual ability. At the same time, subjects at any level of psychopathy show performance that is superior to that of frontal lobe-lesioned patients previously studied with these measures, suggesting that "frontal lobe impairment," per se, cannot describe the neuropsychological pattern of psychopaths.

This study also provides the first examination of the performance on the Modified Vygotsky Concept Formation Test (MVCFT) by a psychiatric sample, as well as a comparison of MVCFT performance to performance on other, more familiar neuropsychological measures. Finally, the results strongly argue against a "narrow localizationistic" approach to psychiatric neuropsychology, and suggestions for increasing the power and utility of such measures in psychiatric settings are offered.

ACKNOWLEDGMENTS

The scholarship and clinical philosophy of my mentor, Corinne Frantz, strongly guided the theoretical and methodological foundations of this dissertation. Her critical evaluations and suggestions throughout the dissertation process helped to hone this study into a coherent thesis.

I must express my gratitude to dissertation committee chairman, Louis Gerstman, for his often unseen, but always keenly felt stewardship of my progress through the dissertation process in particular and the Neurocognition program in general.

To this day, I doubt that Barbara Wilson fully understands the influence she's had on me from the first time I took her Child Neuropsychology course at North Shore Hospital. Her warmth of character, combined with her consummate clinical, research and pedagogical skills, have left a lasting impression.

Donald Sweeney, Clinical Director of Fair Oaks Hospital, has been a source of unfailing support and encouragement throughout my stint at FOH. He's always been ready to recognize the value of my various productions, and to inject needed doses of humor, sage counsel and common sense into clinical and research matters.

The statistical and computer skills of Donald Risucci have spared me much choking and sputtering over raw servings of freshly cut data. Don also introduced me to Mitchell Horowitz, who's further numerodigestive abilities took even more of the bellyache out of assimilating my results.

I want to thank Ellen Karstadt and Jean Rubino, Clinical Nurse Specialists at FOH, for their indispensible help in coding the drug history forms used in the present study. Also, the staff at Medical Records, particularly Pauline Chandler and Ginnie Farmer, offered their kind assistance in pulling charts and obtaining elusive patient records. Miriam Rosenstein, Director of Library Services, helped me track down many an ancient and obscure reference. Fellow Associates in Neuropsychology Imi Supraner, Jaqui Barnett and Susan Green, provided stimulating theoretical discourse and profitable clinical cross-fertilization. And I can't omit Navis Edwards, whose moral support has always been unflagging and who ought to be glad I didn't make her proofread this.

To the memory of the four who were there at the beginning, but who couldn't see the completion of this work for themselves: Your faith and inspiration have always been present and will endure unto the generations.

Finally, to Joan, because love is so often the art of encryption: From now on, no more mush and sour milk and I'm gonna buy you a monkey.

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BACKGROUND OF THE PROBLEM: PSYCHOPATHY AND THE PROBLEM OF LOCALIZATION IN PSYCHIATRIC NEUROPSYCHOLOGY

> Just as the meaning and the adequate sense of things as a whole are lost with semantic aphasia in the circumscribed field of speech, although the technical mimicry of language remains intact, so in most psychopaths the purposiveness and the significance of all life-striving and of all subjective experience are affected without obvious damage to the outer appearance or superficial reactions of the personality.
>
> Hervey Cleckley,
> The Mask of Sanity

Within the field of personality and psychopathology, the psychopathic or antisocial personality has been described as a class of psychopathology whose deleterious effects on others far exceed their degree of apparent psychological disorganization or subjective distress. (Begun, 1976; Cleckley, 1982). Psychopathic personality has been cited as the most frequent of psychiatric diagnoses assigned to criminals (Guze et al, 1969) and the third most frequent among psychiatric emergency room patients (Robins et al, 1977). Classification rates for psychiatric clinic outpatients have been found to range from 15 percent for men to three percent for women (Woodruff et al, 1971), and they are substantially higher among samples of opiate addicts (Sutker, 1971) and alcoholics (Caster & Parsons, 1977; Schuckit, 1973; Tarter et al, 1985).

Clinically, psychopaths have been described as being impulsive, self-centered, and aggressively opportunistic. They appear easily bored and restless, have a low tolerance for frustration, seem to act impetuously, and cannot forgo immediate gratification. They are unable to endure the tedium of routine or to persist at the day-to-day responsibilities of school, jobs or interpersonal relationships. Many seem to enjoy taking chances, thrill-seeking and other forms of dangerous stimulation, and there is a tendency to jump from one exciting and momentarily gratifying escapade to another, with little or no care for potentially detrimental consequences. When things go their way they are capable of acting in a gracious and cheerful manner, but when even slightly or momentarily frustrated in their pursuit of gratification, they quickly become furious and vindictive. Easily provoked to attack, their first inclination is to demean and to dominate.

Despite the characteristic absence of any formal thought disorder, psychopaths seem singularly impaired in the faculty of self-insight. They rarely exhibit any foresight as to the appropriateness of their actions, they are quick to place external blame for their misfortunes and they manifest a stubborn refractoriness to modifying even the most clearly maladaptive of their behaviors. Punishment has little of the behaviorally modifying effect on them that it has on most

people. Psychopaths are reported to be disproprtionately represented among the ranks of criminals and substance abusers, and the need has been expressed for finding ways of characterizing and predicting the manifestations of this form of psychopathology (Begun, 1976; Cleckley, 1982; Millon, 1981; Monahan, 1984; Wilson & Herrenstein, 1985).

Turning to the field of neuropsychology, clinical studies of individuals with organic frontal lobe damage have given rise to the concept of a pseudopsychopathic type of frontal lobe syndrome, characterized by a notable lack of normal adult tact and restraint. The individual may be coarse, irritable, facetious, hyperkinetic or promiscuous, and may on impulse commit acts that could be labeled antisocial. Paranoid or grandiose thinking may be present, but while such individuals may quickly flare to anger, their affect tends to be labile, and the outbursts of excitation, euphoria or anger may be superimposed upon a background of aspontaneity and apathy (Blumer & Benson, 1975; Goldberg, 1985; Hecaen & Albert, 1978; Stuss & Benson, 1984).

A recent approach to research in psychiatric neuropsychology has been to apply neuropsychological measures originally developed for brain damaged subjects to the study of psychopathological syndromes. Given the apparent clinical similarities between the behavior of some organic frontal lobe patients and that of many psychopaths, it is perhaps

only natural that several investigators have attempted to draw neuropsychological parallels between the two. The general body of research on the neuropsychology of psychopathy and delinquency will be reviewed below, but for now the discussion will focus on two of the most important studies of this type to make the psychopathy-frontal lobe hypothesis explicit.

Gorenstein (1982) studied 43 male patients at two public hospitals. Twenty-three of the patients were receiving psychiatric treatment for primary substance abuse (mostly narcotic), 13 for primary psychological disorders and 7 for both substance abuse and psychological disorders. None were diagnosed by the hospital staff as psychotic or brain damaged. Five patients were receiving psychotropic medication, 2 lithium, 2 tricyclic antidepressants and 1 diazepam. The patients were classified as psychopathic or nonpsychopathic on the basis of the Socialization (So) scale of the California Personality Inventory (CPI) and a self-report behavioral checklist adapted from the RDC classification system for Antisocial Personality Disorder (similar to DSM-III). Twenty patients were classified as psychopathic (mean age=26.5, mean education=12.0, 75% white, 25% black), and 23 patients as nonpsychopathic (mean age=29.3, mean education=12.4). In addition, 18 male college students, aged 18-20, served as normal controls. The

following measures were employed: the Wisconsin Card Sorting Test (WCST); Stroop Color-Word Interference Test; Sequential Matching Memory Test (SMMT); Anagrams, the Necker Cube; and the Activity Preference Questionnaire (APQ).

Results showed that the psychopaths, as opposed to the nonpsychopathic patients and normal controls, exhibited the performance pattern of frontal lesion patients on every measure that Gorenstein (1982) regarded as "empirically related to frontal lobe impairment" (p. 376): WCST perseveratory errors, SMMT errors & Necker Cube reversals. Moreover, the psychopaths were not different from controls on those measures considered to be "empirically unrelated to frontal impairment" (p.376). The latter included WCST nonperseveratory errors and anagrams. Gorenstein arrived at his conclusions by comparing the performance of his psychopathic subjects with that of Drewe's (1974) cohort of frontal lesioned patients. Gorenstein's subjects made an average of 29 perseverative errors on the WCST vs. 31 for Drewe's sample. The two groups from the two studies also committed about the same number of nonperseverative errors, an average of 19 for the psychopaths and 20 for the frontal lobe patients. Gorenstein concluded that the perseveratory tendencies of his psychopaths and of Drewe's (1974) frontal cases were equivalent.

Thus, with regard to perseverative responding on the

WCST and number of Necker Cube reversals, Gorenstein (1982) regarded the performance of his psychopathic group as equivalent to that of patients with organic frontal lobe lesions. For him, the results on the WCST indicated that, although psychopaths are able to acquire concepts, they are hampered by a peculiar tendency to persist with a previously reinforced but currently maladaptive response set. Perseveration or impaired cognitive flexibility, then, seems to characterize the thinking of psychopaths. This presumed deficit in modulation of dominant response sets was offered by Gorenstein as an explanation for two traditional distinguishing features of psychopathy: failure to avoid incidental punishment and failure to delay gratification.

However, Gorenstein's (1982) study is hampered by the methodological problem so prominent in cross-disciplinary studies of the neuropsychology of psychopathological syndromes, that of assuming interpretive comparability of results from two different index groups. Gorenstein's approach to this type of neuropsychological research is exemplified by his statement that

> test procedures developed with brain damaged patients can be exactly duplicated in the investigation of functional psychiatric disorders. As a result, the comparablity of response deficits in functional and organic syndromes may be objectively assessed (p. 369).

Gorenstein's (1982) final conclusion that psychopaths demonstrate behavioral inflexibility resulting from a frontally deficient ability to modulate dominant response sets is based on an analogy to frontal lobe findings drawn from the literature (e.g. Drewe, 1974; Milner, 1963) and violates both a substantive and a methodological issue in the neuropsychological evaluation of psychiatric patients, i.e. the notion that equivalence of test performance equals equivalence of deficit. This in turn gives rise to statements about equivalence of anatomical "lesion," an approach that has been criticized by Jones (1983) and Miller (1983). It is erroneous to assume that peformance on a given task involves a unitary cognitive process that is manifested uniformly by all those taking the test. Much clinical and experimental neuropsychological data refute this "narrow localization" (Luria, 1973) concept and argue for a more rigorous specification of the cognitive variables presumed to underlie seemingly unitary performance dimensions (Kiernan, 1981; Miller, 1986; Smith, 1962).

Hare (1984) criticized Gorenstein's (1982) conclusions about psychopaths and frontal lobes from another direction, arguing that Gorenstein's diagnostic procedures were inadequate and the results confounded by group differences in age, education, general ability and substance abuse. Hare studied 46 white male inmates at a medium security prison.

To determine the presence and degree of psychopathy, the subjects were administered the Hare Psychopathy Index, a 22-item questionnaire assessing for variables associated with psychopathy, according to the theoretical model of Cleckley (1976). Each item is scored on a 3-point scale (0, 1, 2), yielding a total possible score of 0-44. On the basis of these scores, subjects were divided into High (N=14), Medium (N=16) and Low (N=16) psychopathy groups (this diagnostic system is described further in the Methods section, below). In addition, subjects were also evaluated by the So scale of the CPI, and also according to DSM-III criteria for Antisocial Personality Disorder. Alcohol and narcotics ratings were made by two research assistants, using a 1 to 5 scale. All subjects were administered the Necker Cube, WCST and SMMT.

Results showed that the psychopaths did not differ from the other inmates in performance on the three cognitive tasks presumed by Gorenstein (1982) to be related to frontal lobe functioning, particularly the WCST. The performance of both the inmates in general and the psychopaths in particular was described by Hare (1984) as being very similar to that of normal and noncriminal individuals. Thus, Hare's (1984) results failed to support Gorenstein's conclusions.

In attempting to account for the difference between Gorenstein's (1982) results and his own, Hare (1984) pointed

out that it is doubtful whether the subjects classified as psychopaths by Gorenstein would satisfy the criteria for psychopathy listed by Cleckley (1976) or for Antisocial Personality Disorder listed in DSM-III. Hare further noted that Gorenstein's results may have been confounded by group differences in demographic variables, medication and substance abuse. For example, in Hare's study, ratings of alcohol use were positively correlated with WCST perseverative errors. The fact that Gorenstein did not control for substance abuse in his index group of psychopaths may have led to spurious positive findings.

In his critique of Gorenstein's (1982) study, Hare (1984) concluded that there is little support for the position that psychopaths have specific cognitive deficits in the processes associated with frontal lobe functioning. He pointed out that the analogy between frontal lobe patients and psychopaths should not be taken too literally because the similarities involved may be only superficial and not necessarily associated with the same neural mechanisms and processes. Hare suggests that true (Cleckleyian) psychopaths are less likely to display symptoms of neurological impairment or dysfunction than are individuals who may exhibit some of the features of psychopathy, but do not fit the complete clinical syndrome.

Hare's (1984) own study employed a more rigorous and

internally consistent method of diagnosis and subject selection with regard to psychopathy and systematically controlled for such important factors as substance abuse. However, where Gorenstein (1982) uses neuropsychological tests to demonstrate performance similarities and to infer functional equivalence of deficit between psychopaths and frontal lobes, Hare also uses the same measures and the same approach to demonstrate the absence of a relationship and to argue the absence of equivalence. Neither study takes the necessary theoretical step of specifying what cognitive dimensions, if any, are believed to underlie the performance parameters of either frontal lobe patients or psychopaths, and of addressing such dimensions systematically.

Thus, the questions of whether psychopaths show identifiable cognitive deficits and whether such deficits resemble those seen in organic frontal lobe patients has not been adequately addressed. Neither of the studies were guided by a theoretical formulation as to what dimensions of cognitive functioning are affected in psychopathy that make it similar to, or different from, organic frontal lobe impairment. As a consequence, neither the measures chosen nor the methods used to interpret their results demonstrate a specific relationship to a putative cognitive dimension. This is one of the inadequacies of the functional equivalence approach to research in psychiatric neuropsychology (Miller,

1986) and in neuropsychology as a whole (Kiernan, 1981).

However, it would be equally unproductive to dismiss out of hand the possibility that the cognitive style of psychopaths may be related to subtle alterations in brain-behavioral functioning and that these may in turn be assessed by neurocognitive measures. The purpose of this dissertation is to identify that aspect of the cognitive deficit in psychopaths that accounts for their poor performance on measures of conceptual flexibility. Only then can inferences be made and further research carried out toward ascertaining what performance parameters - clinical, psychodynamic or cognitive - are similar to organically impaired patients - frontal or otherwise - and to what extent these parameters generalize to overall problems in life functioning.

Therefore, in order to get a better idea of what, if any, cognitive or neuropsychological performance patterns characterize - or indeed distiguish - psychopathic individuals, the relevant literature on the neuropsychology of psychopathy and delinquency will be reviewed in the next section. In the succeeding section, the findings from these studies will be integrated into the larger theoretical model that informs the present study.

REVIEW OF THE LITERATURE: NEUROPSYCHOLOGICAL STUDIES OF ANTISOCIAL POPULATIONS

Adjudicated adolescent delinquent males who were incarcerated for the first time at a state juvenile corrections facility were studied by Berman & Siegal (1976). They were compared to a control group of volunteer nondeliquent males from an inner city public high school who were drawn from the same catchment as the delinquents. All subjects were administered the WAIS and the Halstead-Reitan Neuropsychological Battery.

Results showed that on the WAIS, the performance of the deliquent group was almost uniformly inferior to that of the controls on all but two subtests (Digit Span and Picture Completion). It appeared that the delinquents showed deficits with respect to controls in their ability to comprehend, manipulate and utilize conceptual material of a verbal nature, as well as in their ability to organize nonverbal perceptual material and to operate effectively on the basis of these nonverbal perceptions. Although both groups obtained higher PIQ scores than VIQ scores, the magnitude of this difference was significant only for the delinquent group.

The delinquents did worse than the controls on Trails A (although the performance of both groups was technically within normal limits), which the investigators conceptualize

as a measure of the ability to organize spatial perceptions. Trails B is conceptualized as adding a verbal-symbolic manipulation to the spatial and perceptual demands of Trails A, in that the subject must comprehend the concept, then use that concept to generate a correct sequence of spatial locations. On this task, the delinquents performed so much more poorly than the controls that they met the test's criteria for brain damage; the authors attribute this to the "strong verbal component" of Trails B.

On the Halstead-Reitan Battery, the delinquents performed significantly worse than the controls on 5 out of 7 tests comprising the Impairment Index. The most profound intergroup differences occurred on the Category Test, a nonverbal concept-formation task which requires the subject to effectively integrate past experience (positive and negative reinforcement) into the present problem, and then to utilize these experiences to modify behavior into more adaptive patterns. Thus, an inability to profit from experience and the repeated use of poor judgement seemed to characterize the delinquents' performance on both the Category Test and in their overall lifestyle. The authors caution, however, that delinquents and controls differed significantly on many of the WAIS scales, and that performance on the Category Test is likely to be confounded by intellectual limitations.

A series of neuropsychological tests and EEG examinations were given by Krynicki (1978) to three groups of adolescent male inpatients: a repetitively assaultive delinquent group, a comparatively nonassaultive delinquent group and an organic brain syndrome group. Four variables were found to be significant: the number of abnormal EEGs, handedness laterality quotient, perseveration in an alternate square-triangle drawing task and verbal short-term memory. With all of these variables, the nonassalutive behavior disorder group differed in the direction of more normal or better performance than the assaultive or organic groups; differences between the latter two groups were not significant. Thus, the nonassaultive group had fewer abnormal EEGs, better established hand dominance, fewer perseverative errors and better verbal memory. The data indicated that the behavioral results, as well as EEG abnormalities were similar in repetitively assaultive adolescents and adolescents with known brain damage.

Three out of seven of the repetitively assaultive patients had paroxysmally abnormal EEGs, which have been related to violent behavior. Moreover, in all three of these cases, the activity showed partial or complete localization in the frontal or frontotemporal area. Assaultive patients also had lower laterality quotients (i.e. they were more ambidextrous). This, in combination with poor verbal memory,

would seem to point to left hemisphere dysfunction, although EEG resuts did not give any indication of laterality. However, the author points out that in younger subjects, verbal measures may be differentially affected by generalized brain damage, in contrast to the more lateralized pattern seen with adults. The perseverative errors seen in the assaultive patients seemed to reflect the motoric impulsivity characteristic of these subjects.

Heilbrun (1979) examined the relationship between intelligence, psychopathy, violence and impulsiveness of criminal behavior in a sample of adult male prisoners from the Georgia penal system. An inclusion criterion for this study was having at least a 6th grade reading level, to which the investigator attributes the fact that this select group of prisoners had a mean IQ (as measured by the IPAT Culture Free Intelligence Test) higher than average for prisoners within their penal system. A scale was used that was devised to assess the degree of violence and impulsivity of the criminal activities that led to conviction, and a variety of measures for psychopathy and other personality variables were also employed.

The study found that it was the combination of unsocialized personality characteristics and lower intelligence that was associated with more violent and impulsive crime. Intelligent psychopaths were neither

violence-prone nor impulsive, relative to nonpsychopathic prisoners. Furthermore, the brighter psychopath more effectively achieved socially valued educational goals. It was the less intelligent psychopath who failed to sustain his education relative to all criminals in the study. According to Heilbrun, the findings point to a combination of continuing deficiencies in self-regulation due to poor socialization and limited ability to come up with temporary cognitive restraints (e.g. alternative plans, anticipated consequences) that magnifies the threat of impulsive behavior.

In a followup to his earlier study, Heilbrun (1982) sought to identify more specific models of violence relating to psychopathic status. He did this by considering various cognitive factors that might relate to intelligence and to the expression of physical aggression. Heilbrun (1982) studied a group of male prisoners in the Georgia penal system, which included the sample reported in Heilbrun (1979). In addition to assessing for intelligence and psychopathy, Heilbrun (1982) conceived of "certain specific cognitive variables" such as cognitive control, impulsivity and self-reinforcement.

Heilbrun (1982) contends that both the cognitive control of impulses and the quality of empathy require effective processing of information, and the results of this study

showed that both variables were diminished in the less intelligent criminals. He feels that his earlier finding (Heilbrun, 1979) of a high risk for violence in low-IQ psychopaths can be partially explained in terms of these two cognitive deficits, self-control and empathy, which are associated with the psychopathic personality. Thus, in this impaired processing psychopath model the combination of poor cognitive control, insensitivity to other's feelings and limited intelligence appears in itself to be conducive to violent behavior. Indeed, the more intelligent psychopath in this sample could not be described as either impulsive or unempathic, and Heilbrun (1982) attributes the attenuated prediction (in his 1979 study) of violence from psychopathic diagnosis alone to the heterogeneity of this earlier sample with respect to the cognitive variables of self-control and empathy.

The most empathic group of criminals were intelligent psychopaths who nevertheless had a history of violence. Heilbrun (1982) interprets this in terms of a sadistic, effective processing psychopath model in which inflicting pain and distress on others is both arousing and reinforcing. Such acts are really more intentional than impulsive, and the presence of well-developed empathy actually promotes the arousal and sadistic reinforcement by enhancing the psychopath's awareness of the pain and distress of the

victim. Interestingly, rapists were the most highly represented group of criminals in this subtype.

The defensive, impaired processing psychopath model is conceived of by Heilbrun (1982) as combining the cognitive properties of high self-reinforcement, poor impulse control, limited empathic ability and low IQ. An individual in this group is the least dangerous in terms of prevalence of violent acts, but the most dangerous in terms of quality of violence. That is, such a person is least likely to spontaneously initiate an aggressive act, or respond violently to provocation, however, once initiated, the violent act tends to be especially savage and uncontrolled.

Brickman, et al (1983) administered an intellectual, scholastic and neuropsychological battery to a group of male and female delinquents whose histories were characterized by multiple violent felonies, including serious assaults. The violent and recidivistic delinquents showed a distinctly abnormal neuropsychological pattern of functioning. The pattern extended over a wide range of functions; it was not limited to the higher cortical "intellectual" functions often associated with school performance, although those functions were also implicated. Striking abnormalities were seen in temporal sequencing, rhythmic functioning and expressive speech. In addition, impaired attention and concentration, as well as widespread affective lability was seen in this

population.

The authors speculate that problems in attention and concentration, on the one hand, and difficulty with affective lability on the other, could have reciprocal effects, or they could stem from a common source. That is, it may be that these delinquents do not develop the cognitive controls necessary to modulate their affect, and the problems in establishing these controls and in learning may themselves serve as a source of affective lability, inattention and delinquency. On the other hand, difficulties in discursive and abstract thinking, temporal sequencing and concentration may contribute to this weakness in the development and application of cognitive controls.

Two groups of male subjects were studied by Robbins et al (1983). The first group was composed of male adjudicated delinquents who had been referred to a court psychiatric clinic and the second group contained adjudicated male delinquents without psychiatric court referrals. Both groups were given a neurological examination, a medical examination, a structured interview, the Snellen test of visual acuity and a battery of psychological and neuropsychological tests. The two groups were found to be significantly impaired in cognitive, perceptual and perceptuomotor functioning. In addition there were many indicators of minor neurological instabilities. The majority of the delinquents were not

intellectually impaired; nevertheless, 44% of those having normal intelligence were found to be learning disabled.

The investigators believe that the early age at which school problems were reported in this sample is consistent with a profound delay in the mastery of many perceptual and perceptuomotor skills, as well as other cognitive functions that normally develop by age 10. These include clumsiness, poor judgement, poor visual and auditory perception, poor language skills, poor echoic memory, poor discrimination of sounds and speech recognition, incoordination, poor right-left differentiation and poor visual tracking. Many nonsignificant trends suggest that the psychiatrically referred sample was more impaired than the nonreferred sample. Boys in the psychiatric clinic were more repeatedly adjudicated and performed worse on the tests.

Tarter et al (1983) divided a sample of male adolescent delinquents into violent, nonviolent and sexual offender groups. There were no EEG abnormalities, no neurologic disorder assessed by neurological exam, and psychosis was ruled out by the examining psychiatrist. All subjects were administered a battery of intellectual, scholastic and neuropsychological tests. The results failed to reveal either a strong or systematic relationship between antisocial behavior and cognitive functioning. Sexual, violent and nonviolent juvenile offenders did not differ from one another

on the above measures. Moreover, little relationship was found between cognitive performance and rating of the delinquent's most violent act. The investigators speculate that the fact that their subjects were not psychotic or neurologically impaired suggests that this delinquent sample was more neuropsychiatrically intact. When these latter subject attributes are controlled, as in the present study, differences between nonviolent, sexual and violent offenders may not be observed.

Offenses that had a psychiatric as well as a criminal component were studied by Valliant et al (1984) in a group of male offenders from a medium security forensic unit at a Canadian psychiatric hospital. These were divided into two groups of dangerous (crimes against persons) and nondangerous (crimes against property) offenders. Thirty male college students served as controls. All subjects were assessed as to intelligence and personality variables.

Dangerous offenders were not found to present a more overall psychopathologically deviant profile than nondangerous offenders, although the data indicated that the nondangerous offenders were more anxious and sensitive than the dangerous offenders. Mean WAIS-R IQ was significantly lower for both groups of offenders than for college controls. The authors suggest that the lower IQ of the total offender group is related to the fact that less intelligent offenders

are arrested more often than brighter offenders and may thus bias the institutional population. Interpretation is limited, however, by the fact that no data as to the educational level of the offenders are given. The nondangerous offenders were similar to nonoffender controls in level of autonomy. The investigators speculate that individuals in both of these groups may be better able to function independently than the dangerous offenders, who look to peer groups for social support of their actions.

Bryant et al (1984) studied two groups of adult inmate volunteers selected from those admitted to two prison facilities. Violent offenders were defined on the basis of having committed assaultive crimes against persons. A control group of nonviolent offenders consisted of felons convicted for property-related crimes. All subjects were administered the Luria-Nebraska Neuropsychological Battery (LNNB).

The violent criminal offenders showed serious deficits, scoring in the pathological range with regard to reading, writing and arithmetic skills. The violent group also demonstrated impaired performance on tasks requiring complex integration of information from visual, auditory and somesthetic processing systems, the ability to create, plan, organize and execute goal-directed behaviors and sustained attention and concentration. The investigators point out

that the type of behavior disorders described for the violent offenders have been associated with adult-onset frontal lobe disorders. They cite their "own experience" with neuroradiological measures as suggesting a strong role for involvement of anterior subcortical temporal and frontal areas as well. Some of the deficits found in their sample, primarily those in academic ability, could, they say, be associated with parietal lobe functioning. They conclude,

> In light of normal LNNB performance we can hypothesize that, in the nonviolent, poor achievement is due more to defects in motivation and personality, rather than brain dysfunction. In the violent, the deficits may be more related to brain dysfunction, with the personality and other problems secondary, rather than primary (p. 324).

Summary and Comment

Interpretation across studies is limited by differences in subject selection, diagnostic criteria and demographic variables, test measures used and forms of administration of those measures. With this qualification in mind, however, a rough consensus does appear to emerge from this literature. The studies emphasize deficits that appear primarily in the areas of self-regulation, conceptual manipulation and cognitive integration and control. These variables seem to be related, in opposite ways, to the dimensions of empathy and violence. That is, the poorer the conceptual and self-

regulation abilities, the more deficient the quality of empathy and the higher the level of violence characterizing the antisocial history. Several investigators have indeed drawn an analogy to the behavioral dysregulation seen in some frontal lobe patients.

Importantly, there also seems to be a relationship between poor verbal ability and low verbal intelligence on the one hand and deficient self-regulation on the other, suggesting that language, in some form, is related to the ability to monitor one's own behavior and modify it appropriately. Finally, general intelligence appears to be an important variable.

The next section will use these conclusions about language and self-regulation to formulate the theoretical rationale that guided the present study. This model will then be used to generate the hypotheses that were empirically investigated.

THEORETICAL MODEL AND RATIONALE OF THE PRESENT STUDY: THE PSYCHOPATHIC NEUROCOGNITIVE DEFICIT

A recent review of the field of personality theory (Pervin, 1985) has stressed the need for research that appreciates the complexity of individual personality functioning, especially for understanding the relationship between cognitive and affective dimensions of personality. Similar calls within neuropsychology to respect such psychological complexity (Kiernan, 1981; Miller, 1986; Smith, 1962) have not always been heeded. Nevertheless, it should be possible to develop useful models of complex brain-behavioral relationships that do not rely on a narrow localizationistic taxonomy of "symptoms or syndromes = hemispheres or lobes." This section attempts to elaborate such a model for psychopathic thought, feeling and action.

The Frontal Lobes and the Regulation of Behavior

Among neuroanatomical structures, the frontal lobes have the unique - if dubious - distinction of having been called both a "riddle" (Teuber, 1964) and a "problem" (Nauta, 1971). Conceptions of the role of the frontal lobes in cognition have generally emphasized their controlling, or modulating influence on mental operations. Whereas other brain regions and systems subserve the operative conditions for the performance of intellectual activities, such as language,

memory and perception, the frontal lobes, especially the prefrontal regions, constitute the essential apparatus for organizing the intellectual activity as a whole, including the programming of cognitive activity and the checking of its performance (Damasio, 1979; Luria, 1973, 1980, Stuss & Benson, 1984; Teuber, 1964).

Luria (1980) has described the functions of the frontal lobes as involving the

> primary integration of all stimuli reaching the organism and the attachment of informative or regulatory significance to some of this--the formation of the "provisional basis of action" and the creation of complex programs of behavior; the constant monitoring of the performance of these programs and the checking of behavior with comparison of actions performed and the original plans; the provision of a system of "feedback" on the basis of which complex forms of behavior are regulated (p. 248).

The frontal lobes synthesize information about the outside world received through the exteroceptive apparatus as well as input from internal states of the body, thus providing the means by which the behavior of the organism is regulated in conformity with the effects produced by its actions (Luria, 1980). The frontal lobes judge and regulate ongoing external perception and calculate appropriate responses to what is being perceived, thus serving to preserve the individual's overall equilibrium (Damasio, 1979; Luria, 1980; Nauta, 1971; Teuber, 1964). And for this to

occur, optimal negotiation of the social environment is necessary.

Research in the fields of social cognition and social learning theory suggests that people characteristically impose schematic organization on their knowledge about themselves, their environments and about other people. This knowledge both guides behavior and provides a basis for judgements about its efficacy (Bandura, 1982; Carver & Scheier, 1982; Markus, 1983).

According to the cybernetic model of Carver & Scheier (1982) this involves self-focus, a process that enables the use of self-directed attention to compare one's present state with relevant and salient reference values. This, in turn, fosters self-regulation: If the functioning of some internal comparator reveals a discrepancy between a perceived state and some reference value, the result is behavioral output aimed at countering the deviation.

Similarly, in social learning theory (Bandura, 1982), an important cognitively-based source of motivation - self-efficacy - is seen to operate through the intervening processes of goal-setting and self-evaluation. This form of self-motivation, as in Carver & Scheier's (1982) model, also involves internal comparison processes and requires personal standards against which to evaluate performance.

Markus (1983) speaks of self-schemas which are knowledge

structures about the self that derive from past experience and that organize and guide the processing of the self-relevant information contained in the individual's social experiences. Self-schemas provide for a point of view, an anchor or a frame of reference. They guide the individual in choosing those aspects of social behavior to be regarded as self-relevant, and they function as interpretive frameworks for the reflective understanding of this behavior.

It's not hard to see why writers seeking to remodel personality formulations in neuropsychological terms have been enticed by conceptualizations of the frontal lobes' role in cognition and behavior. According to Nauta (1971), the behavioral effects of frontal lobe destruction are in part a consequence of an interoceptive agnosia, i.e. an impairment of the subject's ability to integrate certain information from his internal milieu with the environmental input provided by the neocortical processing mechanisms. This results in a derangement of the normal role of the frontal lobes in facilitating the convergence of interoceptive and exteroceptive information.

A deferred plan of action, says Nauta, cannot be maintained intact for any length of time unless it is represented in matching sensory and affective registries. In this formulation, the loss of the frontal lobes as a major mediator of information exchange between the cerebral cortex

and limbic system is followed, not only by an impairment of strategic choice-making, but also by a tendency of projected or current action programs to become attenuated or overridden by interfering influences. Thus, for Nauta (1971), one of the deficits of the frontal lobe patient lies in an inability to maintain a normal stability-in-time of behavior. The individual's action programs, once started, are likely to fade out, to ineffectually perseverate or to become deflected away from the intended goal.

Nauta (1971) also emphasizes the role of self-directed verbalization in the internalization of behavioral strategies, a point reinforced by Luria's (1980) studies of patients with frontal lobe lesions. These patients tended to manifest a state of overall reduced activity, their attention was easily distracted by irrelevant stimuli, and it was usually impossible for them to organize their attention and to keep it focused on a definite plan. Luria (1980) was particularly struck by the observation that patients with mediobasal frontal lesions exhibited serious disturbances in the regulation of nonspecific activation processes (as measured, for example, by the electroencephalographic orienting response) by verbal mediation.

Whereas in normal subjects, presentation of a problem to solve by means of verbal instruction produced a stable orienting reflex, in frontal lobe patients verbal instruction

did not restore an extinguished response, and an instruction which should have increased the patient's psychophysiological activity produced no change. Luria (1980) took this as evidence that the mediobasal zones of the frontal lobes are mainly concerned with higher forms of regulation of short- and long-term processes of nonspecific activation, taking place with the aid of the speech system. According to this conception, the human mediobasal frontal lobes participate in the activation induced by a spoken instruction, and are part of the brain system directly involved in the processes associated with the higher forms of active attention.

Luria (1973) points out that the normal psychophysiological indicators of a mobilization of voluntary attention under the influence of a spoken instruction is ill-defined in the child, develops progressively in early adolescence and appears in stable form only at about age 12-15 -- at a time when frontal cortex is beginning to play a more intimate part in complex and stable forms of higher voluntary attention. The role of the frontal lobes in directing and modulating the task- or situation-appropriateness of behavior requires this component of sociodevelopmentally-fostered verbal mediation. For Luria (1973), then, voluntary attention, unlike the elementary orienting reactions, is not biologically fixed in its origin, but develops as a <u>social</u> act.

Thus, Luria's (1973, 1980) observations of the deficit in responding to the verbal entrainment of attention shown by frontal patients suggest that one effect of frontal damage is to disrupt what is normally the intimate relationship between verbal behavior and socially relevant aspects of attention. In human ontogenesis, language from the first guides and motivates the progressive internalization of certain standards, certain regularities, on the basis of which our behavior achieves a measure of both intrapersonal specificity/predictability and adaptiveness to a wide range of situations. Through language, we build up the stability-in-time (Nauta, 1971) that allows us to judge behavior in relation to both the environment and ourselves. This autoarticulatory "signal function of speech" (Luria, 1980) for the processes of attention and social behavior becomes progressively internalized in ontogenesis, and it is in this process that frontal cortex plays a crucial role.

Language, Thought and the Interhemispheric Basis of Reflective Self-Consciousness

The sociodevelopmental nature of thought and behavior that Luria (1973, 1980) speaks of in relation to the frontal lobes is based on Vygotsky's (1962) conception of the interrelatedness, even interdependence, of thought and language, and the progressive developmental relationship

between thought and inner speech.

> Thought development is determined by language, i.e. by the linguistic tools of thought and by the sociocultural experience of the child. Essentially, the development of inner speech depends on outside factors; the development of logic in the child, as Piaget's studies have shown, is a direct function of his socialized speech. The child's intellectual growth is contingent on his mastering the social means of thought, that is language (Vygotsky, 1962, p. 51).

The relation of thought to language, says Vygotsky, is a dialectical process, a continual moving back and forth from thought to word, word to thought. In this process the relationship between thought and language undergoes progressive changes. Linguistic articulation, socially mediated, becomes more and more internalized in the form of inner speech, preceded by an intermediary stage of egocentric speech, which is a less complete assimilation of word into thought.

> In our conception, egocentric speech is a phenomenon of the transition from interpsychic to intrapsychic functioning, i.e. from the social collective activity of the child to his more individualized activity -- a pattern of development common to all the higher psychological functions. Speech for oneself originates through differentiation from speech for others (Vygotsky, 1962, p. 133).

The development of inner speech is probably necessary for a sense of self as actor (after Markus, 1983), a

dimension which has been previously discussed in relation to its role in providing for an optimum ability to guide and regulate behavior in response to changing situations. Vygotsky (1962), for example, is clear about the role of inner speech in modulating the affective-volitional aspects of behavior. Without inner speech, without the ability to self-articulate the rules and codes of action that guide behavior in relation to the socially shaped self, the affective-volitional component of behavior becomes divorced from the ideational-evaluative aspect. Language, which gives rise to thought via internalization, becomes in man the linchpin of cognitive mediation between the self-referential needs and wants of the individual and the exigencies of the objective situation.

Joseph (1982) has taken an explicitly neurodevelopmental approach to the question of the social origins of thought and language. He argues that the motor areas of the cortex mature before the sensory areas, and that the left hemisphere develops prior to the right. This gives the left hemisphere a competitive advantage in the acquisition of motor representation, whereas the later-maturing right hemisphere has an advantage in the establishment of sensory-affective synaptic representation, including that of limbic mediation. Thinking is viewed in part as a left hemisphere internalization of egocentric language which corresponds to

the increased maturation of intracortical and subcortical structures and fiber pathways and the myelination of the callosal connections that subserve information transfer between the hemispheres. Joseph thus argues that thought is a means of organizing, interpreting and explaining impulses that arise in the nonlinguistic portions of the nervous system so that the language-dependent regions may achieve understanding.

Joseph (1982), like Vygotsky (1962), recognizes both the motivational and sociodevelopmental aspects of speech-thought development. The earliest forms of communication and thus social speech, says Joseph, are embedded in limbic activity, since limbic speech provides a context within which associations may be formed and schemata developed. Language slowly develops from the construction and association of these schemas and vocalization-experience pairings. As the left hemisphere continues to mature and develop, a second aspect of language emerges, one that arises through interactions and nominal associations with external stimulatory activities - denotative speech. Although it emerges out of relationships originally having a limbic basis, denotative, or social language is concerned with nominal functions and denotative statements of fact or belief and statements of assertion. As such, denotative social language is closely bound with cognitive activities and the

eventual expression of one's thoughts. Thinking, however, does not appear until much later in development. Moreover, although a semi-independent motor function, it remains influenced by social-limbic language throughout life.

Following Vygotsky (1962), Joseph (1982) sees egocentric speech as the linguistic structure from which thought will arise, and which appears in the context of social-denotative speech. Egocentric speech is thus viewed as an essentially self-directed form of communication which heralds the first attempts at self-regulation. Egocentric speech, says Joseph, is essentially speech for oneself. It develops eventually (at about age 7) into truly inner speech. The child has by then learned to think in words, as well as to speak them, and to think them in a temporal and organized sequence that retains its original and primary function, self-communication.

> Essentially, egocentric speech is a function of the left hemisphere's attempt to organize and make sense of behavior initiated by the right half of the brain. Because interhemispheric communication is at best grossly incomplete, the left utilizes language to explain to itself the behavior in which it observes itself to be engaged. As the commissures mature and information flow within and between the hemispheres increases, the left also acts to organize linguistically its internal experiences. As the organism develops, interhemispheric information exchange is increased and the language axis (Broca's, Wernicke's and the angular gyrus regions) increasingly acts to organize (as well as inhibit) sensory-limbic right

> hemispheric transmissions and initiated behaviors, organizing these impulses as it organizes impulses that originate in the left cortex, so that they may be efficiently and motorically carried out. Rather than passively observing the sensory-limbic actions as they occur in the environment, as the commissures become complete, the left hemisphere now actively engages in the formulation of behavior, achieving understanding prior to its occurrence. Essentially, commissural transmission allows the left hemisphere access to right hemisphere impulses-to-action before the action occurs, rather than forcing it to make sense of the behavior after its completion (Joseph, 1982, p. 21).

If, as is implicit in this argument, the left hemisphere language system serves to organize and give social meaning to feelings and drives, then it might be expected that psychopaths, arrested at some neurodevelopmental stage associated with language functioning, might also be frozen at the level of the external speech-egocentric speech transformation, and thus suffer an incomplete or disorted self-reflective behavioral control system. Under conditions of ambiguity, stress or frustration, especially in social situations, such individuals would be especially prone to regress to more phylogenetically stereotypical patterns of behavior, representing partially distorted manifestations of antagonistic-antisocial or approach-prosocial behaviors.

In addition, as mentioned above, such individuals might be expected to show deficits in other indices of left hemisphere language. Indeed, a number of studies have

pointed out the association of psychopathy or delinquency with impairment on various indices of verbal functioning, such as Verbal IQ (Eaker, 1983; Graham & Kamano, 1958; Heilbrun, 1979, 1982; Holland, 1981; Prentice & Kelly, 1983; Shulman, 1951; Wiens, et al, 1959) and learning disorders (Berman & Siegal, 1976; Bryant, et al, 1984; Hurwitz, et al, 1972; Robbins, et al, 1983; Spreen, 1981) which traditional neuropsychological lateralization indices describe as reflecting left-hemisphere dysfunction.

At some important stage in normal development, the interpretation or evaluation of a behavior precedes its execution. Behavior no longer has to be emitted, and its effect on the environment observed, in order for self-modulation to occur. To Joseph (1982), this corresponds to the maturation of the left hemisphere mechanisms responsible for self-articulation; for Vygotsky (1962), it was the transformation of egocentric speech into true inner speech.

In terms of the present neuropsychological model, we might propose that while the actual cerebral substrate of communicative language is neuroanatomically related to the perisylvian language regions and their connections with the various afferent and efferent association cortices, the more general ability to make practical use of inner speech in guiding and evaluating socially appropriate behavior is a function which inheres in the frontal lobes (perhaps

predominantly left-lateralized, as some writers have suggested). Thus, in frontal lobe dysfunction, even if inner speech were present in some form on the basis of relatively intact language areas, use of this capacity would be impaired and the neurodevelopmental arrest of frontal lobe function would produce deficits in attentional responsivity and affective evaluation similar in quality to that seen in Luria's (1973, 1980) frontal lobe patients.

In the Vygotskian schema, the development of inner speech is a prerequisite for the development of abstract thinking, and true concept formation depends upon the fully-formed processes of abstraction. In this, the linguistic component - the <u>significative</u> use of language - is vital.

> All the higher psychic functions are mediated processes, and signs are the basic means used to master and direct them. The mediating sign is incorporated in their structure as an indispensable, indeed the central, part of the total process. In concept formation, that sign is the <u>word</u>, which at first plays the role of means in forming a concept and later becomes its symbol (Vygotsky, 1962, p. 56).

A deficiency or maldevelopment in the significative use of language can result in a type of thinking which, on the surface appears "abstract" - e.g. the individual can sort objects or stimuli into classes of one type of another. But this can be shown to be only <u>pseudoconceptual thinking</u>, as Vygotsky calls it. This is because the principles of

classification are not based on a true analysis of the properties of the stimuli which enable them to be assigned to superordinate classes, but only on certain superficial similarities which are, at base, still rooted in the concrete properties of the stimuli. This leads to certain characteristic features of immature thinking such as

> a tendency to compensate for the paucity of well-apprehended objective relations by an overabundance of subjective connotations and to mistake these subjective bonds for real bonds between things (Vygotsky, 1962, p. 60).

This tendency to form pseudoconcepts, says Vygotsky (1962), is what distinguishes the preconceptual thinking of children and adolescents from the true conceptual thinking that occurs later with maturity. Vygotsky (1962) cites the striking discrepancy in the thinking of early adolescents between the ability to form a concept and the ability to articulate it. The adolescent will form and use a concept quite correctly in a concrete task situation, but be unable to express the concept in words. If pressed, one frequently finds that the articulated concept is narrower or less precise than the one that seems to be in use for adequate task solution. Only later, when the significative use of language has fully developed, does the ability to articulate concepts equal in proficiency the ability to use them for practical problem-solving. Only then, can true conceptual,

as opposed to pseudoconceptual thinking take place because truly abstract concepts are transsituational - they are not grounded in the stimulus configuration of the present concrete situation.

A derangement or maldevelopment of the capacity to use significative language, then, will be associated with a disintegration of the ability to employ truly abstract conceptual thinking.

> In pathological disturbances of conceptual thinking, the measure of generality of concepts is distorted, the balance between the abstract and the concrete is upset, and the relationship to other concepts becomes unstable. The mental act through which the object and the object's relation to the concept are grasped loses its unity, and thought begins to run along broken, capricious, illogical lines (Vygotsky, 1962, pp. 113-114).

The Psychopathic Neurocognitive Deficit

Integrating the previous material, the psychopath is hypothesized to suffer from a neurodevelopmental-maturational deficit which is responsible for a relative inability to use inner speech to modulate attention, affect, thought and behavior. Under conditions of social frustration or ambiguity, behavior regresses to the use of more impulsive and primitively aggressive response strategies to effect changes in the social environment.

The factor of intelligence probably interacts with this hypothesized maldevelopment of inner speech utilization. That is, within the normal ranges, a lower as opposed to a higher IQ does not by itself automatically mean that an individual lacks the cognitive wherewithal to control his behavior, any more than a higher IQ automatically guarantees such a capacity. However, given a deficit in inner speech utilization, a higher intellectual ability may confer just that amount of advantage in other areas necessary to compensate for the specific deficit.

Nor is the hypothesized inner speech utilization deficit an all-or-none phenomenon. An individual with an especially severe degree of this problem may lack self-control, even though performance on standardized measures of intellectual functioning is otherwise normal or superior (clinicians are familiar with the so-smart-yet-so-dumb patient who seems to possess - in the abstract - the knowledge and insight of a scholar, but in the real world can't seem to keep himself out of trouble for two minutes). Similarly, if the deficit is only minor, even an otherwise intellectually limited individual may not display it, except under extreme circumstances.

The history of ADD/MBD/hyperactivity found in many psychopaths (Cantwell, 1979; Gittleman, et al, 1985; Lewis, 1980; Prinz, et al, 1981; Robins, 1974; Stabenau, 1984) may

be a reflection of the same type of frontodiencephalic instability that is hypothesized to characterize impulsive, disinhibited individuals (see also Gorenstein & Newman, 1980). As for learning disabilities, the hemisphericity dimension (e.g. Joseph, 1982) may play a role, since success in most academic curricula demands a certain degree of mastery of verbal skills. The inner speech deficit and problems in other "verbal" areas are probably related through this hemisphericity dimension, but, as pointed out above, there need be no causal relationship between the two.

Finally, unlike in the Gorenstein-Hare debate, the present approach goes beyond the narrow localizationistic frontal-or-not-frontal conception by emphasizing the study of cognitive subcomponents that are important to psychological functioning. These may overlap to some degree in different kinds of neuropathological and psychopathological syndromes, but are not identified exclusively with any one of them, and their common presence does not imply isomorphism of mechanism. In other words, psychopaths look like frontal lobe patients on some tests because the task demands of those tests tap cognitive functions that are impaired in both groups; they may not necessarily be the same functions, however. While frontal lobe patients are impaired on conceptual classification tasks, the psychopath's deficit on similar tasks is not necessarily due to impaired frontal lobe

functioning. Rather, it is hypothesized that the deficit in inner speech utilization to guide behavior is responsible for disrupting efficient set-shifting and conceptual flexibility on sort-and-shift tasks that include some verbal processing component. On tasks in which this verbal component is not a prerequisite, the psychopath will perform adequately, as Hare's (1984) group in fact demonstrated with the WCST.

STATEMENT OF THE PROBLEM & THEORETICAL HYPOTHESIS

The question of frontal lobe dysfunction in psychopaths has not been addressed in the literature, except from a narrow functional-localizationist point of view. The purpose of this dissertation is to rectify the deficiencies in this area by applying a cognitively-based model to the study of the psychopathic neuropsychological deficit. The question that emerges is: Do psychopaths show a deficit in the ability to use inner speech to modulate behavior?

In answering this question, the following hypothesis is proposed.

Psychopaths will show deficits in conceptual classification tasks which require for their solution the use of a verbally-labeled concept to guide responding in a task-appropriate manner, along the lines suggested by Vygotsky (1962). Where such a verbal tag requirement is not an essential task demand, psychopaths' performance will not differ from that of normal controls on the dimension of conceptual classification, per se.

The operationalization of this hypothesis will be described following the Methods section.

METHOD

Subjects

Subject Selection and Group Assignment

Subjects were 65 male inpatients at Fair Oaks Hospital (FOH), a private residential psychiatric and substance abuse treatment center. To control for the effects of age on general neuropsychological functioning, the sample was restricted to subjects below age 40. To facilitate comparability of Wechsler IQ scores, only subjects older than 16 (the age cutoff for the WAIS-R) were included. Full demographic, diagnostic and test results information are given in the Results section (Tables 1 and 2).

All subjects were tested on all of the neuropsychological measures. In six cases, IQ data were already available from prior personality testing done at FOH by another clinical psychologist, and this data was used for the present sample. No subject was tested before he had been adequately detoxified from substance abuse. Clinical neuropsychologists know that degree of subject cooperation can critically affect interpretability of neuropsychological results. Therefore, only subjects whose cooperation with testing was judged by the examiner to be adequate were included in the study.

Subjects were selected from among consecutive referrals

for neuropsychological and projective psychological testing at FOH. This could possibly be seen as introducing a selection bias, in that those patients regarded by the clinical staff as being most "organic" or "psychopathological" to begin with are the ones most likely to be referred for such testing. However, at FOH neuropsychological and psychological testing comprise part of a comprehensive Neuropsychiatric Evaluation Procedure (NEP) that virtually all patients undergo during their hospitalization. Thus, it is likely that the sample used for this study is representative of the larger psychiatric and subtance abuse population at FOH.

Axis I diagnosis was according to DSM-III guidelines and the patient's Discharge Diagnosis was used for the present study. Inpatient hospitalization at FOH is typically divided into Evaluation and Treatment phases. Psychiatric diagnosis follows DSM-III guidelines and generally proceeds through several stages: 1) an Intake Diagnosis, representing the results of the patient's initial intake evaluation; 2) an Evaluation Diagnosis, representing the cumulative diagnostic impression of the Evaluation Unit team at the end of the patient's stay on the Evaluation Unit; and 3) a Discharge Diagnosis, the final diagnostic impression at the time of the patient's discharge from the hospital, which includes all clinical, laboratory, psychometric, treatment response and

other data obtained during hospitalization. The Discharge Diagnosis is therefore generally considered to represent the most accurate diagnostic formulation available on a given subject. Psychological and neuropsychological testing is almost always done at some point between the Intake and Discharge Diagnoses, so that at the time testing was carried out on any given subject, the evaluator was aware of the Intake or Evaluation diagnosis, but of course "blind" to the final Discharge diagnosis.

Subjects with "hard" organic nervous system impairment as assessed by neurologic exam or CAT scan were excluded. Inasmuch as schizophrenia and possibly other psychoses have been associated with significant cognitive and neuropsychological deficits of their own (Goldstein, 1978; Heaton et al, 1978; Muller, 1985; Seidman, 1983), an attempt was made to exclude these diagnoses as well. However, since the final Discharge diagnosis was not made until after testing was done (see above), and due to the nature of the multiaxial diagnostic format of DSM-III, a few patients eventually received Discharge diagnoses in the organic and schizophrenia spectrum, e.g. "Organic Personality Disorder" or "Schizophreniform Psychosis."

To control for this, the DSM-III Axis I Discharge Diagnosis of all subjects in this study was reviewed and recorded, with special attention to those receiving "organic"

diagnoses of any type. Where the basis for the organicity diagnosis consisted of either an abnormal neurologic exam or positive CAT scan, the patient was excluded from the sample. However, where the assessment of organicity was made on clinical grounds only, in the absence of confirmatory neurologic or radiologic data, the subject was retained. Similarly, subjects with diagnoses of frank schizophrenia were excluded, whereas subjects diagnosed as "possible" schizophrenia or within the "schizophreniform" range were retained. Diagnostic data are shown in Table 1 in the Results section.

Assessment of Psychopathy

As in Hare's (1984) study, subjects were divided into High, Medium and Low Psychopathy groups. Group assignment was by means of a self-assessment form of the Hare Psychopathy Index (Hare, 1980, 1985; Schroeder, et al, 1983). Hare (1980) has argued that "any assessment procedure should be explicitly tied to the clinical conception of psychopathy" (p. 111) and that many existing diagnostic scales for personality disorders and psychopathology (e.g. DSM-III) rely too heavily, or even completely, on an atheoretic tabulation of index signs and symptoms (Hare, 1980, 1985, in press; Hare & Cox, 1978). The Hare Psychopathy Index was used in Hare's (1984) study that critiqued Gorenstein (1982). The

theoretical model that best conceptualizes the core syndrome of psychopathy, and which is therefore most suited to incorporation in a diagnostic scheme, asserts Hare, is that of Cleckley (many editions, most recently 1982) who specified 16 traits which he believed characterized psychopaths. These are as follows.

1. Superficial charm and good intelligence. Psychopaths typically present a surface persona of being bright, sociable and genuinely affable. When first met, there is usually nothing to suggest any kind of psychological problem.

2. Absence of delusions and other signs of irrational thinking. There is no evidence of thought disorder or problems of interpersonal relatedness.

3. Absence of "nervousness" or psychoneurotic manifestations. If anything, he gives the impression of being unusually poised and free from anxiety.

4. Unreliability. There is no sense of obligation or responsibility, obligations and committments are abrogated at will, and calling this disloyalty into account has little effect on subsequent behavior. He does what he wants when he wants it, unmindful of consequences.

5. Untruthfulness and insincerity. He lies with ease and with a disarming straightfowardness. There seems to be no sense that he has any obligation to keep his word or that failure to do so is grounds for subsequent disbelief, and he

will become indignant when others fail to trust him in the future.

6. Lack of remorse and shame. He does not accept blame or responsibility for the misfortune his actions cause to others or to himself. Nothing is his fault.

7. Inadequately motivated social behavior. Actions, even of the most egregiously antisocial kind, often seem motivated by the smallest of whims, without any significant consideration as to amount of gain or possible dire consequences. Great risks will be taken for what are ostensibly paltry rewards (e.g. risking parole violation and prison to swipe a few bucks).

8. Poor judgement and failure to learn from experience. The psychopath's refractoriness to punishment is legendary. Long after others would have had the "sense knocked into them" by the adverse consequences of their behavior, he continues to persevere in his antisocial ways. There may be a striking contrast between his ability to use seemingly excellent reasoning and judgement in abstract situations (e.g when responding to verbal questions) and the deplorable lack of such sense when it comes to real-life circumstances.

9. Pathologic egocentricity and incapacity for love. His intense self-centeredness renders it impossible for the psychpath to give of himself in the manner that is required for object love. Despite superficial displays of devotional

affection, genuine devotion or affection is impossible.

10. General poverty in major affective reactions. Despite the ability to put on a good superficial show of emotion, the psychopath seems incapable of experiencing true human feeling or of empathizing with the feelings of others. Cleckley (1982) points out that the shallowness of affect and incapacity for object love may be related.

11. Specific loss of insight. The psychopath shows a "total absence of self-appraisal as a real and moving experience" (Cleckley, 1982, p. 214). He does not appreciate how others perceive him or have the ability to assimilate the reactions of others into his own self-system. He shows, says Cleckley (1982), an "inability in his fundamental reactions to size up normally what he has done, what he is and what he has been."

12. Unresponsiveness in general interpersonal relations. Any considerations of kindness and trust fail to elicit commensurate reciprocation, as long as that reciprocation involves suspending his impulsive, egocentric proclivities. Be nice to him, and he'll turn around and screw you again and again.

13. Fantastic and uninviting behavior with drink and sometimes without. "A peculiar sort of vulgarity, domineering rudeness, petty bickering or buffoonish quasi-maulings of wife, mistress or children, and quick shifts

between maudlin and vainglorious moods" (Cleckley, 1982, p. 218) characterizes the inebriated psychopath. However, alcohol does not seem to be necessary for the elicitation of such crude antisocial behavior; rather, it lowers the threshold to the expression of this behavior, which may occur at other times with perhaps only slightly greater provocation. Further, comparatively small amounts of alcohol are sufficient to trigger this kind of acting-out.

14. Suicide rarely carried out. Frequent manipulative suicidal threats notwithstanding, completed suicide is rare.

15. Sex life impersonal, trivial and poorly integrated. Despite stereotypes of lust-crazedness, the Clecklian psychopath seems less, not more interested in sexual activity and gratification and "never seems to find anything meaningful or personal in his relations or to enjoy significant pleasure beyond the localized and temporary sensations" (Cleckley, 1982, p. 223). Sexual activity frequently has a perverse, prankish aspect, as if the object were primarily to shock and demean.

16. Failure to follow any life plan. In Cleckley's (1982) words,

> The psychopath shows a striking inability to follow any sort of life plan consistently, whether it be one regarded as good or evil. He does not maintain an effort toward any far goal at all...On the contrary, he seems to go out of his way to make a failure of life. By

> some incomprehensible and untempting piece of folly or buffoonery, he eventually cuts short any activity in which he is succeeding, no matter whether it is crime or honest endeavor. At the behest of trivial impulses he repeatedly addresses himself directly to folly (p. 224).

Hare (1980) derived from this Cleckleyian characterization a set of 22 characteristics, later (Hare, 1985) reduced to 20, that he felt comprised a diagnostic system for assessment of the "true" (Cleckleyian) psychopath. The 20 items are:

1. Glibness/superficial charm.
2. Grandiose sense of self.
3. Need for stimulation/proneness to boredom.
4. Pathological lying.
5. Conning/manipulative.
6. Lack of remorse or guilt.
7. Shallow affect.
8. Callous/lack of empathy.
9. Parasitic lifestyle.
10. Poor behavioral controls.
11. Promiscuous sexual behavior.
12. Early behavior problems.
13. Lack of realistic, long-term goals.
14. Impulsivity.
15. Irresponsibility.

16. Failure to accept responsibility for own actions.
17. Many short-term marital relationships.
18. Juvenile delinquency.
19. Revocation of conditional release.
20. Criminal versatility.

The original Hare Psychopathy Index (Hare, 1980; Schroeder et al, 1983) is a checklist requiring one or more raters who score each item on a 0, 1 or 2 scale, based on a semistructured interview with the subject and information taken from institutional files. The final score is converted to a severity rating of High, Medium or Low Psychopathy.

The psychometric qualities of the checklist was evaluated by Schroeder et al (1983), using generalizability theory and classical test score indices of reliability. In each of five years, two raters rated a number of prison inmates (total N=301) on 22 items. The generalizability coefficients were .85, .86, .90, .96 and .89 for the five years. The generalizability coefficient for a test-retest study was .89. Classical indices of reliability (alpha coefficients, inter- and intrarater reliability) ranged from .82 to .93. The results indicated that the checklist is a very reliable (generalizable) instrument when used with prison populations. It is highly correlated with global ratings of psychopathy and criteria from DSM-III for Antisocial Personality Disorder.

Recently, Hare's research group (Hare, 1985) has developed a self-report checklist, the Hare Self Report Psychopathy Scale (SRP) that the subject himself can fill out, thus greatly faclitating data collection for research purposes. Using an extreme-groups analysis, the correlation between the SRP and the original Hare Psychopathy Index was found to be .42. In the present dissertation, the SRP was used to assess psychopathy, and the data used to define three groups of High, Medium and Low Psychopathy.

Assessment of Substance Abuse

Hare's group (Hare, 1984; personal communication) uses two 5-point rating scales of subtance abuse, one for alcohol and one for narcotics. This information is gleaned from the institutional records. The ratings are as follows:

Alcohol Use:

1. Nonuser.
2. Light user.
3. Moderate user.
4. Problem drinker.
5. Alcoholic.

Narcotics Use:

1. Nonuser.
2. Infrequent user.

3. Use of soft drugs (almost) daily; possibly some use of hard drugs.

4. Heavy use of hard drugs.

5. Addict.

In the present study, two independent raters, blind to the hypotheses and purposes of the present study, rated the subjects' alcohol and narcotics use according to the 5-point scales. The raters were Clinical Specialists (nurse-clinicians), experienced in making clinical diagnostic psychiatric and substance abuse assessments. The data for the ratings came from each subject's Drug History Form which records the type of drugs used, amount, frequency, duration and pattern of use and the subject's reaction to the drug (likes or dislikes the effect). The raters used this information to derive an overall numerical rating for alcohol and for narcotics use according to Hare's 5-point scale. Since it was possible that some of the patients would be familiar to these clinicians by name (since they may have worked with them on the units), subject names were deleted from the copies of the Drug History Forms given to the raters. In addition, the raters were asked to report if they recognized any particular subject based on the drug data alone; in no case was this reported.

Measures

Many measurement instruments or "batteries" are simply groups of items believed to be related to some underlying trait or state, but not necessarily empirically demonstrated or theoretically rationalized to be so related. Adding items to improve scales tends to increase redundancy of information while quite possibly retracting from validity (Kraemer et al, 1987). As has been pointed out,

> It is far better for investigators to invest in good careful collection of a small number of variables than to measure everything under the sun. That does nobody any good. One has the best chance of solidly hitting a target by aiming carefully and taking one's best shot, not by spraying buckshot wildly in the general direction of the target...The emerging message is that fewer [carefully selected measures] are better (Kraemer, 1981, p. 317).

Thus, instead of using the standard megabattery approach so common in psychiatric neuropsychological research, the present study employed a small, carefully chosen, empirically- and theoretically-based set of measures.

Experimental Measures

Wisconsin Card Sorting Test (WCST)

Description and Review: Sorting tasks in neuropsychology have traditionally been regarded as measuring such functions as abstraction and concept formation, although under certain

methods of administration they can be used to assess the ability to apply rules and modify behavior in accordance with these rules (Stuss & Benson, 1984). In addition, sorting tasks represent the classic "frontal lobe tests" of neuropsychology (Drewe, 1974; Milner, 1963, 1964; Stuss & Benson, 1984).

The Wisconsin Card Sorting Test (WCST) has evolved over several methods of administration and scoring. The two most commonly used protocols are those of Milner (1963) and Heaton (1981). The subject is presented with four stimulus or "cue" cards which differ in color, form or number: one red triangle, two green stars, three yellow crosses and four blue circles. The subject is given a pack of response cards which vary in different ways across these same dimensions of color, form and number. He is instructed to place each response card in front of one of the stimulus cards, matching it with whichever one he thinks it belongs with. He is told that the examiner will inform him whether each such placement is "right" or "wrong" and that he should make whatever use he can of this information in order to get as many "right" matches as possible. No other instructions or information are given.

According to the test protocol, known only to the examiner, the subject is required to sort first to color, all other responses being "wrong"; then, when he has achieved 10

consecutively correct responses to color, the required sorting principle is switched without warning to form, and color responses are now "wrong". After 10 consecutively correct responses to form, the principle shifts to number for a run of 10 consecutive responses, and then back to color. This procedure continues until the subject has successfully completed six sorting categories of color, form, number, color, form, number, or until all the cards have been placed.

The test yields separate measures for number of categories completed, total number of errors and number of perseverative errors. In the Milner (1963) system, a perseverative error is defined as a match that would have been correct in the immediately preceding stage of the test, e.g. continuing to sort according to color when the rule has switched to form. During the first stage, a perseverative error consists of a continued response in terms of the subject's initial preference, e.g continuing to respond according to form or number while color is the rule. In the Heaton (1981) procedure, a relatively complex scoring procedure for calculating perseverative errors based on within-category patterns of responding is used (see below). In addition, responses may be ambiguous (responding to more than one sorting principle at a time, e.g. both color and form, color and number, form and number, etc.) or unambiguous (responding to only one sorting principle at a time). Some

responses may also be classified as unique, i.e. the match corresponds to no existing sorting principle (not color, not form, not number).

In the most widely cited study of the WCST, and the one which established the WCST as a "frontal lobe test," Milner (1963) used the current 128-card version of the WCST to examine sorting and shifting behavior in a group of patients undergoing frontal and other cortical lobectomy for intractable epilepsy. She found that the ability to shift from one mode of solution to another was more impaired by dorsolateral frontal damage than by lesions in posterior brain areas. The dorsolateral frontal patients showed a strong perseverative tendency, but Milner did not regard this as being due to a primary disturbance in abstract thinking. Her patients frequently could verbalize the correct rule (e.g. "it has to be color, form or number"), but could not make the category shift once a particular pattern of responding had been established. Milner interpreted the deficit in dorsolateral frontal patients as a failure to suppress an ongoing reaction tendency despite proof of its efficacy, that is, a dissociation between the actual response and the ability to verbalize the response, a verbal knowing divorced from doing.

Drewe (1974) attempted to more precisely delineate the contribution of localized brain lesions to WCST performance

in a sample of lobectomy patients divided into left-frontal, right-frontal, left-nonfrontal and right-nonfrontal groups. The patients were also given a short WAIS. No intergroup differences were found in Verbal IQ, but in Performance IQ left-lesioned patients tended to do better than right, and nonfrontal lesioned patients tended to do better than frontal. On the WCST, patients with frontal lesions achieved fewer categories and made more perseverative errors than nonfrontals, and left frontal patients made more perseverative errors than right frontal patients. There was no intergroup difference in nonperseverative errors or total errors.

In an effort to explore the utility of the WCST in assessing frontal-like impairment in psychiatric populations, Malmo (1974) compared the WCST performance of a mixed group of psychiatric patients to that of Milner's (1963) dorsolateral frontal lobe cases. Diagnoses in the psychiatric group included psychoneurotic, acute schizophrenic, chronic schizophrenic, "mixed psychotic," and alcoholic patients. Results showed that the psychiatric patients were superior to the frontal lobe patients in terms of number of categories completed and percentage of perseverative errors. Malmo concluded from this that the WCST taps a function that is specifically impaired by damage to the dorsolateral frontal lobes.

Although an excellent clinical neuropsychological tool, one of the problems with the WCST that has limited its applicability to research has been the lack of a standardized administration procedure, scoring system (most investigators have followed Milner, 1963) and, particularly, normative data. These problems were addressed relatively recently by Heaton (1981), and it is this system which is currently achieving popularity in neuropsychological assessment and research. It is the Heaton version of the WCST that was used by Hare (1984) and is being used in the present study to replicate and extend Hare's findings. The administration procedure is the same as in Milner (1963), however an innovation in the scoring procedure renders the test more sensitive to perseverative errors. In this protocol, a perseverative error is defined as one which would have been correct on the previous category, as in Milner (1963). However, two additional features are included.

First, it is possible for the subject to make perseverative responses before he has completed one category. Once the subject has made the first unambiguous incorrect response in stage one (i.e. a response that matches the stimulus card only with respect to form or number), that sorting principle will be the one to which he can perseverate in the first stage.

Second, it is possible for the perseverated-to principle

to change within a single stage of the test if the patient makes three unambiguous incorrect matches in succession (the definition of "ambiguous" vs. "nonambiguous" responses is explained in the manual) according to another principle, i.e. the principle that is neither the correct one in the current stage, nor the one that was defined as the perseverated-to principle according to the rules given above. Although there can be only one perseverated-to principle at a time, this principle can change more than once in a single stage, provided that the criterion of three consecutive unambiguous sorts are made to another incorrect principle.

Heaton's (1981) normative study with his version of the WCST involved 208 patients with structural brain lesions and 150 normal controls. All subjects were administered the WCST by trained technicians according to Heaton's protocol. In addition, all subjects were administered the WAIS and the Halstead-Reitan Battery (HRB; Reitan & Davidson, 1974). The WAIS Full Scale IQ and the HRB Average Impairment Index (AIR; Russell, et al, 1970) were used as measures of general neuropsychological impairment, and their relationships with the different WCST scores were assessed for both the normal and the brain damaged groups.

Heaton (1981) found that the total brain damaged group scored significantly worse than the normals on WAIS Full Scale IQ, AIR and on all WCST measures, except failure to

maintain set. The frontal-damaged group did significantly worse than the nonfrontal group on WCST total errors and perseverative errors, however, the groups did not differ significantly in categories achieved or nonperseverative errors. Thus, the most important difference between the frontal and nonfrontal groups was that frontals were much more perseverative. In general, the diffusely brain damaged group performed very much like the focal frontal group on the WCST, as well as showing comparable general neuropsychological impairment on the WAIS and HRB. Thus, Heaton's (1981) results raise questions about the utility of the WCST in attempting to discriminate focal frontal from diffuse cerebral lesions. Other relevant findings include only a modest correlation between WCST performance and educational level, no significant sex differences and a nonsignificant group main effect for IQ. The results of the present study, compared with Heaton's normative research will be discussed in the Results and Discussion sections.

Rationale in the Present Study: If the psychopathic cognitive deficit consists of a generalized impairment of frontal lobe functioning, then psychopaths should show a differentially higher rate of the WCST index found to be associated with frontal lobe functioning, i.e. perseverative error rate. If, however, generalized frontal lobe impairment is not a distinguishing feature of psychopaths, then

perseverative error rate should not differ between psychopath and nonpsychopathic groups.

Modified Vygotsky Concept Formation Test (MVCFT)

Description and Review: What has come to be called the "Vygotsky Test" by association with its most widely-known user (e.g. Vygotsky, 1934, 1964) is actually a revived version of an instrument that was pioneered in the 1920's and subsequently (relatively) standardized by Eugenia Hanfmann and Jacob Kasanin (Hanfmann, 1953; Hanfmann & Kasanin, 1936). Although used fairly extensively in the 1920's and 30's, it virtually dropped out of sight thereafter, receiving no more than a single paragraph in zeach of two of the most comprehensive compendia of psychological tests in current use (Anastasi, 1968; Lezak, 1983) - and even in these sources, more as an historical curiosity than as a practical assessment intrument. Only recently has this valuable test been rehabilitated and refurbished by Paul Wang (Wang, 1984, 1987) of Mount Sinai Hospital in Toronto, Canada, and is therefore directly applicable to testing the main hypothesis of the present study.

In his quest for a method that would enable an observer to systematically examine the dynamic factors involved in the process of concept formation, Ach (1921) in Germany originated the following procedure. The subject was

confronted with a group of various geometric forms and another group of meaningless words and, by means of prolonged demonstrations and manipulations, was made to discover that the words refer to definite combinations of certain characteristics of the objects. For example, the nonsense word "gazun" might signify all figures that are both large and heavy, "ras" might stand for all things large and light, and so on.

An important modification was introduced by Sakharov (1930) in Russia and this form of the test became the one subsequently adopted for use by Vygotsky (1934) and adapted by Hanfmann & Kasanin (1936). In their version, the test materials consist of 22 wooden blocks, varying in color, shape, height and width. On the underside of each block, which is not seen by the subject, is written one of the following four nonsense words, CEV, LAG, BIK, MUR. Regardless of color or shape, CEV is written on all small-flat blocks, LAG on all large-tall ones, BIK on all large-flat ones, and mur on all small-tall ones. At the beginning of the test all blocks, well mixed as to color and size, are scattered over the test surface. The subject is told that these are four different kinds of blocks, that each kind has a name and that the subject's task is to find the four kinds and to put each of them into a separate group. The examiner then turns up one of the blocks, shows its name to the

subject and, setting it aside, suggests that the subject start by picking out and putting in the same group all blocks which he thinks might belong to the same kind. After he has done this - selecting for instance, all blocks of the same color or all blocks of the same shape as the sample - the experimenter turns up one of the wrongly selected blocks, showing that this is a block of a different kind (i.e. different nonsense word group), and encourages the subject to keep trying.

After each new attempt one of the wrongly placed blocks is turned over and the process continues until the subject discovers the principle of the classification and organizes the blocks accordingly, or until the same result is achieved through all the blocks having been turned over by the examiner in the process of correction. In either case, the subject is asked to formulate the principle of the classification.

After this, the blocks are turned over (no words showing) and mixed up again, and the subject is asked to put them in order once more, this time without any help from the examiner. This repetition serves as a check as to whether or not the subject has actually grasped the principle of the double dichotomy - large or small, and tall or flat - on which the classification is based. Throughout the experiment the subject is encouraged to "think aloud" and a detailed

record is made of his and the experimenter's remarks, as well as of all selections made by the subject and all corrections made by the examiner.

According to Hanfmann & Kasanin (1936), this test involves giving the subject a definite task and information which is sufficient to suggest that the nonsense words refer to some characteristics of the blocks and that the discovery of what these characteristics are will enable him to carry out the task. They point out that this task does not primarily involve memorization; rather, it is a classification problem which calls primarily for the exercise of systematic conceptual thinking. It is therefore assumed that optimal performance is achieved where the subject sets about establishing a consistent classification leading to a system of four mutually exclusive classes.

In addition to the factors which are inherent in the solution of any classification problem, there are factors arising from tne specific nature of this test. The classification into the correct subclasses of small-flat, large-tall, large-flat and small-tall is based not on one, but on two characteristics in combination. It is this requirement to combine two characteristics to form a new and less easily defined one which is referred to when the test is described as a "concept formation test." The concepts to be found are not supported by already existing simple names

which the subject may have ready at hand, in the same way as he has red, round, etc. Nor is there any general name for the combination of height and size of top surface. Size or volume, which some subjects use, are insufficient and even misleading, since a large-flat block may have the same volume as a small-tall figure.

Thus, it is impossible for the subject to reach the solution by merely operating with the nonsense word-labels in a pseudoconceptual way. The nonsense words become meaningful and helpful - and this is what made the test so attractive to Vygotsky and renders it so appropriate for the present study - only after and insofar as a verbal-conceptual solution has been reached.

The very features of individualized administration and interpretation that make Hanfmann & Kasanin's (1936) version of this block sorting test so valuable for individual clinical assessment also severely limit its use as a standardized research tool. Recently, Wang (1984) has revised this instrument to produce what he calls the Modified Vygotsky Concept Formation Test (MVCFT). The test materials (i.e. the 22 variously shaped blocks with their nonsense names) are identical, but the test procedure has been modified to produce a more standardized format of administration and scoring. At the same time, the test's utility for evaluation of the relevant cognitive variables is

retained.

The new version includes the following features which render it directly applicable for testing the hypotheses of the present study:

1. The MVCFT involves the identification of four sets of problems, graded in an appropriate order, and the subject is to solve one problem at a time.

2. Feedback to the subject's responses is provided in a standardized manner.

3. A coding system has been developed to analyze the subject's discursive processes and problem solving approach.

4. The scoring system has been simplified and an objective quantifying method is provided.

Qualitatively, the MVCFT provides a means for systematic and structured observation of the subject's abstract attitude, problem solving approach and ability to learn from errors. Quantitiatively, the present method also yields a great deal of numerical information for statistical analysis. Moreover, the MVCFT provides for the collection of quantitative data similar to that available from the WCST (Heaton, 1981), i.e. perseverative vs. nonperseverative errors. Detailed instructions for standardized administration and scoring are provided in the test manual (Wang, 1984), along with many completed protocols from different clinical groups to illustrate the MVCFT in actual

use.

Wang (1984; personal communication) claims to have found the MVCFT to be particularly useful in the study of mental retardation, schizophrenia, and cerebral organicity, especially frontal lobe pathology. Recently, Wang (1987) has provided normative data on this test by administering the MVCFT to 30 normal controls and 53 brain damaged patients whose lesions were confirmed by CAT scan. Results showed that, overall, the brain damaged patients did significantly poorer than the controls. The right brain damaged group was not different from the left brain damaged groups, but both did better than the bilateral-diffuse lesioned group. Frontal patients performed significantly more pporly than nonfrontal patients, but there was no significant laterality effect. Overall, these findings suggest that performance on the MVCFT may be sensitive to gross frontal lobe dysfunction, but may also be affected by generalized cerebral impairment. Comparison of results of the present study and norms for Wang's (1987) sample is described in the Results and Discussion sections.

Rationale in the Present Study: The MVCFT is directly applicable to testing the hypothesis of this dissertation. Impairment on the MVCFT in the face of normal WCST performance would confirm the hypothesis that psychopaths'

specific impairment is at the level of the use of language as a facilitator of conceptual classification, related in turn to the hypothesized impairment in inner speech as an internal modulator of thought, affect and goal-appropriate behavior. On the other hand, if MVCFT performance parallels WCST performance in psychopaths, the deficit can be conceptualized as a more global "frontal" or general organic-deteriorative kind of neurocognitive impairment.

Control Measures

Three control measures were used in the present study: the Wechsler Adult Intelligence Scale-Revised (WAIS-R), the Benton Visual Retention Test (BVRT) and the Trail Making Test (TMT). The rationale for the use of these control measures consists of the following:

1) A reasonably substantial literature exists on the use of these measures in the areas of neuropsychology and psychopathology.

2) Clinical experience with psychiatric inpatients has shown these measures to combine facility of administration, maximal patient acceptance and cooperation and therefore most reliable interpretability.

3) Pilot work has shown these particular measures to be the most discriminating and differentiating with respect to intellectual functioning and general neuropsychological

intactness within a psychiatric/substance abuse population.

Wechsler Adult Intelligence Scale-Revised (WAIS-R)

Given the importance that many studies ascribe to IQ level for the interpretation of neuropsychological measures, this factor will be considered in the present study.

The WAIS-R (Wechsler, 1981) substantially satisfies, as does the earlier WAIS, the requirements of reliability and item difficulty, which no doubt contributes to its popularity in many kinds of clinical and research neuropsychology contexts (Lezak, 1983; Matarazzo, 1972). Such psychometric properties also make the WAIS-R a convenient test from which to derive short forms of various types. Short forms are useful insofar as they retain the overall validity of IQ measurement while at the same time facilitating data collection for research purposes.

Maxwell (1957) used the performance of the 300 subjects in the 25-34 year age group of the original WAIS standardization sample to compute the best combinations of two, three, four and five subtests. It was found that the accuracy of an abbreviated WAIS scale in estimating FSIQ score increased as the number of subtests was increased; however, an optimum point of five subtests was reached at which an increase in number brought only a negligible increase in correlation with FSIQ. More recently, a somewhat

lower, but still significantly high correlation of different subtest combinations with FSIQ was found with the WAIS-R in a psychiatric population (Ryan, et al, 1983). Even more recently, Silverstein (1985) and Brooker & Cyr (1986) have provided tables of WAIS-R FSIQ equivalents using two, three and four subtests that, when used with age-appropriate scaled scores, ensure that "none of the IQ equivalents will be in error by more than a point" (Brooker & Cyr, 1986, p. 982).

In the present study, subjects were tested with the WAIS-R. In many cases, one or more subtests were omitted for considerations of patient cooperation and clinical practicality. In these cases, prorated Verbal, Performance and Full-Scale IQs were calculated on the basis of the subtests administered. In all cases, sufficient subscale data was available to calculate reliable prorated IQ scores, according to the criteria of Brooker & Cyr (1986) and Ryan et al (1983).

Benton Visual Retention Test (BVRT)

A measure that assesses memory functioning and at the same time "pulls for organicity" was selected as one of the controls.

The revised BVRT (Benton, 1974) is a clinical and research instrument designed to assess visual perception, visual memory and visuoconstructive abilities. There are

three alternate forms of the test, each consisting of ten plates of line-drawn designs. In administration A, which was used for this study, each of the designs is exposed for ten seconds, after which it is removed and the subject is required to reproduce the design from memory. This procedure is repeated for each of the ten designs.

Scoring of the BVRT can be carried out according to either of two methods. In the Number Correct scoring procedure, each design reproduction is judged on an all-or-none basis and given a score of 1 (entire design correct) or 0 (any element or elements of design incorrect). In the Error Score procedure, deviations from the original design are separately scored as incorrect, even if more than one error occurs within a given design. For example, if a subject completed eight reproductions correctly, missed two reproductions and made three separate errors on one of the two and a single error on the other, his Number Correct score would be 8 and his Error Score would be 4. Detailed explanations of the types of possible errors are provided in the test manual, allowing for a qualitative analysis of error performance. For purposes of this study, Error Score was used.

A positive feature of the BVRT is that scoring and interpretation are based on norms that are standardized for age and IQ. Relative to respective performance range

expectations for each age x IQ group, deviations in terms of either number correct or number of errors are grouped into four categories: 1) no impairment, 2) raises the question of organic impairment, 3) suggests organic impairment, 4) strongly indicates organic impairment.

Malec (1978) reported that figural drawing tasks of several kinds have obtained discriminative hit rates above 80 percent in terms of distinguishing organically impaired patients from psychiatric patients, but not well enough for individual diagnostic decisions. However, Marsh & Hirsch (1982) found the BVRT to be especially effective in this regard. Benton (1974) reports that, as a group, schizophrenic patients show extreme variability on the BVRT, some performing within normal limits, others attaining scores similar to that of brain damaged patients. The performance of depressed patients, according to Benton (1974), varies with the severity of the depression. If they can be induced to exert adequate effort and attention, their performance is likely to be reasonably good; if, however, their motivational level is quite low and their mental energy insufficient, they tend to do poorly, particularly on the more complex designs.

Watson (1968) compared the utility of the BVRT with that of the Bender-Gestalt and Memory-for-Designs test for discriminating between organically brain-impaired patients and schizophrenics. The BVRT was the only one of the three

measures which discriminated significantly between the two groups. Subsequently, Watson (1973) reported on a series of studies that evaluated the utility of over 100 "organicity tests" to separate brain damaged from schizophrenic patients. Only a handful of measures showed promise, the most encouraging being the MMPI Schizophrenic-Organic (Sc-O) scale and the BVRT. The BVRT produced the highest average percentage of hits in the separation of organics from a combined group of schizophrenic, alcoholic, character disorder and affective disorder patients.

More germane to the population used in the present study, Smith et al (1972) found that over 70 percent of a group of alcoholic subjects had what they defined as short-term memory loss, based on BVRT performance. Further, this was a relatively stable finding, deficits remaining after a 90-day inpatient rehabilitation program. In a later study, Smith & Day (1977) found that impairment in affective state, as measured by the Profile of Mood States (POMS) was significantly correlated with impaired performance on the BVRT.

Thus, the BVRT is good control task for the factors of organicity in general, and memory deficits in particular.

Trail Making Test (TMT)

This test has enjoyed wide use as an easily administered

measure of visuomotor scanning, tracking and set-shifting and has been found to be highly sensitive to the effects of brain damage (Golden, et al, 1981; Lezak, 1983; Spreen & Benton, 1965). The test consists of two parts, Trails A and Trails B. In Trails A the subject must draw lines connecting consecutively numbered circles arranged randomly on a worksheet, i.e. 1 - 2 - 3 - 4, and so on. In Trails B he must connect an equal number of consecutively numbered and lettered circles on another worksheet by progressively alternating between number and letter, i.e. 1 - A - 2 - B - 3 - C, and so on. The tasks are timed and errors in sequencing are corrected by the examiner each time they occur. Total time to completion of each worksheet (A and B), including corrections, is the most commonly used scoring system (Lafayette Clinic, 1971; Lezak, 1983). Performance, based on timed scores, is divided into five categories in the scoring system used by the Lafayette Clinic (1971): 1) high normal, 2) normal, 3) mildly impaired, 4) moderately impaired, 5) severely impaired.

When the number of seconds to complete Trails A is much less than that taken to complete Trails B the subject may have difficulty in multiple-conceptual scanning, tracking and set-shifting (Golden, et al, 1981; Lezak, 1983). Golden, et al (1981) regard Trails A as more of a measure of right hemisphere integrity (e.g. visual scanning, spatial skills),

whereas Trails B is considered more indicative of left hemsisphere functioning (e.g. linguistic symbol manuipulation and direction of behavior according to a complex plan). Poor performance on Trails B, especially when the discrepancy with Trails A is high, is also regarded as a sensitive indicator of brain damage in general (Golden, et al, 1981; Lezak, 1983).

Opinion appears to be divided as to the utility of the TMT in detecting organic impairment in psychiatric populations. Golden, et al (1981) feel that the TMT is useful in discriminating brain damaged from psychiatric patients with about a 70 percent effectiveness rate, whereas Lezak (1983) is less sanguine about the consistency of correct differential diagnostic classification that can be obtained by use of this test. Shearn et al (1976) found the use of Trails A and B to be helpful in detecting even mild degrees of organic impairment in severely disturbed psychiatric patients. Smith & Boyce (1962) found chronic schizophrenic patients and brain damaged patients to be equally impaired on the TMT, while Small et al's (1972) schizophrenic subjects performed within normal limits on both Trails A and B. King (1967) found schizophrenics to be impaired on the TMT and observed that this group's performance seemed due to their general psychomotor retardation, and not to any kind of generalized cognitive-

intellectual deficit. King also found that the interrelationship of Trails B with intelligence and educational history was small, and that the correlation was even less for Trails A; in contrast, both A and B performance was significantly related to various measures of fine motor accuracy.

With regard to drug use, the TMT was found by Grant, et al (1973) to elicit better performance among marijuana users than controls. In the study by McGlothlin, et al (1969), LSD users showed a small, nonsignificant trend in the direction of poorer performance on the TMT, while hallucinogen users in Acord & Barker's (1973) study were significantly more impaired than controls on Trails B. Trails B performance was severely impaired, relative to controls, in the polydrug users studied by Adams, et al (1975), and Brandt & Doyle (1983) found only a small difference between younger nonopiate polydrug users and nonuser controls.

For purposes of the present study, then, the TMT seems appropriate for controlling for difficulties in set-shifting that may have a specifically visuomotor or nonconceptual basis, as well as a control for organicity in general.

OPERATIONAL HYPOTHESIS OF THE PRESENT STUDY

Subjects higher in psychopathy will show a significantly higher perseverative error rate on the MVCFT than subjects lower in psychopathy. Performance of the three groups will not differ with respect to WCST perseverative error rate (as in Hare, 1984) when IQ, diagnosis, substance abuse history and performance on neuropsychological control measures are controlled for.

RESULTS

Characterization of the Sample as a Whole

Table 1 shows the DSM-III, Axis I diagnostic distribution of the present sample as a whole. Almost all subjects were being treated for either substance abuse or some form of affective disorder. This is consistent with the demographics of the patient population served by FOH. Only a small proportion of the sample was diagnosed as within the schizophrenia spectrum and only one subject was diagnosed as organic; as pointed out earlier, this was on clinical grounds in the absence of either positive neurological findings or radiologic confirmation.

Table 1. DSM-III Axis I diagnostic distribution of the present sample as a whole.

AXIS I DIAGNOSIS	N	%
Substance Abuse/Addiction	32	49.2
Unipolar Affective Disorder	20	30.8
Bipolar Affective Disorder	7	10.8
Schizophrenic, Schizophreniform or Schizoaffective Disorder	5	7.7
Possible Organic Personality Disorder	1	1.5

Table 2 presents the data from the total sample as a whole on all measures used in the present study. It can be seen that the present sample resembles the published normative samples for all except two measures, WCST Perseverative Errors and MVCFT Perseverative Errors;

moreover, these differences are in the opposite direction. Otherwise, the sample scores appear to be representative of the normative population scores for the measures used. This indicates that the present sample constitutes an essentially neuropsychologically intact psychiatric/substance abuse sample and is not "organic" with respect to the neuropsycholgical measures used. Some explanations and qualifications include the following.

First, the distribution on age is skewed; there is a greater proportion of younger patients in the sample than older (median age=19). This is the result of the demographic breakdown of the patient population at FOH, which includes a large proportion of adolescents. 57.0% of the sample had a high school education or better and since the young age of many of the subjects precluded their attaining 12th grade on strictly chronological grounds, we may suppose that the "true" or "projected" measure of academic achievement would be even higher. Performance on VIQ, PIQ and FSIQ is quite close to the normative data on these measures (Wechsler, 1981), indicating that the overall intellectual level of the present sample is representative of the population at large. Thus, the present sample is of overall normal intelligence and fairly well-educated, which is what one would expect from the demographic catchment of a private psychiatric facility.

Table 2. Characteristics of the present sample as a whole on all measures used in the present study.

	Range	M	SD	Dev from normal(a)
Age	16-37	21.7	6.0	n.a.
Educ	9-14	11.4	1.3	n.a.
VIQ	81-125	101.0	11.2	no(b)
PIQ	75-143	98.5	12.9	no(b)
FSIQ	79-136	100.2	11.3	no(b)
BVRT-E	0-3	1.0	0.4	no(c))
TMT-A	15-64	29.1	9.9	no(d)
TMT-B	31-121	64.9	20.4	no(d)
WCST-C	1-6	5.4	1.2	no(e)
WCST-E	7-76	26.1	16.9	no(e)
WCST-P	0-29	7.1	7.6	better(e)
MVCFT-E	0-69	10.4	12.3	no(f)
MVCFT-P	0-35	2.4	5.5	worse(f)
SRP	40-129	85.2	20.2	no(g)
ALC	1-5	3.1	1.5	n.a.
NARC	1-5	3.3	1.3	n.a.

(a) Significant deviation of mean of the present sample from mean of published normative data for that measure.
(b) Wechsler, 1981.
(c) Benton, 1974.
(d) Rennick, 1971 (Lafayette Clinic).
(e) Heaton, 1981.
(f) Wang, 1987.
(g) Hare, 1985.

With regard to the control neuropsychological measures, the salient finding is the lack of signs of major neuropsychological impairment in the overall sample. 95.2% of the sample fell in the normal or only mildly impaired range on the BVRT-E; interestingly, 93.5% of that group fell in the mildly impaired range, suggesting that, while few of the subjects were significantly impaired, most had some mild problems with the test. The range of performance for the present sample is consistent with that reported for

psychiatric populations generally (Malec, 1978; Smith & Day, 1977; Watson, 1973).

On Trails A, 95.3% of the sample fell in the normal or only mildly impaired range, with 75.0% falling in the normal range. On Trails B, 87.5% performed in the mildly impaired range or better, with 48.4% in the normal range. The slightly worse performance of the overall sample on Trails B versus Trails A may indicate that the alphanumeric set-shifting demands taxed a more vulnerable cognitive capacity, but the general mean levels of performance on the two measures are still not appreciably impaired. Of significance is the fact that unlike the quite restricted range of results on the BVRT-E, a wide range of performance is seen on both Trails A and B, covering all categories from high normal to severely impaired. Thus, although mean overall neurocognitive performance as measured by this task is not grossly impaired, some subjects do perform significantly worse than others.

As for the experimental measures, the present sample's overall performance on the WCST is quite close to that of the published normative reference group of normal subjects (Heaton, 1981) on Number of Categories (WCST-C) and Total Errors (WCST-E). The present sample actually performed signficantly <u>better</u> than the normative group on Perseverative Errors (WCST-P). These results occurred even though the

normative sample's mean FSIQ was significantly higher (greater than 1 SD) than the FSIQ of the present sample (see Table 3). In the present sample, the distribution for Number of Categories is highly skewed in the direction of good performance; 78.5% of subjects achieved either 5 or 6 categories, and 70.8% achieved 6 categories, the maximum for this measure. With regard to WCST Total Errors, the range in the present sample is wider and approaches a normal distribution. However, for Perseverative Errors, the sample performance is skewed in the direction of the greater number of errors being made by only a few patients. Thus, a small number of subjects is accounting for the greater degree of impairment on WCST Perseverative Errors.

Table 3. Comparison of WCST data from the present sample as a whole with published normative data (Heaton, 1981).

	Normative Sample (N=150)		Present Sample (N=65)		
	M	SD	M	SD	
Age	35.9	15.3	21.7	6.0	t=9.79*
FSIQ	114.0	11.7	100.2	11.3	t=8.14*
WCST-C	5.4	1.3	5.4	1.2	t=0.00
WCST-E	24.9	19.4	26.1	16.9	t=0.48
WCST-P	12.6	10.2	7.1	7.6	t=4.37*

* p<.01

Results for the MVCFT represent another deviation from published normative data (Wang, 1987), but in the opposite

direction. As Table 4 shows, the present sample mean for MVCFT Total Errors (MVCFT-E) is not significantly different from that of the normative group. However, number of Perseverative Errors (MVCFT-P) are significantly greater than those for the normative sample in the age group which corresponds to the present sample age range. Thus, the present sample as a whole did significantly worse than Wang's (1987) normal (nonbrain-injured) group on Perseverative Errors; however, the small size of Wang's sample limits the interpretability. In addition, the range of performance in the present sample is extremely wide, some subjects responding flawlessly, making no errors whatsoever, others performing so poorly as to suggest absolutely no understanding of the principles involved in the task and being equivalent to performance by brain-damaged individuals.

Table 4. Comparison of MVCFT data from the present sample as a whole with published normative data (Wang, 1987).

	Normative Sample (N=12[a])		Present Sample (N=65)		
	M	SD	M	SD	
Age	29.7	5.6	21.7	6.0	t=4.49*
MVCFT-E	14.0	3.7	10.4	12.3	t=1.93
MVCFT-P	0.5	0.7	2.4	5.5	t=7.18*

* p=.01

a) Normative data from Wang's 20-40 year old group (excluding his 41-82 year old group) in order to make the results comparable with the present sample.

To summarize the data for the experimental measures, the present sample as a whole performs <u>better</u> than the normative group on WCST Perseverative Errors and <u>worse</u> than the normative group on MVCFT Perseverative Errors. Otherwise, performance between the two samples on these two tests are equivalent.

With regard to psychopathy (SRP), the results for the present sample as a whole come close to replicating Hare's normative sample as a whole, as seen from Table 5 (results for High, Medium and Low Psychopathy groups will be discussed separately below).

<u>Table 5</u>. Comparison of SRP data from the present sample as a whole with published normative data (Hare, 1985).

	Normative Sample (N=226)		Present Sample (N=65)	
Range	33-128		40-129	
M	84.0		85.2	t=0.42
M	84.0	(n.s.)	85.2	t=0.42
		(n.s.)		(n.s.)
SD	20.1		20.2	

Alcohol and Narcotics ratings (see Table 2) for the present sample as a whole fell in the moderately high range, which is not surprising considering the diagnostic breakdown of the sample, as shown in Table 1. About half the sample (49.2%) was being treated for some kind of substance abuse and another sizable chunk (30.8) for depression - of which substance abuse is frequently a concommitant (Barnes, 1979;

Kosten & Rounsaville, 1986; Rounsaville et al, 1982). Relatively few subjects were being treated for either bipolar affective disorder (manic-depression) or a disorder within the schizophrenic or schizoaffective spectrum, and only one subject was suspected of having an "organic personality disorder" of unknown etiology.

Summary: The present sample as a whole performed fairly closely to that of the respective normative samples on which the measures were standardized. An exception is the MVCFT on which the present sample performed significantly more poorly than the normative sample, and the WCST on which the present sample performed significantly better than the normative sample (despite having a significantly lower FSIQ. Performance on control neuropsychological measures was likewise within standardized normal ranges for these measures. Thus, with the exceptions noted above, the present sample as a whole performed fairly normally on the neuropsychological measures used.

Test of the Hypothesis

Following Hare (1984), an overall ANOVA was performed on WCST Categories (C), Total Errors (E) and Perseverative Errors (P) and on MVCFT Total Errors (E) and Perseverative Errors (P) with Psychopathy Rating (SRP) categorized into High, Medium and Low (H, M, L) groups. Overall, as shown in

Table 6, the Medium SRP group performed significantly better on WCST Number of Categories than the two other groups, for which there were no significant differences ($p > .05$). There was also a (nonsignificant) trend for this same group to have both fewer Errors and Perseverative Errors. Thus, in the present sample, level of psychopathy does not predict performance on either of the concept-formation measures used. As did Hare (1984) with his sample, a t-test was performed on the data for the High versus Low SRP groups (H-L) in the present sample. No significant differences emerged between the High and Low Psychopathy groups in any of the experimental measures.

Table 6. Comparison of performance on experimental measures of High, Medium and Low Psychopathy groups in the present sample and of High vs Low groups.

	H	M	L	F ratio Omnibus (2, 62)	L-H (1, 43)
WCST-C				*	
M=	5.0	5.9	5.2	3.75	0.31
SD=	1.4	0.3	1.2		
WCST-E					
M=	28.2	22.2	27.4	0.79	-0.02
SD=	18.9	12.4	18.2		
WCST-P					
M=	7.8	5.5	7.9	0.67	0.00
SD=	8.1	5.9	8.4		
MVCFT-E					
M=	10.5	9.4	11.3	0.14	0.05
SD=	11.8	8.7	5.4		
MVCFT-P					
M=	2.6	1.3	3.1	0.62	0.07
SD=	4.8	2.3	7.7		
	N=22	N=20	N=23		

* $p = .05$

Table 7. Comparison of performance on control measures of High, Medium and Low Psychopathy groups in the present sample and of High vs Low groups.

	H	M	L	F ratio Omnibus (2, 62)	F ratio L-H (1, 43)
Age					
M=	20.6	22.8	21.6	0.67	0.36
SD=	5.9	6.7	5.5		
Educ					
M=	11.0	11.5	11.7	1.59	3.42
SD=	1.0	1.4	1.3		
VIQ					
M=	97.7	101.7	103.6	1.64	3.31
SD=	10.9	11.6	10.8		
PIQ				*	*
M=	94.6	97.1	103.6	3.07	6.15
SD=	13.2	13.3	11.0		
FSIQ				a	*
M=	96.2	100.2	104.2	3.01	6.40
SD=	11.1	11.6	10.3		
BVRT-E					
M=	1.0	1.1	1.0	0.14	- 0.00
SD=	0.5	0.5	0.2		
TMT-A					
M=	30.6	27.4	29.3	0.54	- 0.17
SD=	12.2	9.3	8.2		
TMT-B				*	
M=	73.6	56.4	64.5	4.03	- 1.93
SD=	24.7	13.1	18.6		
Alc				**	**
M=	3.8	3.2	2.3	6.64	- 15.13
SD=	1.4	1.6	1.1		
Narc				**	**
M=	3.8	3.4	2.6	6.02	- 14.52
SD=	1.0	1.4	1.2		
	N=22	N=20	N=23		

* p=.05 ** p<.01 a approaches significance (p=.06)

Table 7 shows the results of an ANOVA performed on the control measures with Psychopathy Rating (SRP) categorized into High, Medium and Low groups. Significant differences among the three groups included Performance IQ, Trails B and

both Alcohol and Narcotics ratings. A t-test was performed on the data for the High vs. Low SRP groups (H-L). Significant differences were found for Performance IQ ($t=2.58$, $p=.05$) and for both Alcohol ($t=3.89$, $p<.01$) and Narcotics ($t=3.81$, $p<.01$) ratings.

Table 8 shows a comparison of the present sample's actual performance scores on the WCST with the performance scores of Hare's (1984) sample (Hare did not separately measure Total Errors). The data for Number of Categories in the present sample is quite close to that of Hare's sample. Curiously, Hare's Medium Psychopathy group achieved the lowest Categories score, while in the present sample, the Medium Psychopathy group had the highest Categories Score. This accounts for the fact that the only significant difference between the present WCST-C data and Hare's is for the Medium Psychopathy groups ($t=4.88$, $p<.01$). With regard to WCST Perseverative Errors, the present sample did significantly better than Hare's sample in High ($t=3.01$, $p<.01$), Medium ($t=5.89$, $p<.01$) and Low ($t=2.58$, $p=.05$) Psychopathy groups.

Table 8. Comparison of WCST performance of High, Medium and Low Psychopathy groups in the present sample with peformance of Hare's (1984) sample. Also included are relevant demographic and diagnostic descriptors.

	Hare			Present Sample		
	H	M	L	H	M	L
Age						
M=	30.2	30.3	34.7	20.6	22.8	21.6
SD=	8.1	7.8	9.9	5.9	6.7	5.5
FSIQ						
M=	103.4	100.8	103.6	96.2	100.2	104.2
SD=	12.2	11.1	9.4	11.1	11.6	10.3
Alc						
M=	3.1	4.1	3.2	3.8	3.2	2.3
SD=	1.0	1.0	1.2	1.4	1.6	1.1
Narc						
M=	3.2	2.8	2.5	3.8	3.4	2.6
SD=	1.4	1.4	1.5	1.0	1.4	1.2
WCST-C						
M=	4.4	3.8	5.0	5.0	5.9	5.2
SD=	1.7	1.7	1.5	1.4	0.3	1.2
WCST-E						
M=	n.a	n.a.	n.a.	28.2	22.2	27.4
SD=	n.a	n.a.	n.a.	18.9	12.4	18.2
WCST-P						
M=	17.3	19.6	13.8	7.8	5.5	7.9
SD=	9.8	8.0	5.9	8.1	5.9	8.4
	N=14	N=16	N=16	N=21	N=20	N=23

To address the question of "frontal lobe impairment" in psychopaths more directly, both WCST (Heaton, 1981) and MVCFT (Wang, 1987) data were compared with published normative data on these measures for normal controls, frontal brain damaged patients and nonfrontal brain damaged patients. Table 9 shows a comparison of the WCST data in the present sample with that of the normative data (Heaton, 1981). All three

Table 9. Comparison of High, Medium and Low Psychopathy groups in the present sample with data for normals, frontal brain damaged and nonfrontal brain damaged subjects from published normative data (Heaton, 1981).

	Heaton			Present Sample		
	Normals	Frontal	Nonfrontal	H	M	L
Age						
M=	35.9	43.1	42.0	20.6	22.8	21.6
SD=	15.3	15.3	14.3	5.9	6.7	5.5
FSIQ						
M=	114.0	95.5	101.5	96.2	100.2	104.2
SD=	11.7	16.1	15.2	11.1	11.6	10.3
WCST-C						
M=	5.4	3.1	4.3	5.0	5.9	5.2
SD=	1.3	2.3	2.2	1.4	0.3	1.2
WCST-E						
M=	24.9	54.9	37.6	28.2	22.2	27.4
SD=	19.4	29.3	27.1	18.9	12.4	18.2
WCST-P						
M=	12.6	38.5	22.6	7.8	5.5	7.9
SD=	10.2	29.6	19.2	8.1	5.9	8.4
	N=150	N=43	N=35	N=21	N=20	N=23

SRP groups in the present sample perform similarly to the normal control group of the normative sample. The High Psychopathy group performed significantly better than the frontal lobe group on WCST Total Errors ($t=4.41$, $p<.01$) and Perseverative Errors ($t=6.33$, $p<.01$), but not significantly better on Number of Categories ($t=1.24$, $p>.05$). Based on this data, there is no support for the idea that psychopaths' peformance on the WCST is equivalent to that of frontal-lesioned patients in terms of conceptual perseveration or total error score. However they may be similar in terms of overall number of categories they achieve.

A similar comparison involving MVCFT is shown in Table

10. The High Psychopathy group in the present sample performed significantly better than the normative frontal lobe group on both MVCFT Total Errors ($t=7.55$, $p<.01$) and Perseverative Errors ($t=6.02$, $p=<.01$). Thus, these results do not suggest that psychopaths are equivalent to frontal lobe patients in verbal conceptual classification.

Table 10. Comparison of High, Medium and Low Psychopathy groups' performance on MVCFT with performance of normals, frontal brain damaged and nonfrontal brain damaged groups in the published normative sample (Wang, 1987).

	Wang				Present Sample		
	Age-Nls[a]	All Nls	Front	Nfront	H	M	L
Age[b]							
M=	29.7	44.9	47.9		20.6	22.8	21.6
SD=	5.6	18.1	15.9		5.9	6.7	5.5
MVCFT-E							
M=	14.0	14.9	38.6	26.0	10.5	9.4	11.3
SD=	3.7	15.3	15.2	16.4	11.8	8.7	15.4
MVCFT-P							
M=	0.5	4.5	14.4	9.6	2.6	1.3	3.1
SD=	0.7	7.6	9.4	9.6	4.8	2.3	7.7
	N=15	N=30	N=32	N=21	N=21	N=20	N=23

a) The normal control group is divided into two subgroups by Wang (1987). This control group includes only subjects in the age range of 20-40, excluding those in the age range of 41-82, thus making it comparable in age to the sample in the present study.

b) Wang gives age data only for the brain damaged group (frontal + nonfrontal) as a whole, i.e. brain-damaged groups are not subgrouped according to age.

A chi-square analysis was performed to determine the frequency of DSM-III, Axis I diagnosis among the High, Medium and Low Psychopathy groups. No significant pattern of

distribution was found between SRP Psychopathy rating and DSM-III, Axis I diagnosis ($p>.05$). There was a trend for High Psychopathy to be associated with DSM-III Substance Abuse diagnoses and for Low Psychopathy to be associated with Bipolar Affective Disorder. Also, Schizophrenia-Spectrum diagnoses tended to be associated with Low Psychopathy, but the number of such subjects in the present sample was too small to base any conclusions on. Finally, the one suspected "organic" subject fell in the Medium Psychopathy group.

Summary: The hypothesis of the present study that psychopathy as measured by SRP rating would be associated with impaired performance on MVCFT-P but not WCST-P was not confirmed. Similar to Hare (1984), level of psychopathy was not related to performance on either measure; in fact, all three Psychopathy groups performed equally intactly on WCST-E, WCST-P, MVCFT-E and MVCFT-P. The only significant finding was better performance of the Medium Psychopathy group in the present sample on WCST-C. This is the opposite pattern for Hare's sample, whose Medium Psychopathy group did worse on WCST-C. Also, the present sample performed significantly better than Hare's sample in all three Psychopathy groups on WCST-P.

Comparison of WCST and MVCFT to their normative data for frontal lobe groups shows that the performance of the High

Psychopaths in the present sample was significantly better than that of frontal lobe patients, gainsaying the idea that psychopaths and frontal lobe patients share a common neurocognitive deficit, or at least one that is equivalent in degree.

Post Hoc Analyses

Intercorrelation Among Measures

It is legitimate to ask whether the findings reported in the previous section are due to any particular patterns of intercorrelations among the measures used. In addition, the present section provides the first analysis in the literature of the interrelationship of the WCST to the MVCFT, as well as the relationship of both of these measures to several widely used neuropsychological and cognitive tests. This data will be of use to researchers and clinicians doing further work in the field of psychiatric neuropsychology. The significance and implications of these findings will be expanded upon in the Discussion section; they are simply presented as Results in the present section.

Table 11 shows the intercorrelations among the experimental measures used in the present study for the sample as a whole. Highly significant correlations occur between subtests of the same measures, for example, between WCST-C and WCST-E r=-.85), WCST-C and WCST-P (r=-.74), WCST-E

and WCST-P (r=.88) and between MVCFT-E and MVCFT-P (.87).

Table 11. Intercorrelations of experimental measures used in the present study.

	WCST-C	WCST-E	WCST-P	MVCFT-E	MVCFT-P
WCST-C	1.00	-.85**	-.74**	-.23*	-.15
WCST-E	-.85**	1.00	.88**	.27**	.19*
WCST-P	-.74**	.88**	1.00	.35**	.30**
MVCFT-E	-.23*	.27**	.35**	1.00	.87**
MVCFT-P	-.15	.19*	.30**	.87**	1.00
SRP	-.03	-.02	-.08	-.14	-.13

* p=.05 ** p=.01

Lower, but still significant correlations are found between the error measures of the two conceptual classification tests, i.e. between WCST-E and MVCFT-E (r=.27) and between WCST-P and MVCFT-P (r=.30), suggesting that these two measures are tapping some of the same task demand components, but not others. Table 11 also confirms the very low, nonsignificant correlations between Psychopathy rating (SRP) and the five conceptual classification measures used in the present study.

Table 12 shows the intercorrelation of the experimental measures with the control measures. The data from the previous two tables are also presented in list form in Table 13 to eliminate redundancy. Education is seen to correlate

significantly with MVCFT-E (r=-.25) and MVCFT-P (r=-.28), but not with any of the WCST scores. SRP is correlated with none of the conceptual classification measures, but does correlate with PIQ (r=-.26), and with both Alc (r=.40) and Narc (r=.42) ratings, confirming the reports in the literature of an association of psychopathy or antisocial personality with substance abuse (see Discussion).

Table 12. Intercorrelation of experimental measures with control measures used in the present study.

	WCST-C	WCST-E	WCST-P	MVCFT-E	MVCFT-P	SRP
Age	-.00	-.11	-.00	-.16	-.18	-.04
Educ	-.11	-.09	-.03	-.25 *	-.28 *	-.13
VIQ	.29 *	-.34 **	-.30 *	-.33 **	-.37 **	-.14
PIQ	.05	-.21	-.23	-.34 **	-.34 **	-.26 *
FSIQ	.21	-.31 *	-.28 *	-.40 **	-.42 **	-.23
BVRT-E	-.11	.22	.33 **	.12	.09	-.04
TMT-A	-.05	.10	.24	.12	.12	.04
TMT-B	-.25 *	.26 *	.30 *	.37 **	.36 **	.11
Alc	-.13	.13	.17	.16	.02	.40 **
Narc	-.02	.01	.09	.09	.09	.42 **

* p=.05 ** p=.01

VIQ is correlated with all five of the conceptual classification measures, including WCST-C (r=.29), WCST-E (r=-.34), WCST-P (r=-.30), MVCFT-E (r=-.33) and MVCFT-P (r=-.37), while PIQ is significantly correlated only with MVCFT-E

(r=-.34) and MVCFT-P (r=-.37) and not with any of the three WCST measures. TMT-B also correlates significantly with all of the conceptual classification measures, including WCST-C (r=-.25), WCST-E (r=.26), WCST-P (r=.30), MVCFT-E (r=.37) and MVCFT-P (r=.36), while TMT-A and BVRT-E correlate only with WCST-P (r=.24 and .33, respectively).

Table 13. Summary list of significant intercorrelations of experimental measures used in the present study.

WCST-C	WCST-E	WCST-P	MVCFT-E	MVCFT-P	SRP
VIQ	VIQ	VIQ	Educ	Educ	PIQ
TMT-B	FSIQ	FSIQ	VIQ	VIQ	Alc
	TMT-B	BVRT-E	PIQ	PIQ	Narc
		MVCFT-E	FSIQ	FSIQ	
		MVCFT-P	TMT-B	TMT-B	
			WCST-E	WCST-P	
			WCST-P		

Tables 14a and 14b show the intercorrelations among the control measures used in the present study. Age and education are significantly correlated in this sample (r=.67), largely on chronological grounds: since the age range began at 16, older subjects have had time to complete more years of education. Interestingly, neither age nor education is related to any of the IQ measures. The intercorrelations among IQ measures approximates that obtained in the original WAIS-R standardization sample (Wechsler, 1981): VIQ-PIQ, r=.51 (present sample) versus.71 (Wechsler); VIQ-FSIQ, r=.84 (present sample) versus .94

(Wechsler); PIQ-FSIQ, r=.83 (present sample) versus .90 (Wechsler).

Table 14a. Intercorrelation of control measures used in the present sample.

	Age	Educ	VIQ	PIQ	FSIQ
Age	1.00	.67**	-.06	-.02	.10
Educ	.67**	1.00	.20	.14	.13
VIQ	-.06	.20	1.00	.51**	.84**
PIQ	-.02	.14	.51**	1.00	.83**
FSIQ	-.10	.13	.84**	.83**	1.00
BVRT-E	.11	.11	.01	-.10	-.07
TMT-A	.05	-.01	-.19	-.29*	-.25*
TMT-B	-.03	-.16	-.30*	-.52**	-.46**
Alc	.02	-.09	-.17	-.16	-.15
Narc	.14	.16	-.07	-.02	-.26*

* p=.05 ** p=.01

TMT-A correlates with PIQ (r=-.29), FSIQ (r=-.25) and BVRT-E (r=.28), as well as with TMT-B (r=.48), but not with VIQ. TMT-B correlates with VIQ (r=-.30), PIQ (r=-.52) and FSIQ (r=-.46), as well as with TMT-A (r=.48), but not with BVRT-E. Alc correlates significantly with Narc (r=.59) and just fails to reach significance with BVRT-E (r=.24). Narc correlates with Alc (r=.59) and also with FSIQ (r=-.26), but not with BVRT-E. These findings have implications for the role of substance-induced deficit versus premorbid deficit in

alcoholism and addiction that will be elaborated upon in the Discussion.

Table 14b. Intercorrelation of control measures used in the present study (continued).

	BVRT-E	TMT-A	TMT-B	Alc	Narc
Age	.11	.05	-.03	.02	.20
Educ	.11	-.01	-.16 *	-.09	-.04
VIQ	.01	-.19 *	-.30 **	-.17	-.22
PIQ	-.10 **	-.29 *	-.52 **	-.16	-.20 *
FSIQ	-.67	-.25 *	-.46	-.15 *	-.26
BVRT-E	1.00 *	.28	.12 *	.24	.16
TMT-A	-.28	1.00 *	.48	.12	.17
TMT-B	.12 *	.48	1.00	.22	.11 **
Alc	.24	.12	.22	1.00 **	.59
Narc	.16	.17	.02	.59	1.00

* p=.05 ** p=.01

Factor Analysis

A Principal Components Factor Analysis (Varimax Rotation) was performed to determine the factor structure underlying all the variables. Six factors were derived (see Table 15).

Table 15. Results of factor analysis of the variables in the present study.

FACTORS					
1	2	3	4	5	6
Age (.91)	VIQ (.79)	WCST-C (-.93)	MVCFT-E (.86)	BVRT-E (.55)	SRP (.64)
Educ (.87)	PIQ (.79)	WCST-E (.94)	MVCFT-P (.88)	TMT-A (.86)	Alc (.80)
	FSIQ (.92)	WCST-P (.88)		TMT-B (.60)	Narc (.79)

Factor 1 can be termed the Demographic factor and loads heavily on age and education. This is not surprising, given the chronlogical relationship between these two variables in the present sample.

Factor 2 comprises an IQ factor formed by VIQ, PIQ and FSIQ. Again, this is not unexpected given the interrelationship among these three IQ measures in both the present sample and the original WAIS=R standardization sample.

Factor 3 can be called a General Conceptual Classification factor which is comprised by the three WCST measures.

Factor 4 can be called a Verbal Conceptual Classification factor with loadings on the two MVCFT scales. The nonoverlap of measures in factors 3 and 4 suggests that the two measures are pulling for different cogntive task demands.

Factor 5 might be termed a General Neuropsychological Performance factor, inasmuch as it is comprised by the three neuropsychological control measures. Apparently, these measures all tap important aspects of general neurocognitive functioning that are not the same as those assessed by the experimental measures.

Finally, factor 6 is a Diagnosis factor and consists of SRP, Alc and Narc. It could almost be called an "Antisociality" factor, since the findings confirm numerous reports in the literature concerning the relationship of psychopathy/antisocial personality to alcohol and drug abuse (see Discussion).

Regression Analyses

To determine how much of the variance of each of the five experimental measures can be accounted for by the other variables in this study, a series of regression analyses were run for each experiemental measure.

For WCST-C, R^2 =.50). The variables that contribute significantly (p=.05 or below) to the explained variance are unipolar affective disorder diagnosis (T=-2.47), schizophrenia spectrum diagnosis (T=-3.62), education (T=-2.33) and performance on Trails B (T=-2.18).

For WCST-E, R^2 =.43. The variables that contribute significantly to the explained variance are schizophrenia

spectrum diagnosis (T=2.55) and performance on the BVRT (T=2.29).

For WCST-P, R^2 =.44. The variables that contribute significantly to the explained variance are schizophrenia spectrum diagnosis (T=2.12) and performance on the BVRT (T=2.59).

For MVCFT-E, R^2 =.42. None of the variables contribute significantly to the explained variance on this measure.

For MVCFT-E, R^2 =.46. The only variable that contributes significantly to the explained variance is SRP (T=-2.03).

Effect of IQ

Table 16. Relationship of experimental measures used in the present study to IQ cohorts. H = >110, M = 90-110, L = <90.

	Kruskal-Wallace 1-way ANOVA[a]	Mann-Whitney U		
	χ^2 H, M, L	U H-L	U M-L	U H-M
	**	**	*	
WE by VIQ	12.03	17.5	109.0	178.5
WE by PIQ	3.12	91.5	194.0	219.0
	**	**	*	
WP by VIQ	10.16	18.0	124.5	187.0
WP by PIQ	4.09	85.5	183.0	226.0
	*	**	**	
VE by VIQ	9.14	29.5	96.0	238.0
VE by PIQ	2.22	93.5	255.5	182.0
	**	**	**	
VP by VIQ	15.09	15.0	64.5	223.5
VP by PIQ	2.41	102.5	271.5	187.5

* p=.05 ** p=.01

[a] Nonparametric tests used because of unequal N sizes.

Given the effect of IQ noted in the previous analyses, this variable was assessed systematically for the sample as a whole with respect to the experimental measures. The data yielded by these analyses can also contribute to the normative data base for these measures.

VIQ and PIQ were divided into three cohorts of high IQ (H =)110, encompassing the high average and superior ranges of the Wechsler system), medium IQ (M = 90-110, encompassing the average range of the Wechsler system) and low IQ (L = (90, encompassing the low average and borderline ranges of the Wechsler system). Differences between the three groups were analyzed by a Kruskal-Wallis 1-way ANOVA. Differences between groups H - L, M - L and H - M were analyzed by a Mann-Whitney U test.

Table 16 shows the results of these analyses. In all cases, differences between IQ groups M and H are nonsisgnificant. This indicates that the effect of IQ on the performance of these conceptual classification tasks is only seen at the average ranges or below.

Within the M versus L category, VIQ has a significant effect on performance of all the measures while PIQ does not. This suggests that performance on all of these conceptual classification tasks is affected by verbal cognitive-intellectual capacity, while nonverbal cognitive-intellectual skills have little influence. While the effect is

significant for both conceptual classification measures, it is noteworthy that a higher level of significance is seen for the MVCFT. Thus, even though not a difficult enough test to challenge those subjects at the upper ranges of intellectual ability, it is nevertheless a more verbal-related measure than the WCST.

DISCUSSION

Psychopathy, Concept Formation and the Question of Frontal Lobe Impairment

The results of this study failed to support the idea that subjects high in psychopathy suffer differential impairment in verbal-conceptual functioning versus general-conceptual functioning. The hypothesis that MVCFT Perseverative Errors would show a relationship with SRP, while WCST Perseverative Errors would not, was not confirmed. In fact, the only significant finding was that the Medium Psychopathy group achieved a somewhat higher number of WCST Categories. Otherwise, there were no differences between the three Psychopathy levels, or even between the High and Low Psychopathy groups. Thus, despite a wide range in level of psychopathy for the sample as a whole, and despite a similarly wide range of performance on all five experimental measures, no relationship appears to exist between these two dimensions, specifically.

This sample contained some individuals who were extremely low in psychopathy (as assessed by the SRP) and others who were extremely high in psychopathy; the sample also contained certain individuals who performed superlatively on the experimental conceptual classification measures, as well as those who perfromed extremely poorly. Yet, knowing how psychopathic an individual was gave no clue

as to his level of performance on any of these measures of conceptual classification.

With regard to the control measures, a relationship does exist between psychopathy rating and ratings for both alcohol and narcotics. This is consistent with the literature on this subject that shows a relationship between antisociality and substance abuse (Cadoret et al, 1985, 1987; Craig, 1982; Croughan et al, 1982; Koenigsberg et al, 1985; Lewis et al, 1983; Nurco et al, 1985, 1986; Stabenau, 1984; Williams & Singh, 1987).

Rather unexpected is the finding of a relationship between higher psychopathy and poorer PIQ, which seems to fly in the face of previous research reporting selective VIQ impairment in antisocial populations (Eaker, 1983; Graham & Kamano, 1958; Heilbrun, 1979, 1982; Holland, 1981; Prentice & Kelly, 1983; Shulman, 1951; Wiens et al, 1959). However, if we consider that the task demands of many of the Wechsler Performance scales include a good deal of novel, integrative cognitive-intellectual activity, then selective impairment on these measures might reinforce the general "integrative deficit" pattern found in many of the past studies. In addition, many of those prior studies used subject groups from lower socioeconomic strata than the present sample and hence those subjects generally attained lower levels of education. Thus, the higher level of educational exposure in

the present sample could compensate for or "mask" the expected deficit in verbal-intellectual skills found in previous studies.

In comparing the results of Hare's (1984) sample to the present one on WCST performance (Table 8), the present sample did significantly better than Hare's on Perseverative Errors in all three psychopathy-level groups; otherwise the results for the two samples were essentially comparable. The high level of neurocognitive functioning of the present sample is thus impressive and will be commented upon further below.

Do psychopaths show frontal lobe impairment? Not according to a comparison of the present sample with Heaton's (1981) normative frontal lobe sample (see Table 9). The present subjects, at all levels of psychopathy, including High Psychopathy, performed better on WCST Total Errors and Perseverative Errors than Heaton's frontal lobe cases. Similar results were found for the MVCFT: performance of the present sample, including High Psychopaths, was equivalent to Wang's (1987) normal subjects (except that the present sample made more Perseverative Errors) and better than Wang's frontal lobe cases.

Level of psychopathy, as measured by the SRP did not predict performance on any of the experimental conceptual classification measures. These results replicate Hare (1984) for the WCST and extend the findings to include a new test,

the MVCFT. One possible explanation for some of the discrepancies between the present study and studies which have found impaired conceptual classification on "frontal lobe" tests, is that those studies may have have been dealing with a non-Cleckleyian type of antisocial population whose members may have included individuals with neuropsychological impairment and antisocial behavior, but who are not psychopaths in the "true" sense as defined by Cleckley (1982) and Hare (1984). This, of course, was Hare's original argument about studies of this type.

The Sample as a Whole: Neuropsychological Characterization of a Psychiatric/Substance Abuse Population

One of the most striking findings of the present study is the sheer "normality" of the sample as a whole on most of the neuropsychological measures used (see Table 2). The subjects used in the present study were all drawn from the patient population of a private psychiatric and substance abuse treatment facility and may thus reflect the higher socioeconomic demographics of the catchment community as a whole. Many of the measures used in neuropsychology, and later adapted for psychiatric groups (including the control measures used in the present study), have been normed and standardized on VA or state hospital populations. These generally come from a different societal stratum than the

population used in the present study, which tends to be more intelligent and better educated than patients in public facilities. Thus, the present sample may show better overall cognitive functioning than the general population from which neuropsychological standardization samples are typically drawn.

What is more surprising is the performance of the present sample on the WCST as compared to the normative group for this version of the test. Despite having a mean IQ significantly lower (albeit in the average range) than the normal sample on which the test was standardized (Heaton, 1981), the present sample did as well on Number of Categories and Total Errors, and better on Perseverative Errors (see Table 3). There is no indication that subject variables in Heaton's normal group that are typically associated with poor performance on neuropsychological tests might account for the differences. Indeed, he states that "the normals were paid volunteers who had no history of neurological illness, significant head trauma or substance abuse" (Heaton, 1981, p. 31). The only other significant difference between Heaton's (1981) sample and the present one is that the present subjects were younger. However, the mean age of both subject groups was sufficiently lower than that at which age by itself is typically reported to affect neuropsychological performance (Botwinick, 1981; Heaton et al, 1986). Also,

although the present subjects were not paid for their participation, there was every indication that they were motivated to do well on the test; indeed, many of the patients remarked that the WCST was the most "fun" of all the measures, although a few clearly disliked the task (as mentioned above, subjects whose cooperation was not judged to be adequate were excluded from the sample).

With regard to the MVCFT (Table 4), comparisons between the normative sample (Wang, 1987) and the present one are limited by the unequal sample sizes. Still, it appears that - in contrast to their WCST performance - the present sample does significantly worse on MVCFT Perseverative Errors than the normative sample. These results suggest that this sample as a whole is more impaired on the verbal conceptual variable than on the general conceptual variable.

An unexpected but intriguing finding is that this psychiatric/substance abuse group of patients makes significantly more perseverative errors than the respective normative groups on the verbal-conceptual measure (MVCFT) and fewer perseverative errors on the general conceptual measure (WCST). This finding is unrelated to the psychopathy variable, but occurs as a feature of the sample as a whole.

The factor analysis suggests that the WCST and the MVCFT are measuring two separate aspects of conceptual classification ability. Moreover, both of these dimensions

are independent of any general "neuropsychological performance" factor. And none overlap significantly with the Alcohol-Narcotics-Psychopathy factor. Thus, in this sample, some subjects have difficulty in verbal conceptual classification, some have trouble with general conceptual classification, some show generalized neuropsychological impairment and some are substance-abusing psychopaths - but none of these are necessarily the same subjects.

There does seem to be some association between a diagnosis in the schizophrenia range and impaired WCST performance, confirming the relationship previously reported in the literature (Fey, 1951; Goldberg et al, 1987; Kolb & Whishaw, 1983; Malmo, 1974; Stuss et al, 1983; Weinberger et al, 1986). Curiously, this relationship does not seem to hold for the MVCFT, despite early reports of the clinical utility of this test to study conceptual ability in schizophrenics (Kasanin & Hanfmann, 1938; Vygotsky, 1934). Perhaps Wang's present version of the test is not as sensitive to schizophrenic deficits in cognition as the earlier versions. At any rate the number of schizophrenia spectrum diagnoses (5) is too small to base any conclusions on. In addition, effort was made to exclude subjects with frank schizophrenia from the sample; the cognitive difficulties of schizophrenic versus "schizophrenia spectrum" patients may not be equivalent. More research with the MVCFT

in different clinical groups is clearly called for.

Intelligence, Cognitive Competence and Neuropsychological Performance

A number of researchers and clinicians have pointed out the importance of controlling for IQ in interpreting the neuropsychological assessment (e.g. see Lezak, 1983); indeed, some tests explicitly control for this variable in their scoring and interpretation protocols (e.g. the BVRT does this). To examine the effect of verbal and nonverbal intellectual functioning on conceptual classification, the VIQ and PIQ data in this study were divided into three IQ cohorts of High (110+), Medium (90-109) and Low (<90). These correspond to the Superior-Very Superior, Average and Low Average-Borderline ranges in the Wechsler system, respectively. The effect of VIQs and PIQs in these ranges was then examined with respect to Error rate and Perseverative Error rate for both the WCST and MVCFT.

Two findings emerge from this data. The first is that the effect of IQ is seen only at the average ranges or below. Apparently, being of at least average intelligence is enough to ensure optimal performance on these conceptual classification measures, all other things being equal. Being of better-than-average intelligence does little to improve performance. This also implies that the measures used in the present study may simply not have been sufficiently

challenging to tax those individuals with above-average IQs. This "ceiling effect" may account for the overall "intactness" of the present sample. Indeed, one suspects that a mean MVCFT Perseverative Error rate of .53 ("half an error") for normal controls is kind of low for a measure that purports to usefully assess ability at all ranges.

A ceiling effect is unlikely to fully account for these results, however, because clinical experience in individual assessments has shown that even subjects with Superior intelligence occasionally bomb on either the WCST of MVCFT or both, despite adequate or even excellent performance on other measures. Clearly, there is still much to be learned about these measures and the component cognitive functions they tap.

The second finding is that within the low-to-medium ranges, VIQ is significantly correlated with conceptual classification ability, while PIQ does not. Even though the effects are significant for both the WCST and the MVCFT, they are more significant for the latter. Thus, within the modest ranges of IQ where the WCST and MVCFT seem to have the most discriminative power, there does seem to be an association between verbal ability and conceptual classification.

With regard to psychopathy itself, it is useful to point out that the overall level of psychopathy (SRP) for the present sample as a whole is virtually identical to that of

Hare's (1985) normative study on the SRP. This is the case for mean, standard deviation and range of scores (see Table 5). In addition, the ratings for alcohol and narcotics use between the two populations are equivalent. Although more research is certainly called for, what this suggests is that, in terms of antisocial behavior and substance abuse, the same kinds of people are finding themselves in medium security prisons in Canada and in private psychiatric/substance abuse hospitals in America.

The above observations may help to explain the discrepancy between Gorenstein's (1982) and Hare's (1984) results on the WCST. If, indeed, the population demographics of Canadian medium security prisons approximate that of American private psychiatric/substance abuse hospitals, then Hare's sample and the present one are roughly comparable, demographically. Both of these, on the other hand, may be superior socioeconomically to Gorenstein's subjects who were drawn from two inner-city public hospitals in Indianapolis and Detroit. Inasmuch as low IQ, especially low Verbal IQ, is associated with conceptual classification deficits, including WCST Perseverative Errors, then it is possible that the performance parameter attributed to frontal lobe impairment in Gorenstein's (1982) psychopathic subjects may simply have reflected the lower general "cognitive competence" associated with lower IQ, especially Verbal IQ.

Indeed, both Hare (1984) and the present study criticized Gorenstein for not controlling for IQ.

Quite recently, Sutker & Allain (1987) administered the WCST (Milner protocol), as well as the Visual Verbal Test and Porteus Mazes, to 19 psychopathic and 15 normal inpatients (diagnosed by multiple criteria) at a VA Alcohol and Drug Abuse Treatment Program, a population demographically similar to that of Gorenstein (1982). However, Sutker & Allain made a point of explicitly controlling for IQ by means of the WAIS-R. The study was intended to correct the lack of IQ control in Gorenstein's study and to test the hypothesis that psychopaths are characterized by no greater difficulties in controlling impulsiveness, planning ahead and exercising flexibility (such as accomplishing shifts and avoiding perseverations) than are nonpsychopathic controls selected from the same population. The results of Sutker & Allain's (1987) study contrasted with those of Gorenstein (1982). Psychopathic subjects did not differ from controls across the cognitive measures thought to reflect frontal lobe functioning - specifically, planning, flexibility, attention, control and abstraction - and including performance on the WCST. One of the important features in Sutker & Allain's study that make it especially relevant to the findings of the present dissertation is the attention paid to the role of intelligence in modulating performance on tasks thought to

assess frontal lobe functioning. Similar to the findings in the present study, Sutker & Allain's analysis revealed significant effects of intelligence, regardless of group assignment (psychopath or not), especially influencing numbers of perseverative and nonperseverative WCST errors, Porteus Maze performance and shifting on the Visual Verbal Test. Unfortunately, the actual IQ ranges are not presented in their report, so it is impossible to judge if the same low-average-high IQ relationships obtained in that study as in the present one. Also, they fail to provide separate VIQ and PIQ data, so the relationship between these varibles and WCST performance cannot be evaluated, as in the present study.

In one of the original studies with a 60-card prototype of the WCST (which used five correct reinforcements per sorting category), Berg (1948) studied a group of male and female college students. Their performance was found to cluster into three groups. Group A achieved a high number of sorting categories, using only the correct classification principles of color, form and number. They quickly caught on to when a shift occurred and were able to report the occurrance of the shifts. They then tested the two remaining classification possibilities systematically and showed little tendency to perseverate. Group B also achieved a high number of categories, but had only a vague idea of when shifts

occurred. They seemed confused that what was a correct sorting response on one trial would be wrong on another. They could not verbalize what they were doing or what they thought the experimenter was doing, and they frequently tried irrelevant classification principles. They showed a strong tendency to perseverate. Group C achieved few categories and had no idea when category shifts occurred. They tended to alternate between extreme variation and extreme perseveration. Instead of discarding false hypotheses after continued negative reinforcement, they persisted in their perseveratory behavior.

This early study demonstrated that a significant portion of presumably normal, even bright, subjects - college students - can have profound difficulty with conceptual classification tasks like the WCST. Since it's unlikely that a substantial number of college students in the 1940s had significant frontal lobe damage, individual factors of personality and cognitive style must be considered in accounting for these findings. These individual differences would have nothing to do with acquired "brain damage" in the usual sense, but could conceivably be related to variations in the neurodevelopmental aspects of cognitive and personality functioning - as could very well be the case for many types of "personality disorders" or psychopathological syndromes. In this regard, it would have been of great

interest to see which of the three groups of Berg's students actually completed their college educations, and with what level of academic excellence, but research like this is certainly potentially replicable today. Such research would involve incorporating neuropsychological measures into the kind of longitudinal life-span research now being carried out by Vaillant (1977, 1983) and others.

The main point for the present study is that wide variations in neuropsychological test performance may be normal for large segments of the general population, including the present psychiatric/substance abuse group. Indeed, clinical observations of individual patients being tested with the WCST in the course of the present study, are similar to Berg's (1948) observations as to her three classes of college student subjects. Some of the patients in the present sample mastered the test with ease; others were initially confused, but were finally able to arrive at a workable solution strategy that enabled them to successfully complete the test; still others just couldn't "get it" and made many errors, achieved only a few categories and often tried inappropriate and/or idiosyncratic sorting strategies.

Again, these observations further highlight the need for more research on the different subject variables that contribute to peformance on "neuropsychological tests." The prerequisite task, of course, is to specify and more clearly

delineate the cognitive construct variables we believe to underlie these tests. Kiernan (1981) has advocated the active development of process models in neuropsychology, which involves an analysis of the task demands inherent in different tests of cognitive functioning. It also involves an examination of the various and complex problem solving modalities that individuals use to negotiate the demands of what may appear superficially to be simple or unidimensional tasks (for example, see Ben-Yishay et al, 1970; Bond & Bechtel, 1984; Grant & Berg, 1948; Hadano, 1984; Schorr et al, 1982). This is the approach that guided the present study. The results suggest that future research efforts continue to take into account the variables found to affect cognitive performance on the "neuropsychologial measures" we so commonly employ in neuropsychology in general and psychiatric neuropsychology in particular.

Further Comments on Antisocial Behavior, Inner Speech and Self-Regulation

It may be asked at this point: Does the failure to confirm the original hypothesis of this dissertation necessarily invalidate the overall model which informs it? From the discussion above, it should be clear that the model is based on converging lines of evidence, each of which has substantial theoretical, clinical and/or empirical support.

The failure to confirm any one particularization of that model, therefore, suggests what refinements might be applied to the present measures and techniques in future studies of this type. Indeed, the preponderance of the evidence serves to corroborate the thesis of this dissertation that impulsive, antisocial behavior is related to an inability to use inner speech to self-reflectively regulate behavior. The following examples illustrate this, and also point to the directions in which future research of the type begun in this dissertation might productively follow.

The role of verbal mediation in guiding problem solving has been emphasized by Jensen (1966) and Meichenbaum (1975). They point out that, although the activity may become overt in dealing with difficult problems, the process is usually automatic and in most circumstances takes place subvocally, below the level of awareness. Jensen (1966) has suggested that the use of verbal mediation in problem solving is a major influence on educability and learning. Verbal mediation has also been implicated as a key element in developing self-control (Meichenbaum, 1975; White, 1965, 1970).

Camp (1977) compared aggressive and normal 6 to 8-year old boys on measures of verbal ability, self-guiding speech, nonverbal intelligence, reading achievement, impulsivity, ability to inhibit responses and response modulation

following overt and covert commands. Aggressive boys were found to have significantly poorer vocabularies, immature and irrelevant private speech, faster reaction times, more inhibition errors and altered speed of responding during covert commands for slowing. The results were consistent with the formulation that young aggressive boys fail to use verbal mediation in circumstances where such mediation would be appropriate and that, when it does occur, covert mediational activity may fail to achieve functional control over behavior. On the basis of these findings, Camp hypothesized that both learning and behavior problems in aggressive boys may be symptomatic of an ineffective linguistic control system.

In conceptualizing these results, Camp (1977) refers to the Vygotsky-Luria idea of a discrepancy in response to overt and covert commands as a stage in the development of verbal control over behavior. Also, Staub (1971) has suggested that insufficient ego development may help account for the impulsivity, inability to delay gratification and poor behavioral control often observed in aggressive and antisocial individuals. White (1965), noting the parallel between Vygotsky's concept regarding the internalization of speech and the Freudian concept regarding internalization of parental sanctions, suggests that both may involve similar mechanisms - a point that also appears in Joseph's (1982)

neuropsychodynamic account, discussed earlier. More broadly, Camp (1977) suggests that the difficulty in maintaining response inhibition in dealing with such impersonal cognitive tasks as observed in that study and difficulty in more general aspects of interpersonal situations could both be symptomatic of an ineffective linguistic control system.

Thus, one way of further exploring the implications of the results of this dissertation would be to examine the developmental aspects of performance on the MVCFT, similar to the way this has recently been done for the WCST by Chelune & Baer (1986). These investigators found that by the time normal children are 10 years old, their performance on the WCST is indistinguishable from that of normal adults. Further, examination of performance in terms of Categories and Perseverative Errors suggests developmental changes that roughly correspond with cognitive stages of development and neuroanatomical changes in the brain. Does the same hold true for this new version of the "Vygotsky test"?

The issue of effective or responsible self-control also has implications for general theories of morality and social deviance. Blasi (1980) reports that delinquents tend to use developmentally lower modes of moral reasoning than do matched controls. Highlighting the verbal dimension, reading comprehension and spelling disturbances have been shown to be associated with a tendency to harbor irrational beliefs

(Prola, 1984, 1985). This connection between verbal ability, rationality and morality is an important one, both on epistemological and social justice grounds. From a cognitive-developmental perspective (Arbuthnot & Gordon, 1986; Kohlberg, 1969, 1981; Piaget, 1965), an individual's sociomoral worldview is a function of his or her logical reasoning abilities, social perspective-taking abilities and tendency to weigh the consequences of moral decisions across both situations and time. In recent reviews (Arbuthnot & Gordon, 1986; Blasi, 1980; Jurkovic, 1980; Jennings et al, 1983), considerable consistency has been demonstrated between cognitive-developmental moral reasoning stages and a variety of moral/amoral behaviors, including delinquency - particularly the kind of impulsive, repetitive and chronic delinquency typically associated with a stable psychopathic or antisocial personality.

For example, using Quay's (1965) typology, Jurkovic & Prentice (1977) compared three equal groups of adolescent delinquents, classed as psychopathic delinquent, neurotic delinquent and subcultural delinquent (cf. Heilbrun's, 1982, classification, described earlier in the Literature Review section) with a matched nondelinquent control group and individually administered a set of cognitive, moral reasoning and role-taking tasks. Psychopathic delinquents were found to be more immature in level of moral development than all

other groups, which did not differ from one another. Psychopathic delinquents were more concrete in their thinking on cognitive tasks and were deficient in role-taking.

These results were interpreted as supporting the idea that the impulsive, psychopathic delinquent is especially limited in his understanding of the moral basis of social behavior and in his capacity to assume the role of others. Importantly, these findings, as do Heilbrun's (1982), provide evidence against viewing "delinquency" or "antisociality" as a unitary syndrome of deviance. Apparently, individuals can commit a wide variety of antisocial behaviors for a number of different reasons. However, there may nevertheless be a subgroup of impulsive, psychopathic deliquents who suffer a relatively stable deficiency in self-control. And it is this subgroup that may be the one that is repeatedly identified by impaired neuropsychological performance in the studies reviewed earlier. A dearth of such individuals in the present dissertation's sample, then, may have been a factor in this group's overall neuropsychological intactness. More broadly, cognitive measures like the WCST and MVCFT might be further refined and extended in such a way as to help delineate such subgroups of antisociality, even as they are being applied to the subcomponential analysis of cognition and personality in general.

This is of more than just academic interest. The

nonhomogeneity of antisocial subjects may also help explain the results of studies seeking to modify the moral worldview - and thereby the social behavior - of such individuals. Noting the consistency with which delinquents have been shown to function at lower stages of moral reasoning, Arbuthnot & Gordon (1986) hypothesized that adolescents at risk for delinquency would benefit both cognitively and behaviorally from an intervention designed to accelerate moral reasoning development. Subsequent to participation in a cognitively based moral reasoning development program, adolescents identified by teachers as aggressive and/or disruptive demonstrated an advance in moral reasoning stage, as well as improvement on several behavioral indices, including behavior referrals, tardiness, academic performance and police and court contacts. For a subgroup of subjects, one-year followup data showed significant effects for moral reasoning, behavior referrals, academic performance, teacher ratings and absenteeism.

It would be instructive to carry out replications of this study that incorporated measures of neuropsychological status and verbal-conceptual ability. That is, do certain interventions work for all delinquents, or only for those who do not already possess the more repetitively antisocial, nonself-relflective, verbally deficient and neuropsychologically impaired profiles? Similar questions

are beginning to be asked in alcohol and substance abuse treatment settings (McLellan, 1986; Parsons, 1987; Rounsaville & Kleber, 1986), but the field is still virtually wide open with respect to the application of neurocognitive measures - and especially the nonnarrowly localizationistic models that should inform such measures - to the evaluation and prediction of treatment response. This is clearly a fruitful area for further application of this research.

Scanning the literature on psychopathy with a somewhat broader beam, it appears that some types of antisocial behavior may be related to a more general problem with impulse control, and that this impulse control problem may manifest itself in a variety of behavioral disorders. Here, too, neurocognitive variables are important and neurocognitive measures can make a contribution in assessment and treatment. For example, Messer (1976) and Messer & Schacht (1986) have hypothesized a dimensional construct of personality which they call reflection-impulsivity. This expresses itself as the tendency to reflect on the validity of problem solving under conditions where several possible alterations are available and there is some uncertainty as to which is the most appropriate. Based on their studies with children, the authors have described several key features of individuals at the two extreme poles of the reflection-impulsivity continuum that are relevant to the main

theoretical orientation of the present dissertation.

In their use of speech, reflectives are more mature than impulsives. For example, Meichenbaum & Goodman (1969) found that reflective children verbalize more and use more mature, self-guiding private speech in comparison to impulsives, who verbalize less overall and display more immature, egocentric speech. While performing a motor task, reflective children show more verbal control over their behavior in the form of covert speech, using words as cues to guide appropriate responding. Impulsive children, by contrast, use words metronomically, that is, to simply "mark time" with respect to their responses. Reflectives possess more internal locus of control (Shipe, 1971), while impulsives appear to more passively accept the inevitability and uncontrollability of threatening or frustrating events (Campbell & Douglas, 1972). Correspondingly, reflectives are less field-dependent than impulsives (Campbell & Douglas, 1972; Keogh & Donlon, 1972; Massari, 1975; Massari & Massari, 1973; Mumbauer & Miller, 1970; Neimark, 1975; Schleifer & Douglas, 1973) and make moral judgements on the basis of intentions rather than consequences, indicating a more advanced stage of moral judgement (Schleifer & Douglas, 1973).

If some forms of antisocial behavior are expressions of an underlying dimension of impulsivity, might this same dimension also underlie certain types of prosocial behavior

disorder? And might these not also be related to the neurocognitive dynamics hypothesized in the present study? For example, the inability to use verbally-generated internal points of reference for personality consolidation, reality testing and behavioral control could be associated with borderline or histrionic/hysterical syndromes in which clinging dependency, somatization, unstable personal relationships, impulsive self-injury and "loose ego boundaries" are typical features (Gruenwald, 1970; Gunderson & Kolb, 1978; Kernberg, 1975). And Shapiro (1965) points out the commonalities between the hysterical and impulsive cognitive styles, contrasting it with that of the obsessive-compulsive and paranoid.

And cognitive styles brings us back to cognitive measures. Are the findings on many "neuropsychologial" tests really expressions of differences in cognitive style between individuals and subject populations? This is yet another unmined lode on which to apply neuropsychological methodology in addressing the question of a more general neurocognitive conceptualization of impulsivity. Data from other disciplines and methodologies point to certain unities in this field.

For example, evidence from neuropsychopharmacology and behavior genetics suggests that certain biochemical markers, such as low platelet MAO and low cerebrospinal fluid 5-HIAA

(indicating abnormalities of catecholamine and serotonin metabolism, respectively) may be linked to a general tendency toward behavioral impulsivity. This may express itself variously in psychopathic behavior, violent suicide, alcoholism or substance abuse (Gottfries et al, 1980; Lidber et al, 1985; Oreland et al, 1984; von Knorring et al, 1985; Wiberg et al, 1977). This syndrome has been related to a general inability to control impulses and to anticipate future consequences (especially negative ones), a "disinhibitory psychopathology" (Schalling et al, 1987). Many of the behaviors reported to characterize this syndrome resemble the kinds of disturbances discussed in terms of frontal lobe dysfunction by Gorenstein (1982) and others (e.g. Yeudall, 1977; Yeudall et al, 1985). In fact, Gorenstein & Newman (1980) have argued for a specific relationship between frontal lobe dysfunction and disinhibitory psychopathology.

A potential point of connection with neurochemistry might lie in the role of subcortical striatal and limbic structures in both normal and disordered behavior, a role which is often overlooked in many "neuropsychological" accounts that focus on cortical lobular pathology (Goldberg, 1985; Goldberg & Bilder, 1987; Nauta, 1971). But before elaborating yet more neuropsychological systems, it may be wise to focus on the cognitive dimension. Future studies

should combine neuropsychological, psychopharmacological, behavior-genetic, and other (e.g. evoked potential and neuroimaging) measures in the search to develop process models of behavior - antisocial or otherwise - that can guide subsequent research efforts and clinical interventions.

Appendix A: Sample test protocol of WCST.

WISCONSIN CARD SORTING TEST
SCORING AND RECORDING FORM

Robert Heaton, Ph.D.
University of Colorado School of Medicine

NAME [redacted] AGE ______ SEX ______

EDUCATION ______ OCCUPATION ______

BEHAVIOR DURING TESTING ______

ADDITIONAL COMMENTS ______

Trials: C, F, N, C, F, N,

C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O	C F N O	C F N O	C F N O	C F N O	C F N O
C F N O	C F N O					

CORRECT ______ ERRORS 34 PERSEVERATIVE RESPONSES ______

NONPERSEVERATIVE ERRORS ______ PERSEVERATIVE ERRORS 11 CATEGORIES 5

FORM #307-SF

Cat. No. 36119R Recording Form
Modified Vygotsky Concept Formation Test

Revised by: Paul L. Wang, Ph.D., C, Psych., Mount Sinai Hospital, Toronto, Canada

PATIENT NAME: [redacted] AGE: ___ SEX: ___

DATE OF BIRTH: _____ EDUCATION: _____

OCCUPATION: _____

DATE OF TEST: _____

SOURCE OF REFERRAL: _____

DIAGNOSIS: 1. _____

2. _____

NEURODIAGNOSTIC FINDINGS (CT SCAN, E.E.G., OTHERS):

RESULTS:

A. CONVERGENT THINKING:

SET	CEV	LAG	BIK	MUR	TOTALS
ERRORS	8	2	1	20	31
PER. ERRORS	2	0	0	0	2
CUES			N/A	N/A	
PRINCIPLES					

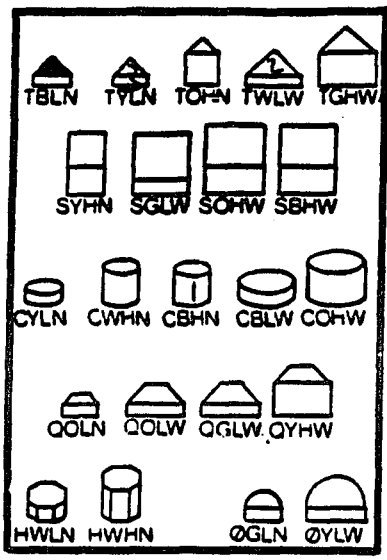
B. DIVERGENT THINKING:

PRINCIPLES: _____ POINTS: _____

Cat. No. 36119R
Stoelting Co.

A. CONVERGENT THINKING

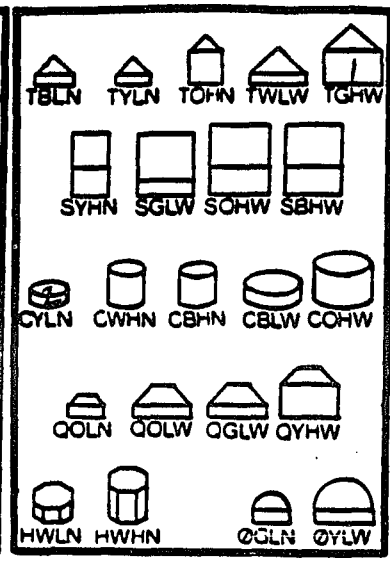
(CEV)



Demo: TBLN

Choice:

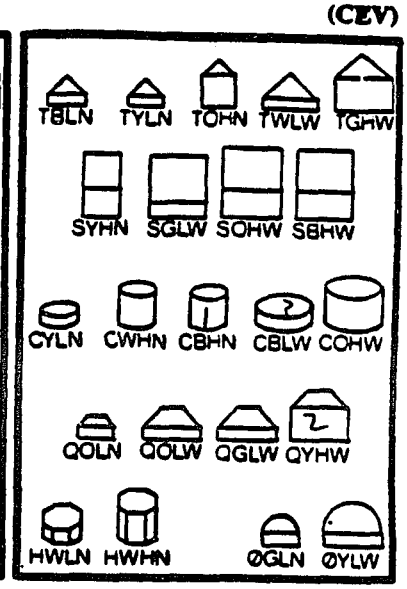
1. CBHN ØØ
2. TWLW ØØ
3. TGLW ✓



Cue: _____

Choice:

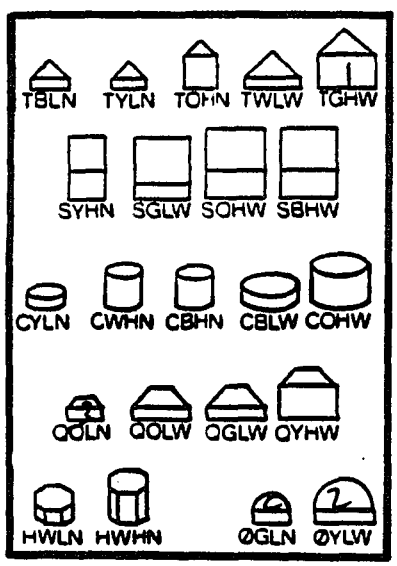
1. TGHW ØØ
2. CYLN ✓
3. _____ ( )



Cue: _____

Choice:

1. CBHN ØØ
2. QYHW ØØ
3. CBLW ØØ



Cue: ØGLN

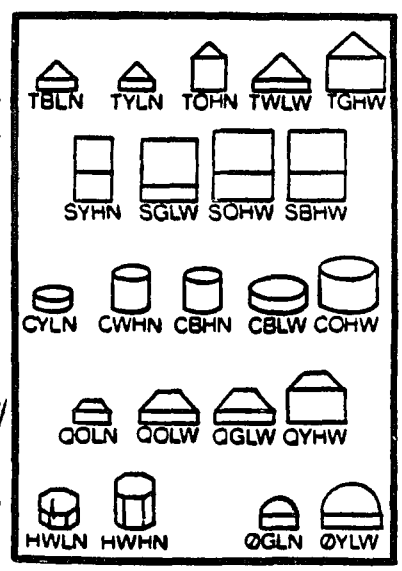
Choice:

1. TGHW ØØ
2. QYLW ØØ
3. QOLW ✓

Cue: _____

Choice:

1. HWLN ✓
2. _____ ( )
3. _____ ( )

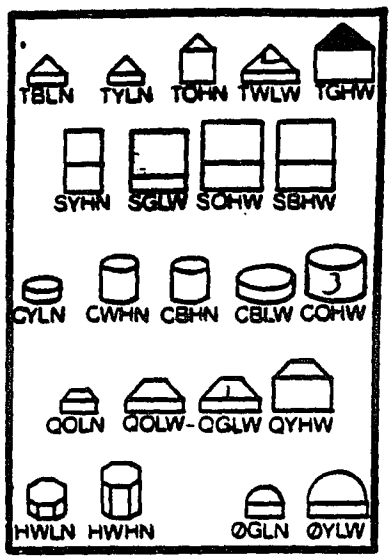


Principles:

Total errors: _____ **Perseveration errors:** _____

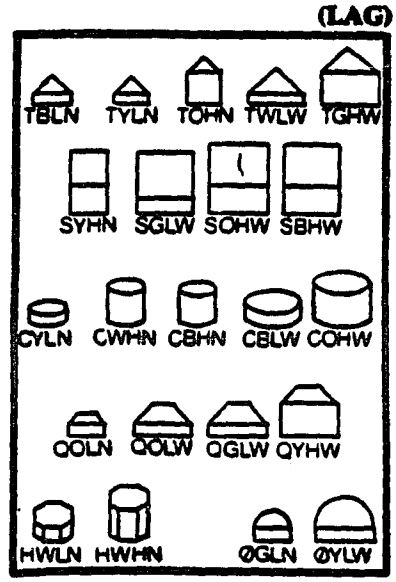
Cat. No. 36119R
Stoelting Co.

(LAG)



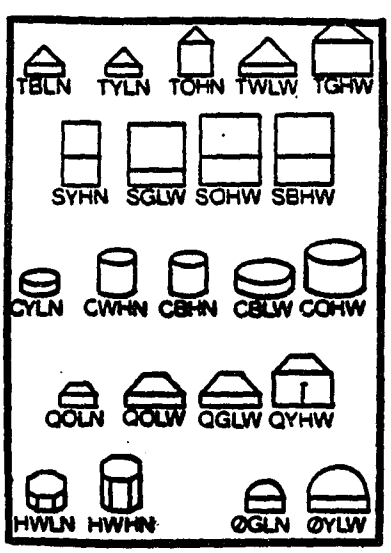
Demo: TGHW

Choice:
1. QGLW (X)
2. TLLW (X)
3. COHW (✓)



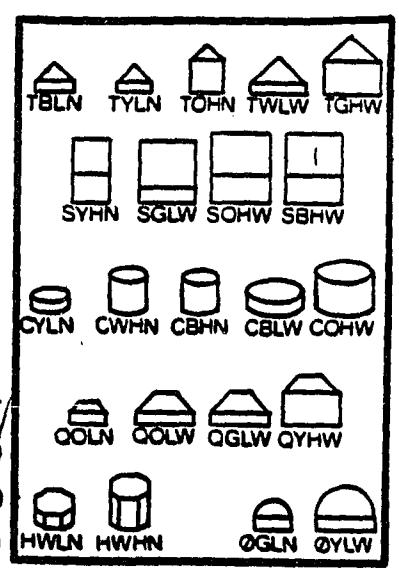
Cue: _____

Choice:
1. SOHW (✓)
2. _____ ( )
3. _____ ( )



Cue: _____

Choice:
1. QYHW (✓)
2. _____ ( )
3. _____ ( )



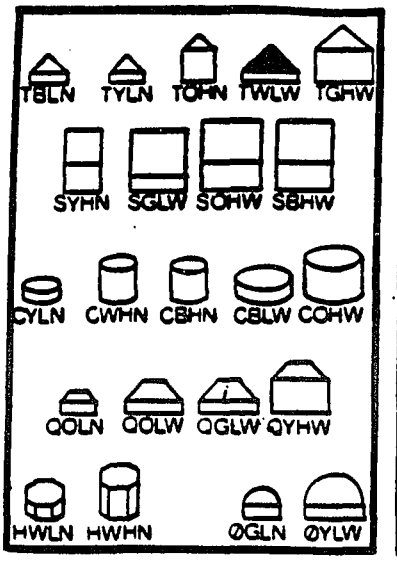
Cue: _____

Choice:
1. SBHW (✓)
2. _____ ( )
3. _____ ( )

Principles:

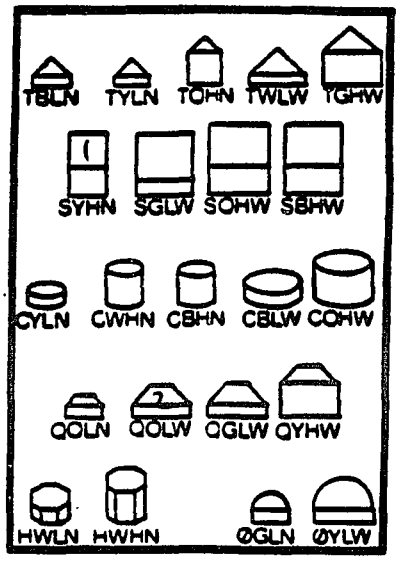
Total errors: _____ **Perseveration errors:** _____

(BIK)

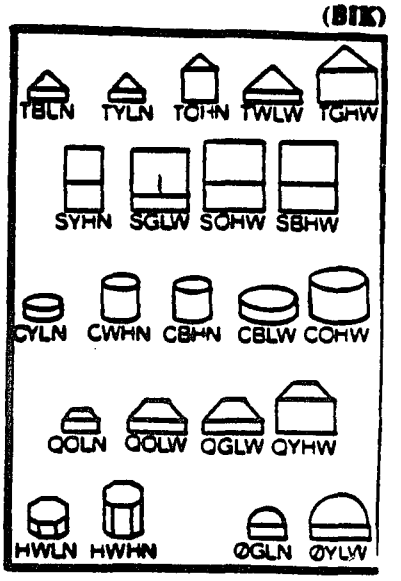


Demo: TWLW

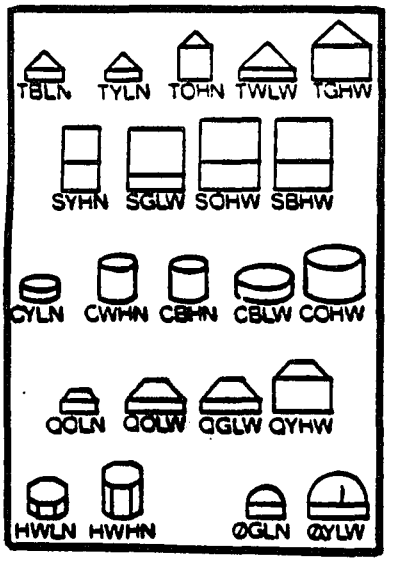
Choice:
1. QCLW (✓)
2. ( )
3. ( )
4. ( )
5. ( )



Choice:
1. SYHN (✗)
2. QOLW (✓)
3. ( )
4. ( )
5. ( )

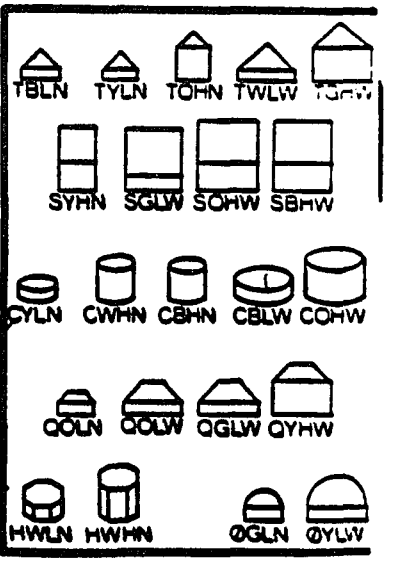


Choice:
1. SGLW (✓)
2. ( )
3. ( )
4. ( )
5. ( )



Choice:
1. QCLW (✓)
2. ( )
3. ( )
4. ( )
5. ( )

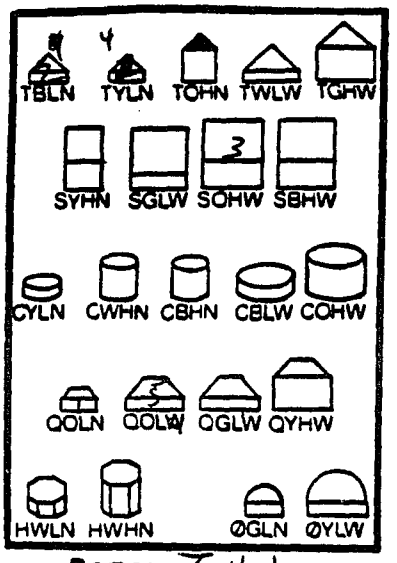
Choice:
1. CBLW (✓)
2. ( )
3. ( )
4. ( )
5. ( )



Principles:

Total errors: _____ **Perseveration errors:** _____

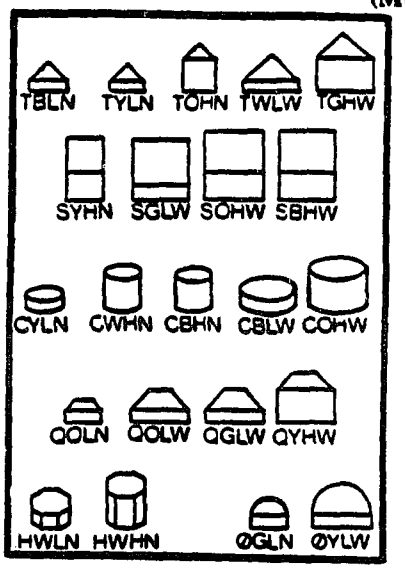
4



Demo: TOHN

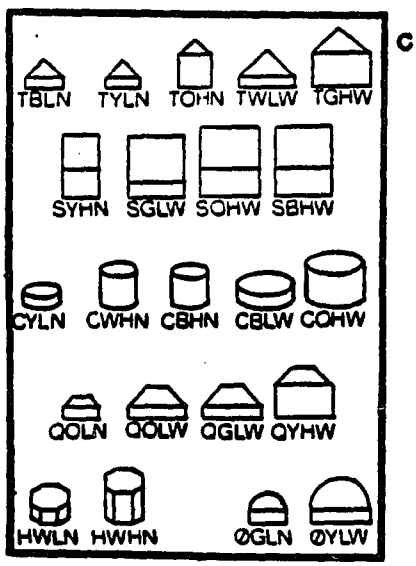
Choice:

1: QOLW
2. TBLW
3. SOHW
4. TGLW
5. QOLW



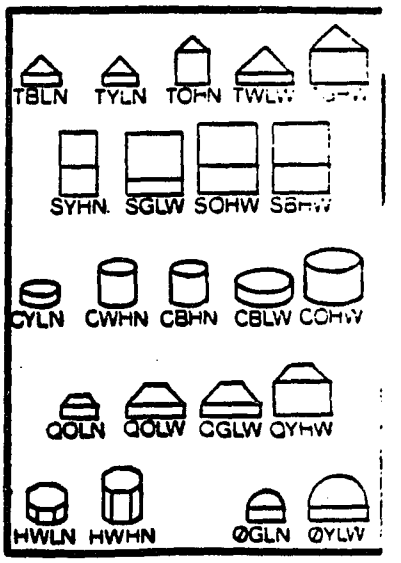
Choice:

1. ( )
2. ( )
3. ( )
4. ( )
5. ( )



Choice:

1. ( )
2. ( )
3. ( )
4. ( )
5. ( )



Choice:

1. ( )
2. ( )
3. ( )
4. ( )
5. ( )

Principles:

Total errors: _____ **Perseveration errors:** _____

[redacted]

(73)

Instructions:

On the following pages you will find a list of statements that have been used by people to describe themselves and others. Read each statement and indicate (by placing an X in the appropriate box) how much you disagree or agree with the statement. The boxes, running from left to right, are labelled as follows: Strongly Disagree; Disagree Somewhat; Uncertain; Agree Somewhat; Strongly Agree. Please do not omit any items.

SRP

	Strongly Disagree	Disagree Somewhat	Uncertain	Agree Somewhat	Strongly Agree	
3. I get in trouble for the same things time after time.	[ ]	[ ]	[ ]	[X]	[ ]	4
4. The most important qualities in a sex partner are physical attractiveness and sexual compatability.	[ ]	[ ]	[X]	[ ]	[ ]	3
5. I enjoy gambling for large stakes.	[X]	[ ]	[ ]	[ ]	[ ]	1

12. I have sometimes broken an appointment because something more interesting came along.	[ ]	[ ]	[X]	[ ]	[ ]	3
13. Above all else, it has been my own concerns and needs which have been most important to me.	[ ]	[X]	[ ]	[ ]	[ ]	2

	Strongly Disagree	Disagree Somewhat	Uncertain	Agree Somewhat	Strongly Agree	
14. I get a kick out of "conning" someone.		X				2
15. It is stupid to remain with a person if they don't satisfy you sexually.			X			3
16. I enjoy drinking and doing wild things.				X		4
18. Rules are made to be broken.			X			3
27. I prefer having many sexual partners rather than just one.	X					1
28. I enjoy taking chances.	X					1

	Strongly Disagree	Disagree Somewhat	Uncertain	Agree Somewhat	Strongly Agree	
32. One must live only for the present and not worry about the future.		X				2
36. I have often done something dangerous just for the thrill of it.		X				2
39. A good motto is "live now and let tomorrow take care of itself".			X			3
41. I enjoy driving at high speed.		X				2

	Strongly Disagree	Disagree Somewhat	Uncertain	Agree Somewhat	Strongly Agree	
44. If one is to succeed in this world, you have to look out for yourself and nobody else.			X			3
45. I have used most of the hallucinogenic drugs.		X				2
46. I got in a lot of trouble at school.				X		4

58. I almost never feel guilty over something I've done.	X					1
60. Conning people gives me the "shakes".				X		2

	Strongly Disagree	Disagree Somewhat	Uncertain	Agree Somewhat	Strongly Agree	
61. I like to change jobs fairly often.		X				2
64. I enjoy giving "bossy" people a hard time.			X			3
66. I usually get what I want with members of the opposite sex.		X				2
68. Beginning a project is always more exciting and interesting than finishing one.				X		4
69. I would be good at a dangerous job because I like making fast decisions.				X		4
70. I think I could "beat" a lie detector.		X				2
73. If you want to get ahead you can't worry too much about the other guy.			X			3
74. It's sometimes fun to see how far you can push someone before they catch on.		X				2
75. Being unemployed would depress me.			X			3

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