

DELINQUENTS ARE DISABLED: AN INNOVATIVE APPROACH TO THE  
PREVENTION AND TREATMENT OF JUVENILE DELINQUENCY

Final Report of the Neuropsychology Diagnostic Laboratory  
at the Rhode Island Training Schools

By

Project Director: Allan Berman, Ph.D.  
Associate Professor of Psychology  
University of Rhode Island  
and Andrew Siegal, M.A.

Funds and support for this project were provided by:

The R.I. Governor's Commission on Crime and Delinquency  
The R.I. Department of Corrections  
The University of Rhode Island

December, 1974

16628  
82991

26-2

UNITED STATES GOVERNMENT

# Memorandum

TO : Gerald M. Caplan, Director  
NILECJ

FROM : George K. <sup>GC</sup>Campbell  
Regional Administrator, Region I

DATE: January 24, 1975

SUBJECT: Report: "Delinquents are Disabled: An Innovative Approach to the Prevention and Treatment of Juvenile Delinquency"

Enclosed is a copy of a report entitled, "Delinquents are Disabled: An Innovative Approach to the Prevention and Treatment of Juvenile Delinquency," which I would like to recommend for replication and dissemination by the National Criminal Justice Reference Service. The findings are a result of an LEAA-funded effort in Rhode Island - Neuropsychology Diagnostic Laboratory - under that state's 1972 Comprehensive Plan.

While it is brief, this document highlights some important issues in a relatively unexplored area of criminal justice related research. Additionally, the author's sincerity and commitment are apparent throughout and serve to heighten the reader's interest in the material - which, as I am sure you will agree, can be an important asset in the reading of research material.

It is my understanding that this report has already been forwarded to Dr. James Howell of the Juvenile Justice and Delinquency Prevention Task Group for review and comment, and to NCJRS directly for consideration for inclusion in the NCJRS data base. I, as well as several of my staff members who have reviewed the report, am hopeful that it will receive the attention we feel it deserves.

I look forward to your decision.

CC:  
Allan Berman, Ph.D., Acting Chairman Department of Psychology  
University of Rhode Island Kingston, RI 02881

16628



## Table of Contents

Acknowledgements-----	Page 1
Chapter I. Introduction-----	4
Nature of the Problem Generally-----	4
Nature of the Problem in Rhode Island-----	9
Neuropsychological Approach to Delinquency-----	11
Neurological Trait Approaches-----	17
Neuropsychological Approach-----	22
Chapter II. The Current Project-----	25
Clinical Activities-----	25
Method of Research-----	26
Instruments Used-----	27
Results-----	30
Tabular Presentation of Results-----	33-37
Chapter III. Discussion-----	38
From Adaptive Disabilities to Learning Disabilities-----	46
Table of Specific Learning Disabilities-----	47
Summary and Conclusions-----	50
Recommendations-----	51
References-----	59

### Acknowledgements

Completion of a study of this proportion would not have been possible without the cooperation and effort of many other individuals. Primary among these have been the research assistants whose efforts over the past years were responsible for gathering and analyzing the data, interviewing subjects and administering diagnostic assessments. Chief among these has been Andrew Siegal, Senior Research Assistant throughout the project, who has not only carried out the burden of the data gathering, but has also been an immense help in designing statistical analysis and in preparing this final report. Other research assistants who have helped during the process of the research have been: Howard Benesch, Karen Estes, Betty Fielder, Richard Miller, Michael Gershon, Ann Varna Garis, Cora Banerjee, and Carol Goerner.

The project would never have developed out of the thinking stage were it not for early and continuous support from Mr. John Sharkey of the Rhode Island Department of Corrections, who was the first - and for a time the only - individual within the Corrections Department to recognize the importance of this project. After the beginning of data gathering, other individuals within Corrections, especially those at the Training Schools, have been quite helpful. Mr. Michael DiLorenzo at the Boys' School and Mrs. Esther Reali at the Girls' School were particularly patient through the early phases of the project and were vital in arranging transportation and logistical necessities for the project. Mrs. Reali and her staff have always been hospitable and generous with their time, since the Laboratory was housed in the Girls' School and must have been a source of some disruption of their routines.

Individuals at the Governor's Commission on Crime have also been extremely supportive throughout the research. Lois Wagar's advice and support in the early stages was instrumental in setting the study up; and the assistance of Fred Raisner, Dave Chiras, Michael DiLorenzo, Jr., and Jack Daniels is appreciated. Extra thanks go to Colonel Walter McQueeney and Mr. Jack Kilduff, former Directors of the Crime Commission, who have been unstinting in their support of the project.

Sometimes a person not directly on the scene can be of immense encouragement and support enough to assist during periods when the monotony of data gathering seems to outweigh the value of what might be achieved. Such a person has been Dr. Chester Poremba, Chief Psychologist at the Denver, Colorado, Children's Hospital, and Chairman of the section on Juvenile Delinquency of the Association for Children with Learning Disabilities (ACLD). Chet has been magnanimous not only in his continual encouragement of this project, but also in making groups around the country aware of the emerging results. His support has been critical during this project; and, indeed, the enthusiasm of the many local and regional ACLD groups which I've encountered has helped add to the significance and personal value this research has had for me.

Some of my colleagues at URI have, through their constant willingness to provide advice and direction, also deserved thanks. They are Drs. Henry Biller, Albert Lott, Peter Merenda and William Vosburgh.

Obtaining the control group was a delicate process requiring utmost cooperation from the Providence Schools. Dr. Charles Bernardo, Superintendent of Schools, as well as the principals and teachers at Hope and Central High Schools in Providence, made this aspect of the project possible.

A special word of thanks goes to Russ Dixon and Marge Burns in the administrative offices of the Department of Corrections. For years they have put up with, and helped undo, the many snafus I encountered due to my incompetence in matters of budgeting. They should know that their help hasn't been forgotten.

Finally there are over 150 young people around Rhode Island who are called "delinquent", who were the principle characters in this project. They each were willing to cooperate for a grueling one-or-two day battery of tests and interviews. More than any others, they have to be the ones who have made this project go. My contact with them over the past few years has borne out what I hope this research will help prove: that they're basically awfully decent people who will respond to concern and the feeling that someone cares about them. It is my earnest hope that this project will serve to better the lives of other young people like them by making people more aware of the indignities and agonies they undergo throughout their lives.

Allan Berman, December 10, 1974

## Chapter I - Introduction

### A. Nature of the Problem Generally

Behavioral symptoms exhibited by many juvenile and adult delinquents have often been bewildering and irritating. The irritation results from anger and frustration at the delinquent's refusal to control his behavior when requested or demanded to do so. The bewilderment has resulted from the fact that, in many instances, it has seemed to responsible observers that the delinquent was possessed of a sincere desire to control the offending behavior (s); yet, he seemed incapable of effective control. Controversy has been active in the fields of psychology, psychiatry, neurology and related areas concerning the amount of voluntary control the delinquent individual is capable of exerting over his behavior. For years the impact of psychoanalytic theory has led investigators to assume that delinquent behavior was primarily the result of personality or psychosocial disturbances originating in early childhood, and culminating in the expression of the delinquent symptom.

More recently, however, many observers have noted concrete, physiological changes existing in some delinquents. Advances in neuropsychology and the psychology of perception have led to findings that significant numbers of delinquents have disturbances in these areas. Within the past 20 years several specific, recognizable syndromes of behavior have been implicated as significant causes of some behavioral disturbances.

Rosenfield and Bradley (1948) first described one pattern, and Laufer, et. al., (1957) labelled it as hyperkinetic impulse disorder. Characteristic behavioral symptoms of this syndrome are:

hyperactivity  
short attention span  
poor powers of concentration  
poor schoolwork  
unpredictable emotional reactivity  
impulsivity  
inability to delay gratification of needs and demands  
irritability  
explosiveness  
low frustration tolerance  
hostility  
aggressiveness

It is recognized that many of these symptoms may be related to emotional disturbance. However, it has also been found by Denhoff (1959, 1967, 1969, 1970), Knobel (1959, 1962) and others that this particular group of behavioral disturbance is related to specific neurological or perceptual disturbances. These disturbances, if correctly diagnosed, can often be treated with dramatic, sudden changes in behavior ensuing. However, all too often the behavior is attributed to purely psychosocial causes, leading to a vicious cycle of ineffective treatment, misguided rehabilitation procedures, and demands made upon the delinquent to regulate behavior over which he has little voluntary control. This causes secondary emotional disorders to arise in addition to the neurological and perceptual origins, and the unhappy delinquent, exhibiting the combined symptomatology, is often deemed "incorrigible".

Other researchers have pointed out the relationship between behavioral disorders and neurological or perceptual abnormalities. Different

investigators have sought to explain the relationship in different ways. Knobel, et. al; viewed acting-out behavior as part of a larger syndrome of organically-based disorder, and described a pattern similar to Laufer's hyperkinetic impulse disorder. Ingram (1956) has described a characteristic form of overactive behavior that he has observed in brain-damaged children. This characteristic pattern involves aggression, heightened distractibility, and failure to respond to punishment. Eisenberg has more recently (1964) conceptualized the problem as "pathology in the control of behavior".

Hare (1970) has described the repeated delinquent as "callous, impulsive, frequently aggressive....lacks the ability to empathize and to form warm emotional relationships with others...(has an) inability to delay the gratification of psychological and physiological needs no matter what the future consequences to himself or to others." Hare went on to point out some of the standard psychodynamically-based explanations for this behavior. He reviewed the pertinent literature and concluded that "there is no doubt that these emotional anomalies have physiological correlates". In general, Hare's research has suggested that repeated delinquents tend to be "hypo-responsive" autonomically in situations that would ordinarily be considered anxiety-provoking (1968). In other words, Hare's physiological research has found that delinquents simply don't have adequate emotional responses to situations which ordinarily evoke these responses in most people. Thus, for instance, they may fail to respond with appropriate emotion to the suffering or distress of other people, to threat of punishment, to love or affection, or to guilt or remorse. While

most people are capable of appropriate emotional responses to these situations, the delinquent simply cannot do so.

Hare also suggests that some of these individuals may have a tendency toward cortical "underarousal", and a tendency for sensory information to become attenuated somewhere along the journey from the receptors to the brain. This has serious implications, since it might cause the affected individual to have to seek more pronounced and more persistent sources of sensory stimulation to remain attentive or satisfied. In addition, many of the "cues necessary for adequate social functioning are subtle" - of such low intensity that the delinquent's underaroused cortical and autonomic systems would fail to respond appropriately. "in an attempt to attain an optimal level of arousal, he would actively seek intense stimulation....In scanning the environment for such stimulation, however, he would probably miss...many social cues... that are needed for the guidance of social behavior" (Hare, 1970).

It is important to point out here that all of these hypotheses would be testable with appropriately-controlled neuropsychological experimentation. If verified, they would suggest innovative approaches to treatment that have heretofore been overlooked.

Ralph Reitan, one of the country's most authoritative neuropsychologists, has noted the tendency of many individuals to forget the fact that the brain is responsible for all human adaptive behavior (Reitan, prepublication). Relatively little emphasis has been given to evaluating judgmental ability, ability to deal with spatial and temporal relationships, and more subtle types

of neurological deficits, even though these functions are crucial for adaptation to problems encountered in daily living. Reitan also has pointed out the implications such neuropsychological research would have for rehabilitation programs. "While such programs have existed for some time, they generally have been based upon broad considerations ...rather than upon evaluation of the particular deficits and patterns of abilities shown by the individual subjects." He feels that rehabilitation must be organized around each individual's personal pattern of deficits, so that rehabilitation helps the individual to overcome those specific problems that have caused his maladaptive behavior. This cannot be done without appropriate, detailed diagnosis. While Reitan has dealt mostly with people who have suffered head injuries, he feels strongly that delinquent behavior has been a largely untapped area, and that much of the behavior of the delinquent is similar to the patterns of behavior shown by individuals with known neurological impairment (Reitan, 1972, personal communication).

Yet despite obvious similarities between the symptoms of many of the disorders mentioned above and the behavioral symptoms of many adult and juvenile delinquents, there is virtually no organized, published research on the phenomenon of neuropsychological or perceptual impairment as it relates to delinquency. In addition, increasing attention that is being paid to problems of the children and adults of lower socioeconomic groups has resulted in findings of disturbances of perception, information-processing, and other psychophysiological disturbances related to the adjustment problems

of people in this social group. Despite this fact, and despite the statistics indicating the high percentages of adult and juvenile delinquents from middle and lower social groups, there is virtually no organized research into perceptual, characteristics of delinquent populations.

As has been pointed out above, the importance of learning more about the neuropsychological characteristics of delinquents is paramount for effective rehabilitation to be planned. Attempting to change delinquent behavior by purely psychological or sociological techniques, when the central problem is neurological or perceptual distortion or deficiency, is not only unrealistic, but it is also expensive and wasteful. For a delinquent to spend 60 hours in casework, counseling or group therapy when he might profit more from perceptual training, neurosensory remediation or effective medico-chemotherapeutic treatment simply exposes the delinquent to even more frustration. Thus the rehabilitation tools which may be beneficial and therapeutic for some delinquents, may be confusing, stressful and productive of even more hostility and aggression for other delinquents. A crucial rehabilitation element, then, becomes the ability to distinguish among delinquents, often with similar behavioral symptoms, who will require alternative kinds of rehabilitation programs.

Nevertheless, in perusing the literature and in studying the organizational and rehabilitation plans of agencies throughout the country, there does not appear to be in operation a single comprehensive, scientifically-designed and operated facility for the study of neuropsychological and psychophysical characteristics of delinquents. Despite the wealth of case-study

These numbers are stark testimony to the fact that, despite all the best efforts of judges, mental health and rehabilitation professionals, there has still been no systematic success in the fight against the waste of young lives. It seems to me that after 70 years of trying the best methods known to psychology, psychiatry and other areas of rehabilitation - after 70 years of utter failure and the waste of thousands of young lives - we ought to think about the possibility that we may have been approaching the problem the wrong way. Even a rat learns that after banging his head on the door he ought to try a different one.

Aside from a few exceptions, traditional rehabilitation for juvenile offenders has taken two general routes. There is the "work 'em hard" technique which emphasizes discipline, custody and the alledgedly remedial effects of sweat. The second approach has been more treatment oriented -- a descendent of our psychodynamic heritage: the assumption here is that delinquency is a form of psychopathology like neurosis or psychosis, and that the best way to rehabilitate the youngster is to provide different forms of psychotherapeutic activities within the institution.

Both of these methods have certain logical appeal to them and there is much support for their use by intelligent and learned advocates. Nevertheless, the sad fact is that neither has worked. Neither type of approach has been able to produce results that have been any better than simply allowing the youngsters to vegetate in cells or in meaningless activities. (This latter "treatment" technique, I might add, is still the most frequently used around the country.)

B. Nature of the Problem in Rhode Island

The situation locally parallels the national problem. In the Rhode Island Training Schools, 80% of the boys and girls are in at least their second detainment. At the Adult Correctional Institutions, 76% of the prisoners in a recent study (Wagar, 1972) had histories of repeated confinement as juveniles. In addition, a look at individual statistics is even more discouraging. While a youngster may be sent to the training schools initially for such relatively minor offenses as truancy, running away from home, or automobile offenses (over 70% are sent initially for reasons similar to these) his subsequent offenses become steadily more serious. For the second offense there are often car thefts, burglaries or vandalism; while third offenses escalate to assault or armed robbery. The sad reality is that not only do most youngsters who come to the Training Schools once come again, but that each time they return the offenses are more serious. Obviously, despite genuine attempts at rehabilitation, little such treatment has actually been effective.

On the staff of the Adult and Juvenile Correctional Institutions are psychiatrists, psychologists, social workers, counselors, teachers, and other personnel whose function it is to enter the rehabilitation process. In addition the Adult Correctional Institutions has therapy groups, groups for alcoholics, groups for men with drug problems, advisors from the state Department of Employment Security, counselors from the Division of Vocational Rehabilitation, and MDTA grants for vocational training. The Training Schools have individual and group therapy, counseling, individual social case work,

special educational procedures, and a new federal grant for developing progressive and exciting treatment and cottage programs. Yet, if we are to judge by current evidence available, the discouraging statistics indicate that all these procedures have been, and most likely will continue to be, ineffective in halting the steady spiral of increasing frequency and seriousness of offenses and recidivism. While there are no doubt many reasons for failure so far, there is strong reason to believe from the evidence so far presented that part of the problem may simply be that both adults and juveniles volunteer or are assigned to various kinds of rehabilitative procedures rather indiscriminately, without benefit of detailed study of unsuspected disorders which may be contributing to their behavioral symptoms.

Current evaluation procedures are minimal. Most incoming adults and juveniles are examined psychiatrically, and are given a short, routine battery of psychological tests usually including an intelligence test and a few projective tests. These evaluations aim at determining the individual's intellectual and personality status. If examination indicates neurological or perceptual disturbance, there are no facilities at the Institutions, and few readily available in the state, which can be used for more detailed analysis. And no doubt the present brief testing probably detects only a minority of the existing neuropsychological, psychophysical problems.

It is becoming apparent that before money and energy are expended on further barrages of therapeutic rehabilitation techniques, we must develop a diagnostic system to understand the nature

of the problems of the individual delinquent, so that he might then be assigned to the most appropriate form of treatment. Proliferation of treatment programs without adequate diagnostic screening is a persistent, widespread practice which has not produced results.

C. Neuropsychological Approaches to Delinquency

Workers who devote their attention to the area of behavior disorders which are mediated or perhaps even produced by dysfunction, have usually been clinical neurologists, neuropsychologists or neurologically oriented psychiatrists. Their principal tools have been the EEG, medical history, psychological tests, subjective reports of symptomatology and various anti-convulsant medications to which the responses of individual patients or subjects are carefully studied. Their data usually has come to them via referrals from other physicians, psychologists or social agencies such as the courts. Their usual tasks are to identify and to control neurological or constitutional processes which may be playing a role in the unacceptable behavior for which the patient has been referred. Often, however, the reason for referral is not for antisocial or delinquent behavior but for complaints of pain, disturbances of affect, perception or consciousness of which the patient may complain. It may then be noted, secondarily, that the patient's history will indicate anti-social behavior disorder.

Gibbs and Gibbs (1964) emphasized that the EEG is of value when used to answer the question of whether possible epileptic or structural brain lesions may be involved in the etiology of a behavior disorder. The Gibbs' (1964) contended that the EEG is not, however, capable of illuminating the actual cerebral

concomitants of the major clinical manifestations of behavior disorder. This admonition is included for use as a guide in the interpretation of the EEG findings in delinquent populations.

The Gibbs's (1964), on the basis of their own extensive laboratory studies and their exhaustive surveys of the EEG literature, concluded that there are no significant correlates between EEG patterns and behavior disorders in non-psychotic, deviant adults. The two important exceptions to this general rule included the 14-6 cycles per second (cps) positive spike (Gibbs and Gibbs, 1964; Glaser, 1963; Henry, 1963; Lehman, 1970; Schwade and Geiger, 1960) and anterior temporal lobe spiking (Ervin, 1967; Gibbs and Gibbs, 1952, 1964; Glaser and Dixon, 1956; Mark and Ervin, 1970). In children the patterns which have usually been associated with behavior disorders are the 14-6 cps positive spike pattern (Gibbs and Gibbs, 1964; Glaser, 1963; Henry, 1963; Schwade and Geiger, 1960) and negative spiking in the temporal or frontal areas (Gibbs and Gibbs, 1964).

The 14-6 cps positive spike pattern has been described as a maturational defect which is observed in the sleep EEG's primarily of children and adolescents (Lehman, 1970; Weiner, 1966). The pattern is observed in the occipito-temporal leads especially, and often appears bilaterally (Lehman, 1970). This pattern is often correlated with autonomic dysfunction, somatic convulsive equivalents, and especially with behavior disorders (Glaser, 1963; Henry, 1963; Lanfer, 1967; Lehman, 1970). The literature on this pattern has been reviewed by both Gibbs and Gibbs (1964) and Henry (1963). Psychiatric interests in this pattern was stimulated by early reports of bizarre cases of matricide and other spectacular murders (Schwade and Geiger, 1953, 1960; Winfield and Ozturk, 1959).

pattern and violent behavior. Gibbs and Gibbs (1964) re-emphasized that the occurrence of this EEG pattern in many of these violent children could, indeed, be fortuitous, since they had observed this pattern in nearly one out of five school children. The Gibbs' (1964) also noted that in one of their studies they had observed a greater incidence of 14-6 activity in a control group than was shown by a group of murderers. Weiner et al (1966) compared their findings on eighty institutionalized juvenile delinquents with the EEG's of seventy non-delinquent adolescent volunteers and found that no significant differences existed between the groups with respect to the incidence of 14-6 activity. Although lack of differences between these two groups tempered the prevalent thinking regarding the causal relationship of this EEG pattern to violent behavior and other aggression problems, Weiner et al's (1966) sample included a pair of identical twins which yielded interesting results. In short, the twin with 14-6 cps positive spikes was found in the group of institutionalized juvenile delinquents, while his brother who served in the control group was free of electroencephalographic abnormalities. This study was the object of further discussion by Maugh's' (1967) Progress article on "Criminal Psychopathology."

Weir and Anderson (1958) observed 14-6 activity in almost 60 percent of a group of 181 children who came referred because of severe school adjustment and behavior problems, as compared with the slightly more than 16 percent of their control group who showed 14-6 cps positive spikes. Smith, Phillipus and Guard (1969) reported a significant increase in Verbal IQ scores following the administration of anti-convulsant medication (Zarontin) to a

group of children with 14-6 activity. Also observed was the amelioration of various behavior disorders which were shown by these children. Discontinuance of the drug resulted in a decrement in Verbal IQ scores along with exacerbation of school adjustment problems and other behavior disorders. These results were replicated by Smith and Heyl (1969).

Although the significance of the 14-6 cps positive spike is obscure, and in spite of the fact that the EEG pattern is not specific to children with violent aggressive behavior or behavior disorder, its correlation with aggressive behavior disorder in individuals who show this electroencephalographic anomaly cannot be overlooked.

In addition to the epileptoid 14-6 cps pattern, which is not generally considered to be a truly epileptic seizure manifestation, the other epileptic process which is frequently associated with behavior disorder with or without aggressive behavior is the psychomotor seizure (Gibbs and Gibbs, 1952). The EEG spike focus in psychomotor epilepsy almost always involves the anterior temporal lobes and, without proper sleep recording techniques, it is difficult to demonstrate this EEG abnormality (Gibbs and Gibbs, 1952). In adults the clinical seizure typically includes disturbances of consciousness in which the patient usually does not actually lose consciousness but is amnesic for the ictal behavior. Also manifested may be perceptual distortions, facial movements and relatively complex behavioral automatisms, which can include assaultive behavior, especially if the person is restrained (Ervin, 1967; Gibbs and Gibbs, 1952; Mark and Ervin, 1970; Rodin, 1973. Mark and Ervin

(1970) devoted almost an entire volume to the concept of limbic dysinhibition secondary to the cortical dysfunction which is observed in the temporal lobes of these psychomotor epileptics. They stress especially the likelihood of violent and assaultive behavior in many temporal lobe epileptics. Rodin (1973), however, observed no violence associated with either the ictal or post-ictal states in over 150 psychomotor attacks. It was Rodin's contention that the assaultive behavior which is associated with psychomotor seizures is usually precipitated by others' attempts at restraint. It should be noted, however, that Rodin's subjects were observed in a relatively stress-free laboratory environment.

Although Gibbs and Gibbs (1952) contended that the age of onset of psychomotor epilepsy is significantly later than that which is observed in patients with 14-6 cps positive spiking, Glaser and Dixon (1956) emphasized that their research indicated a far greater prevalence of psychomotor seizures in childhood than had been previously thought. Glaser and Dixon (1956) went on to note the incidence of aggressive activity "as a common denominator" of their sample of psychomotor epileptics (aged one to sixteen) during the actual seizure itself. They also, however, noted during the periods between actual seizures a high incidence of a cluster of traits consisting of (1) excitability, (2) hyperactivity, (3) aggressiveness, (4) temper tantrums and the entire sample showed specific learning disabilities. An earlier paper by Charles Bradley (1951) also emphasized this symptom complex in the inter-ictal periods of many epileptic children.

Green (1961) reported on results of electroencephalographic and psychopharmacologic studies of ten children who came referred to him for severe behavior disorders, frequently showing destructive-aggressive behavior and learning disability with hyperactivity. All ten of these children had EEG foci which were referable to the temporal or temporo-occipital regions, yet none had ever had any recognizable seizure activity as such. Many of these children showed a good response to anti-convulsant medication (Dilantin) with subsequent amelioration of their aggressive and other inappropriate behaviors (Green, 1961).

Although these various abnormalities are frequently found to occur no more often in groups of delinquent offenders (Gibbs and Gibbs, 1964; Weiner, 1966), the numerous case studies of children and adolescents who have been known to suffer from these disorders indicate a major role which paroxysmal cerebral dysrhythmias may play in the etiology of socially unacceptable behavior, in at least some individuals, especially that which is of a violent or aggressive nature.

#### D. Neurological Trait Approaches

Perhaps the line of research which represents the most extreme position of neurological trait theories which attempt to explain the etiology of various behavior disorders which might predispose an individual to commit delinquent acts is that of the cytogeneticists. In investigating the XYY syndrome cytogeneticists postulated that a higher incidence of aggressive and anti-social behavior will be found in males displaying the extra Y chromosome. Marinello et al (1969) cited evidence from a number of leading geneticists that the

the incidence of the XYY pattern is seldom greater than one in one thousand newborn males. Reviewing the results of three earlier studies on delinquent populations Marinello et al (1969) reported incidence rates of 1/21, 1/378, 1/29. Reporting on their own findings they observed the XYY pattern occurring in two out of eighty-six prisoners at Attica. All subjects had to be at least six feet tall for inclusion in the study. In a group of institutionalized juvenile delinquents one boy out of fifty-seven demonstrated the XYY chromosomal anomaly. Height was not a criterion in the selection of subjects for the study. Casey et al (1966) demonstrated the XYY pattern in even greater proportions in tall men who were being detained at mental hospitals for anti-social behavior. These striking statistics must, however, be tempered by several considerations. It should be noted that the proposed mechanisms by which this chromosomal anomaly expresses itself remains obscure. Secondly, it accounts for such a small portion of the total delinquent population that its status at present can be regarded as little more than a curiosity. It must also be noted that not all men who have an extra Y chromosome are either tall or exhibit anti-social behavior.

Another source of evidence for neurological factors in the etiology of delinquent behavior in some children is derived from case studies of children with hyperkinetic impulse disorder. Although various authors have contended that not all hyperactive children have a history of brain injury (Morrison and Stewart, 1971), many of these children do show at least "soft" neurological signs (Laufer, 1962, 1967; Levy, 1958; Morris and Dozier, 1961) as well

as any one of a variety of EEG abnormalities (Burks, 1957; Laufer, 1962, 1967; Levy, 1958). Laufer (1962, 1967) also has demonstrated that many of these children show differential drug responses and lower Photo-Metrazol thresholds. Hyperactive impulse disorder is frequently combined with specific learning disability and described as "Minimal Brain Damage" or "Minimal Neurological Impairment" (Laufer, 1967). These terms in many cases constitute an unfortunate choice of words since one must frequently, in the absence of neurological signs, infer that the child has structural or functional cerebral dysfunction simply because he acts as though this were the case. (Birch, 1964; Eisenberg, 1964; Gruenburg, 1964).

The clinical picture which characterizes these children has been described by Laufer (1962, 1967) and Levy (1958). Typically the presenting symptoms of these children included hyperactivity, short attention span, distractability and explosive irritability. In addition to this list of symptoms one can frequently observe disturbances of left-right discrimination, disturbances of spatial and temporal orientation, and difficulties in visual and auditory perception. Visuomotor and hand-eye coordination problems frequently beset these children; nor are more cognitive types of deficits unusual in this group. These deficits frequently include difficulties in abstraction, conceptualization, and generalization. Difficulties with figure-ground relationships and the ability to assimilate and recall material are also common in this population (Laufer, 1967). Masland's epidemiological research indicates that this syndrome afflicts between five and ten percent of the school age population (Laufer, 1967).

Levy (1958) emphasized that his behavior pattern is conducive to the development of delinquent behavior. He also suggested that what he called "post-encephalitic behavior disorder" (hyperactive impulse disorder) constitutes a primary etiological factor in the development of many juvenile delinquents. Levy (1958) reported on the results of one hundred cases of "post-encephalitic" children and adolescents who were successfully treated with stimulant medications. Almost all of the cases in his sample were referred by various legal and social agencies for either delinquent behavior or severe socially disruptive behavior disorder.

Laufer (1962) emphasized that the early pure picture of hyperkinetic impulse disorder tends to ameliorate either by or during adolescence. By the time that the primary symptom complex abates, it has become complicated by various psychodynamic defensive and adaptational patterns which the child has developed in his attempts at coping with the reactions of significant others to his annoying, unpredictable and uncontrollable behavior. These adaptations also serve to bolster his reactions to his own subjective feelings of developmental incompetence and low self-esteem.

Further implications that selective impairment of various adaptive abilities may characterize large portions of the delinquent population may be derived from studies of delinquent offenders which have utilized Wechsler's intelligence scales. Wechsler (1958) stated that a discrepancy between Verbal IQ and Performance IQ in which Performance is greater is typical for Wechsler, diagnostic) of "adolescent psychopathy." Prentice

and Kelley (1963) reviewed the results of twenty-four studies which aimed at investigating Wechsler's hypothesis which had earlier been validated by Levy (Rabin, 1945). Prentice and Kelley observed that out of twenty-four studies, those which employed subjects who were similar to those who had been represented in Wechsler's (1944) sample the  $PIQ > VIQ$  relationship did hold true. Generally, the mean Performance IQ's of the delinquent populations fell within the Normal range and the Verbal IQ's typically fell within the Dull Normal range. The results of various authors supported this finding: Diller, 1955; Guertin et al, 1962, 1966; Graham and Kamano, 1958; Manne et al, 1962. Notable exceptions included Foster's (1959) study in which "any boy whose social or medical history indicated the possibility of organic impairment was excluded from the group." Foster, similarly, excluded from his sample all mental defectives ( $IQ < 70$ ) as well as any boy with a known history of brain damage. Foster's exclusion of subjects with known or suspected cerebral dysfunction may very well have been the factor which is responsible for the absence of the  $VIQ < PIQ$  relationship. Further support is lent to this notion by the finding of Graham and Kamano (1958) in which they observed the  $VIQ < PIQ$  split in only those juvenile delinquents who showed reading difficulties.

This line of thinking must, however, be tempered with the observations of the Gluecks and Vane and Eisen (Prentice and Kelley, 1963) that although this  $VIQ < PIQ$  relationship is associated with juvenile delinquency, it is non-specific. The pattern is observed frequently in control subjects who have been matched on their age, education level and socio-economic status.

E. The Neuropsychological Approach

The bulk of the Organic and Constitutional studies which have been reviewed thus far have tended to emphasize quantitative precision primarily with respect to the description and classification of neurological variables in their observed or hypothesized brain-behavior formulations. The majority of these workers, however, seemed to be content with using loosely defined qualitative clinical impressions or rather global measures of intelligence to describe the behavioral aspects of their observed or hypothesized brain-behavior relationships. It should be noted that David Wechsler (1958) has himself contended that the sample of behaviors which are assessed by the WAIS do not do justice to the complexity of variations in human neural functioning. A battery of tests was introduced by the late Ward C. Halstead (1946) and developed and validated by Ralph Reitan (1956, 1959, 1966) to serve as an instrument which would not only be sensitive to the integrity of the cerebral hemispheres but which would also provide a battery of tasks which would more adequately reflect the wide spectrum of human adaptive abilities (Reitan, 1955, 1956, 1959, 1963, 1966). Included in the Halstead Neuropsychological Test Battery are tests of concept formation and utilization as well as tasks which require abstraction, generalization and various mnemonic skills. Both complex psychomotor and pure fine-motor abilities are assessed and several tests of the intactness of auditory, visual and tactile sensory modalities are included as well. Tests for aphasic symptomatology (language skills, expressive and receptive), a test of speech perception, attentional tasks, as well as several tests which require  $S_5$  to locate figures in

space all form integral portions of this diagnostic instrument.

The standardization and validation studies for this test battery showed that Halstead's tests proved to be highly effective in discriminating between subjects with clearly demonstrated brain lesions and normal controls (Reitan, 1955, 1956, 1959, 1966; Wheeler and Reitan, 1963). Similarly, the Modification of the Halstead-Nepman Aphasia Examination, which is administered as part of the battery, not only proved successful in discriminating between subjects with and without known brain damage but also frequently proved capable of lateralizing the lesion (Heimburger and Reitan, 1961). For a more extensive description of the battery and the validation studies upon which its diagnostic use is based, the reader is referred to Reitan's (1966) definitive review article.

It should be emphasized that in actual clinical usage the Halstead Battery is used in two very different yet interrelated ways. The results of Halstead's test, along with several other tests which are included in the battery such as the WAIS or WISC, the Trailmaking Test (Reitan, 1966), and the Examination for Sensory Imperception (Reitan, 1966), can be combined to yield a comprehensive quantitative assessment of a wide variety of critical adaptive abilities which are requisite for successful psychosocial adaptation as well as for successful academic and vocational performance. An individual's scores on Halstead's Battery may be used to assess his adaptive capabilities over a number of types of behaviors. Various psychological functions may be examined in relatively pure form or in various combinations. The battery provides samples of both types of observations. The

second use to which the results of the battery may be applied consists of subjecting the observed performances on the Halstead Battery to four different scoring systems simultaneously, in order to make inferences regarding the presence or absence of cerebral dysfunction. Various other considerations which are concerned more with making neurological diagnosis than with the assessment of the individual's actual functioning per se may be considered. These questions include laterality of the dysfunction, acuteness versus chronicity, and the prediction of the actual type of brain lesion.

In the present study we have been concerned primarily with the assessment of various patterns of ability and deficits which are shown by the subjects, and there has not been an attempt made to generate inferences regarding the underlying neurological sub-strata of the observed behavior. The adherence to a functional assessment serves two basic purposes: (1) It avoids the precarious situation of predicting neurological variables on the basis of psychological data in the absence of neurological criterion data; and (2) the functional approach also articulates more productively with a psychological level of analysis in explaining behavior.

The Neuropsychology Lab and Diagnostic Clinic (MLDC) from 1971-1974 operated as a functional research, diagnostic and clinical training facility serving the residents and staff of the Rhode Island Training Schools. The Project Director and Research Assistant are both certified for the administration and interpretation of the specialized neuropsychological examinations provided by the lab, and are the only psychologists so certified in the state, for this particular kind of diagnostic testing. Therefore, the Lab acquired a statewide reputation for Neuropsychology services, and referrals come to us from the Juvenile Diagnostic Center, Division of Vocational Rehabilitation, Child Welfare Services, and other state agencies. Our policies have been to try to service other state agencies on a limited basis as we have time, without interfering with service to the Training School. The clinical trainees have been functioning in the administration of some of the more basic parts of the test battery, have been doing essential interview and history-taking, and have been serving in a consultative capacity, interpreting our findings to Training School staff.

#### Clinical Activities

We have seen in the Lab randomly selected residents for our sample groups, as well as boys specifically referred to us for diagnosis by Training School staff. Most of these referrals come from the psychiatrist, the Training School counselors, or as a result of the interviews done on new arrivals by our

clinical trainees. The staff made referrals to clarify questions that they may have about the functioning of certain residents. These questions usually involved one of the following areas:

a) Is there a possibility of cerebral or neurological dysfunction; and, if so, what specific areas of ability are affected?

b) Is there a learning disability which can be identified and treated?

c) Sometimes the referral was to obtain our comprehensive profile of the assets and deficits of the child's adaptive abilities in order to work out a rehabilitation plan that would be appropriate. The profile provided indications as to the best avenues for a particular resident with regard to either educational or vocational training.

#### Research Activities

The continuing research project involved the investigation of the occurrence of adaptive disability in delinquents. Sensory functions, motor skills, conceptual abilities, and psychological adjustment were evaluated in detail, in an attempt to bridge the gap in our understanding of the juvenile offender.

#### Method

##### Subjects

Two groups of adolescent males, one composed of delinquents and another which was composed of matched controls, were examined.

The delinquent group consisted of forty-five males ranging between fifteen and eighteen years of age (Mean Age 16.1, Standard Deviation 0.75). Fourteen (32 percent) of these Ss were Black and the remaining thirty (68 percent) were White. All

delinquent Ss had been adjudicated "delinquent" by Rhode Island Family Court and had been incarcerated for the first time at Rhode Island's juvenile correctional facility, The Rhode Island Training School.

In order to attempt to control for any possible "institutionalization" effect, selection was restricted to those Ss who were presently serving their first sentence. Similarly, all Ss were examined within one week of the time of admission to the Training School. After having met the "first admission" criterion Ss were randomly selected from the weekly intake rosters.

The non-delinquent control group consisted of forty-five adolescent males who were enrolled in a Providence inner-city public high school at the time of neuropsychological examination. All controls participated in the study voluntarily. Controls were matched with their delinquent counterparts on age, race and sex. Earlier research done by the Rhode Island Governor's Crime Commission indicated that the geographical area which surrounds the high school which was used in the present study contributes over 80 percent of the delinquent population to the Training School (A. Berman, Personal Communication, August, 1973). Therefore, by drawing the non-delinquent sample from this same high school a rough control for socio-economic level was effected.

#### Instruments

All Ss were administered the Halstead Neuropsychological Battery for Adults. The battery included the Category Test, the ten block Tactual Performance Test with Time, Memory and Location scoring, the Seashore Rhythm Test, the Finger Oscil-

lation Test, and Halstead's Speech Sounds Perception Test. The interested reader is referred to Reitan (1966, 1968) for detailed presentation of this battery.

Also administered was the modification of the Halstead-Neuman Aphasia Examination (Heimberger and Reitan, 1961) and Reitan's examination for Sensory-Imperception (Reitan, 1966, 1968). Included in this battery were the Trailmaking Tests, parts A and B, and the Lateral Dominance Examination (Reitan, 1966, 1968).

#### Procedure

The above battery was administered during day to a day and a half of testing which was conducted at one of two neuropsychology laboratories. The delinquent group was examined at the Neuropsychology Laboratory and Diagnostic Clinic at the Rhode Island Training School, while a field laboratory was set up at Central High School in Providence for examination of the control group. Halstead Batteries were administered and scored by the author; WAIS and WISC batteries were administered and scored by various research assistants. A final check of all scorings was made by an independent judge.

Ss' adjudication as delinquent or non-delinquent constituted the criterion for group membership in either the delinquent or the control group, and the two groups were labelled as such. Ss were matched pair-wise on age and race with only male Ss being utilized. For those of you who care, statistical comparisons were made using the t-test for matched pairs and the Mahalanobis  $D^2$  technique for Discriminant Analysis, both of which were run on standard

computer programs (Wilcox, 1973).

It was hypothesized that the delinquent group could be differentiated from their controls on the basis of their neuropsychological characteristics as reflected in the patterning of their abilities and deficits as assessed by the Halstead Battery. Using Halstead's Impairment Index, Wechsler's Verbal and Performance IQ, and both parts A and B of the Trailmaking Test as summary indices of neuropsychological status, Mahalanobis'  $D^2$  technique for Discriminant Analysis was utilized (Wilcox, 1973). A statistically significant value of  $D^2$  would indicate that the groups can be differentiated on the basis of their neuropsychological status.

It was similarly hypothesized that a set of five predictors (Impairment Index, VIQ, PIQ, and Trails A and B) could be used to reliably classify Ss correctly with respect to group membership as delinquent or control. The classification matrix which is produced by the discriminant analysis program (Wilcox, 1973) was constructed in order to answer this classification question.

It was similarly predicted that the poorest performance by the delinquent group on the Halstead Battery would be manifest on the Category Test. This hypothesis was investigated by inspecting the significance levels of the differences between the group means on Halstead's Tests.

Also predicted was a greater difference in the VIQ-PIQ split. VIQ was predicted to be lower than PIQ in both groups, but the magnitude of the intra-group differences was hypo-

thesized to be greater for the delinquents. This hypothesis was investigated statistically by computing the VIQ-PIQ for each S in each of the two groups. These PIQ-VIQ values were then summed, and it was these sums upon which the group means were computed. The difference between these group means was then tested, statistically, by using the t-ratio for matched pairs (Wilcox, 1973).

### Results

Sample means and standard deviations were computed on all of the tests for both the delinquent group and their controls. These values are presented in Table 1. The significance of the observed differences between pairs of sample means was tested statistically by using the t-test for matched samples, (Spence, et al, 1968). These t-ratios and probabilities are also reported in Table 1.

The six sub-tests which comprise Reitan's examination for Sensory Imperception were collapsed and the total number of errors on all six sensory sub-tests constituted the raw score upon which the delinquent and non-delinquent sample means were computed. This composite score expresses sensory imperception in the auditory, tactile and visual modalities, as well as three additional measures of the intactness of tactile perception. These include fingertip number writing, tactile form recognition and a test of finger agnosia. The results of the statistical tests between the delinquent and control groups' sample means are presented in Table 1.

The results are striking. The delinquents performed more poorly on nearly all measures of Wechsler's Psychometric Intelligence and on all of Halstead's tests with the exception

the TPT ( $P=.05$ ) was significantly greater for the delinquent group, it is noteworthy that when the TPT time score was analyzed on each trial, significant differences between the groups were observed on only one of the three trials (non-dominant hand) ( $P .05$ ).

Although in both groups the disparity of Verbal and Performance IQ favored the Performance value, the magnitude of this difference was significantly greater ( $P .005$ ) in the delinquent group.

In addition to the profile analysis which was yielded by inspection of the inter-group differences between sample means, the data was subjected to a discriminant analysis. Five predictors were utilized in the present study: (1) Verbal IQ, (2) Performance IQ, (3) Halstead's Impairment Index, (4) the Trailmaking Test Part A and (5) Part B. The rationale for the selection of this set of predictors was based on the fact that the first two measures are relatively non-redundant summary scores which reflect Ss' performance on all of the Wechsler scales. The Impairment Index was selected since it, too, is a summary measure which reflects the level of performance on all of Halstead's tests. The Trailmaking Tests are included in neither of these summary measures and were therefore included separately. Rao's Generalization of the Mahalanobis  $D^2$  Technique was run on Bio-Med's M-5 Program for Discriminant Analysis for Two Groups (Wilcox, 1973). The value of the Mahalanobis  $D^2$  was found to be 59.50, which reaches statistical significance at the .001 level. This indicates that the differences which exist between the groups' profiles on the five predictor variables are so marked that they could occur by chance fewer than one out of one thousand times. Using the group profiles on these five predictors, a classification matrix was

constructed. This matrix summarizes the correct and incorrect classifications of all Ss in the experiment as either delinquent or non-delinquent on the basis of the patterning of the neuropsychological test performances as assessed by the five predictor variables. Table 2 illustrates that 87 percent of the delinquents and 78 percent of their controls could be correctly classified on the basis of these five neuropsychological indices. It is apparent, then, that although some minimal overlap between delinquents and their controls exists, the level of performance and the patterning of the abilities and deficits is markedly different for the two groups. Table 3 illustrates the relative contributions of each of the five predictor variables in discriminating between the delinquents and their controls. The most powerful predictors were PIQ and the Impairment Index, followed closely by VIQ. The Trailmaking Test contributed to the discrimination, although to a somewhat lesser degree than the aforementioned measures.

TABLE 1

COMPARISON OF 48 MALE JUVENILE  
DELINQUENTS WITH MATCHED CONTROLS  
ON THE HALSTEAD AND WECHSLER BATTERIES

Test	Delinquent		Control		t-ratio	df	P
	X	s	X	s			
Verbal IQ	87.49	11.84	101.78	11.47	6.60	44	<.001
Performance IQ	95.78	10.90	103.91	11.69	3.41	44	=.001
Full Scale IQ	90.56	11.40	103.09	11.04	5.83	44	<.001
Information	6.33	2.08	8.73	2.34	5.43	44	<.001
Comprehension	6.98	2.34	11.00	2.72	7.67	44	<.001
Arithmetic	7.00	2.75	9.04	2.32	4.24	44	<.001
Similarities	8.04	3.00	11.44	2.69	6.03	44	<.001
Digit Span	8.84	2.54	9.33	3.03	0.84	44	N.S.
Vocabulary	6.58	2.91	8.51	2.05	4.01	44	<.001
Digit Symbol	6.49	2.91	9.07	2.17	4.04	44	<.001
Picture Comp.	9.69	2.90	10.93	2.85	1.97	44	=.05
Block Design	9.47	2.01	10.78	2.52	2.78	44	<.01
Pic. Arrang.	8.73	2.08	9.87	2.33	2.47	44	<.05
Object Assem.	9.53	2.67	11.36	2.76	3.35	44	<.01
PIQ-VIG	8.29	8.64	2.13	10.88	-2.92	44	<.005

TABLE 1 - Continued

Test	Delinquent		Control		t-ratio	df	P
	X	s	X	s			
Halstead Neuro-psychological Battery:							
Category Test	59.96	23.05	44.56	18.13	-3.77	44	<.001
TPT: (Time)	13.93	5.11	12.14	5.50	-1.94	44	=.05
TPT (Memory)	6.87	1.62	7.78	1.43	2.69	44	=.01
TPT (Location)	4.16	2.26	5.82	2.05	3.38	44	<.01
Speech Test	9.71	6.42	7.27	4.23	-2.09	44	<.05
Rhythm Test	26.33	3.66	26.67	2.34	0.56	44	N.S.
Finger Oscil.	46.27	6.79	45.18	4.34	-0.86	44	N.S.
Impairment Index	0.46	0.25	0.30	0.22	-3.51	44	=.001
Trailmaking Test A- Time in seconds	34.89	12.49	25.01	6.21	-4.92	44	<.001
Trailmaking Test B- Time in seconds	109.68	47.02	78.40	42.19	-3.02	44	<.01
Sensory Im-perception	2.78	3.22	2.13	2.11	-1.52	44	N.S.

TABLE 1 - Continued

Test	Delinquent		Control		t-ratio	df	P
	$\bar{X}$	s	$\bar{X}$	s			
TPT dominant hand	6.65	2.98	5.97	2.60	-1.26	44	N.S.
TPT non-dominant hand	4.74	2.55	3.82	1.70	-2.38	44	.05
TPT both hands	2.68	1.29	2.37	1.96	-0.84	44	N.S.

TABLE 2

RESULTS OF DISCRIMINANT  
ANALYSIS FOR TWO GROUPS (D<sup>2</sup> TECHNIQUE)

---

Two Discriminant Equations  
produced by D<sup>2</sup> Technique

Discriminant Function 1      .690 VIQ + 1.037 PIQ +  
   0.350 Trails A + 0.121  
   Trails B + 40.467 Impairment  
   Index - 104.166

---

Discriminant Function 2      .580 VIQ + 1.070 PIQ +  
   0.457 Trails A + 0.124  
   Trails B + 41.512 - 100.736

---

Classification Matrix	Statistic- ally clas- sified as Delinquent	Statistic- ally clas- sified as Control	Total
Actual Group Membership (Delinquent)	38	7	45
Actual Group Membership (Control)	10	35	45

---

TABLE 3

RELATIVE CONTRIBUTIONS OF EACH OF  
5 VARIABLES IN PREDICTING GROUP MEMBER-  
SHIP IN EITHER DELINQUENT OR CONTROL GROUPS

Function 1		
Predictor	Lambda Weights	% of variance ac- counted for
VIQ	.689	21.00
PIQ	1.037	30.77
Trails A	.350	8.55
Trails B	.121	14.18
Impairment Index	40.467	25.50
Function 2		
VIQ	.578	17.41
PIQ	1.069	31.34
Trails A	.456	11.03
Trails B	.124	14.38
Impairment Index	41.512	25.85

### Discussion

The performance of the delinquent group on the Wechsler variables was almost uniformly inferior to that of their controls. This is evidenced not only by the intergroup differences seen on Verbal IQ ( $P < .001$ ) and Performance IQ ( $P < .001$ ) but by analysis of the individual subtest scores as well. As previously noted, their performance fell below that of their controls on all subtests, with the only two exceptions being Digit Span and Picture Completion.

The meaning of these intergroup differences can be clarified within the context of Cohen's (1957) factor-analytic studies of the WAIS. Cohen's study demonstrated that individual subtests do not in any way tap specific or independent mental abilities. Cohen (1968) also found that WAIS subtest scores typically cluster into three basic components, in addition to "g", each which apparently reflects a constellation of closely related psychological functions or adaptive abilities which are measured by the WAIS subtest scores; "Verbal Comprehension," "Perceptual Organization," and "Memory." Using these three factors as guidelines for interpretation of the present data, it appears that the delinquents as a group showed deficits with respect to their controls in their ability to comprehend, manipulate and utilize conceptual material which is of a verbal nature. This interpretation is evidenced by the intergroup differences on the Information ( $P < .001$ ), Comprehension ( $P < .0001$ ), Similarities ( $P < .001$ ) and Vocabulary ( $P < .001$ ) subtests upon which are based Cohen's (1968) Verbal Comprehension factor. Similarly, the delinquents' ability to organize non-verbal perceptual material and to operate effectively on the basis of

these non-verbal perceptions was studied. This latter ability constellation, which (Cohen (1968) labelled "Perceptual Organization," is reflected by the Block Design and Object Assembly sub-tests. In the present study each of these sub-tests yields significant inter-group differences which favor the controls ( $P < .01$ ). Cohen (1968) interpreted the significance of the Digit Span sub-test as assessing short-term memory and attentional abilities. In the present study, no significant differences between the delinquents and their controls were observed with respect to short-term memory or attention, as assessed by the Digit Span sub-test.

Although both groups obtained higher PIQ scores than VIQ scores, the magnitude of this intra-group difference was statistically significant only in the delinquent group ( $P .005$ ). The relatively greater impoverishment of verbal skills in the delinquent group is quite consistent with the earlier WAIS literature on intellectual functioning in delinquent populations.

The Wechsler data clearly reflect a trend for the delinquents to perform more poorly, with respect to controls, on Perceptual Organization tasks. This trend reappears on Parts A and B of the Trailmaking Test.

Part A of the Trailmaking Test simply required that S locate the numerical sequence 1 to 25 consecutively on a printed page and to connect them with a continuous line. Since recall of the number sequence 1 to 25 was well within the repertoire of almost all Ss examined, the primary task necessary for completion of the test was that of locating the desired number on the page, therefore making the task a measure of S's ability to organize spatial

perceptions. The performance of the delinquents on this task was significantly worse than that of the controls ( $P \leq .001$ ). Although the delinquents' ( $X=34.89$ ) scores fell below those of the controls ( $X=25.01$ ), both groups scored within normal limits as defined by Reitan's norms (Reitan, 1959).

Part B of the Trailmaking Test introduced a verbal-symbolic manipulation in addition to the spatial and perceptual demands which characterized Part A. In Part B Ss were asked to locate an inter-digitated series of alternating letters and numbers. S must proceed from "1 to A, A to 2, 2 to B, B to 3, etc." He must not only comprehend the concept which is clearly presented during the spoken instructions, but he must then utilize this concept in order to actually generate the correct sequence of spatial locations which he is subsequently required to perform. As on the Wechsler tests, the controls' performance surpassed the delinquents' by a wide margin ( $P < .01$ ). The delinquents performed so poorly on Part B, with its strong verbal component, that their performance ( $X=109.68$  seconds) fell within the range of scores which were obtained by Reitan's (1955) Ss, all of whom suffered from major neurological disorders.

The results of inter-group comparisons on Halstead's Neuropsychological Battery yielded an overall trend which closely paralleled that of the WAIS and Trailmaking data. Again, the delinquents performed significantly worse than their controls on five out of seven of those tests which compose the Impairment Index, Halstead's summary measure.

The most profound differences which were observed between the groups occurred on the Category Test, which is a non-verbal concept-formation task in which Ss were required to effectively

utilize positive and negative reinforcement in order to form, and effectively act upon, various concepts. The poor performance shown by the delinquents on the Category Test is particularly significant if one stops to consider that aspect of this task which requires S to effectively integrate his past experience (positive and negative reinforcement) into the present problem in order to utilize these experiences to modify behavior into more adaptive patterns. The inability to profit from experience and the repeated use of poor judgement seem to characterize the delinquent's performance on both the Category Test and his overall life style.

The delinquents' performance on all three scales of the Tactual Performance Test (TPT) fell below that of the controls ( $P=.05$ ;  $P<.01$ ,  $P<.01$ ), although as predicted, these differences were less striking than the inter-group differences on the more conceptually oriented Category Test ( $P .001$ ). Noteworthy is the fact that while the differences between the groups in the time which was necessary for completion of the form-board task, which involves strong kinesthetic and motor components, just barely reached significance at the .05 level. The Ss, when asked to reproduce in a drawing those figures which had just been manually manipulated and to then locate those figures in a "cognitive map" showed mean differences between the groups which were more distinct ( $P<.01$ ). The delinquents' scores on these more perceptuo-cognitive tasks again clearly fell within the impaired range. This pattern indicates a further example of the trend in which the delinquent group performed slightly less effectively than, or on a par with, normal controls on more basic adaptive

abilities such as motoric abilities and simple mnemonic skills, but showed substantially more severe impairment of those psychological functions which require verbal mediation, concept-formation, and perceptual organization.

Consistent with the overall trend, in which the delinquents' more basic, i.e. less behaviorally complex, abilities appear to have developed to approximately normal levels, is the lack of significant difference between the group means on the Finger Oscillation test. This test measures primarily fine motor speed. Similarly, no significant differences were observed to exist between the groups, vis a vis the gross intactness of sensory functions, as assessed by the Examination for Sensory Imperception.

In summary, it appears as though there exists in the delinquent group an overall impoverishment of adaptive abilities in comparison to the level of performance of normal high school students. Less complex adaptive abilities seem fairly intact and have attained approximately the same level of development as normal controls sharing similar demographic characteristics. These intact abilities included motor skills, attentional abilities, and gross sensory functioning. The delinquents showed more extreme impairment in the verbal, perceptual, and non-verbal conceptual spheres. The concordance of these data with the following summary of the clinical interviews and clinical neuropsychological interpretations of these Ss is striking. This clinical profile (Siegal, 1973) illuminates the delinquent's more global adaptational patterns in light of his basic neuropsychological adaptive abilities:

Careful scrutiny of our neuropsychological test protocols revealed a rather typical picture of the boy who is sent to the Training School: he is typically a boy who has difficulty in conceptualizing or making sense out of the world which surrounds him. He usually doesn't have the verbal skills which are necessary to function effectively with the people with whom he interacts and in the situations in which he finds himself, (i.e., multi-problem families, ghetto life, and unsatisfactory teacher-student relationships in school, etc.). As a consequence of this conceptual and verbal impoverishment or deficit he has difficulty in making the complex interpersonal compromises and solutions which enable the more gifted individual to control his world and function more effectively in it. By virtue of the fact that, in spite of a mild degree of clumsiness or incoordination, the delinquent boys' motor capabilities, i.e., action; doing things with his hands, represent this most adaptive tool. The pattern which then results is an individual who, exercising what we would call poor judgment, acts swiftly and without thinking about the reasons for, effectiveness of, or the consequences of his actions.

Along similar lines, the boy's intellectual impoverishment and developmental immaturity and incoordination, have kept the boy from enjoying success experiences in academic, vocational, athletic and social endeavors. These are the kinds of achievements which our culture

values, and from which the non-delinquent boy derives a sense of satisfaction and self-esteem. The boy which we typically see at RITS, instead, has been forced by virtue of his own ineptness at living, to seek out alternate or deviant ways to bolster his damaged self-esteem and to find his place in life. The frustration of his unsuccessful attempts at living serve to generate anger and aggressive behavior which only exacerbate his difficulties legally and interpersonally.

It is vital to emphasize, however, that the "typical" delinquent which we have just described is an abstraction and by no means represents the wide variety of differing abilities and inadequacies which each child at the training schools presents. This abstraction does highlight various trends which seem to be endemic to this population; wide-spread individual differences occur within the context of the general picture which we have described.

Hopefully the following vignette will serve to highlight the utility of the "delinquent self-image" in counteracting the deep-seated feelings of inferiority which many of the delinquent children experience as the result of the shortcomings, disappointments, and failures which attend the life of the impaired individual. During the time in which the delinquents were being examined it was customary to drive each boy from the intake cottage at the Boy's Training School to the Laboratory which was housed at the Training School for Girls. It was requested by the administrators

that the boys be kept in handcuffs while being transported. The writer would, typically, handcuff the boy apologetically while in the presence of the guards and later remove them once out of the guard's sight. Subjects would typically remain unshackled until it was time to re-enter the cottage. On one particular day a boy with an obvious microcephalic condition, asymmetrical gait, and who radiated an aura of intellectual incompetence, was being driven to the Lab. As we approached the Training School for Girls the boy noticed a group of young female inmates who path we were obviously about to cross. The boy turned to me and suddenly began to plead that he be placed in handcuffs; he stated that the reason for his request was to help him look more attractive to the girls. It then became apparent that it must be infinitely less anxiety arousing for these impaired boys to approach their peers in the role of "Dillinger" rather than as "Quasimoto."

This same vignette also provides an opportunity to demonstrate the manner in which neuropsychological explanation articulates with the already existing approaches to the study of the delinquent. The neuropsychological approach provides data which are complementary to those which are provided by the Sociological, Psychodynamic-Interpersonal and Constitutional-Organic approaches. Neuropsychological findings may be used fruitfully in deepening our understanding of the data and constructs which are used by these three other approaches. Perhaps the most important single contribution which neuropsychological assessment can make grows out of

its potential to define newer, more homogenous sub-groups of delinquents. With this increment in homogeneity within more precisely defined diagnostic classifications it can be anticipated that explanatory concepts would gain greater specificity and accuracy. Neuropsychological assessment, then, could provide not only a new object of study for the already existing approaches, i.e., redefined patient populations, but could also provide additional dimensions to the explanatory constructs which are already in use.

#### From Adaptive Disabilities to Learning Disabilities

It may be more useful for some users of this research to conceptualize the deficits we found in terms of customarily-used disabilities commonly found in youngsters of elementary school age. One of the more significant interpretations of this research is that the adaptive deficits we found are not different from those that are routinely being diagnosed in children with early school learning problems. The inescapable fact, then, becomes one where it appears as though the youngsters who become delinquent are those whose learning disabilities did not become diagnosed and who went through the viciously escalating cycle of behaviors that ends up in a life style predisposing the child to delinquent behavior as the only possible response to the continual frustration and humiliation caused by his disability. Table 4, then, translates the adaptive deficits found on the Halstead-Reitan battery into terminology that would be more meaningful for learning disability remediation.

Table 4 is summarized in two ways. The larger number (second column on the table) is data taken for all youngsters

we've seen, regardless of randomness or other experimental sampling considerations. Once methodological concerns are exercised, many youngsters were excluded from the experimental sample due to factors which might confound interpretation. The selected sample, then, is in the first column. Which figures you use depend on your purposes. If you are interested in looking at the total picture, regardless of making hypotheses about causation, then the second column is more appropriate. I think that the less selected group is most realistic for this group, since you need a picture of what these youngsters are like.

Table A

Specific Disabilities Found in 46 Selected, and 122 Non selected, adolescent delinquents

<u>Disability</u>	<u>No. of Times Occurring</u>	
	<u>N=46</u>	<u>N=22</u>
Visual-perceptual or visual-motor disability	14	67 (55%)
Perceptual-motor disability other than visual	8	38 (31%)
Impaired nonverbal concept formation	12	37 (31%)
Auditory discrimination or memory disability	8	35 (30%)
Impaired kinesthetic feedback	14	31 (28%)
Nonspecific dyslexic disorder	4	18
Arithmetic reasoning	3	11
<u>TOTAL NO. SHOWING AT LEAST ONE MAJOR DISABILITY</u>	<u>26(56%)</u>	<u>86(70%)</u>

These data are sobering. Seventy percent of the youngsters being imprisoned in the training school had measurable disabilities significant enough to warrant professional attention. Examination results indicate that these disabilities have been chronic - that is,

they have existed for some time, perhaps from birth, without having been noticed by anyone associated with the child. We are currently evaluating a control group of youngsters in a city high school who come from similar socio-economic backgrounds but have not been delinquent. Although final results aren't completed, early data on about 1/2 of the control group indicate that the percentage of disabilities there will run at about 20%. It is important to remember that we are not making any statements about etiology or causation of these disabilities. We feel that, at this point in the lives of these young people, questions of causality are academic. It is clear that these disabilities exist, that we have failed to find them, and that the resultant effects on the lives of these youngsters have forced them out of the mainstream of society.

These figures certainly don't portend that every disabled child who doesn't get treated will become delinquent. Nevertheless, after carefully reviewing the case histories of these youngsters, I feel that our project has demonstrated that failure to recognize significant disabilities early in a child's school career sets into motion a devastating series of events that, for a large number of unfortunates, ends up a reformatory or juvenile court.

The cycle begins with early problems at home. The child was showing perceptual and attentional problems even prior to school, but the behavior was written off as "ornery" or "uncooperative" personality. The child enters the early grades of school already accustomed to the fact that he won't be able to do things as well as expected of him, that he will fail and be humiliated continually. This prophesy is fulfilled in school as teachers, considering the

child a "behavior problem", punish and ridicule him for failures or for behaviors that he cannot control. The child begins to think of himself as a loser, as someone who can never hope to live up to what people expect of him. Rather than face the embarrassment of continual failure in front of friends and teachers, the behavioral signs become even more pronounced. Clowning around and general disruptiveness become the ways which best insulate this youngster from having to face continual and repeated failure. He becomes much more successful as a clown or troublemaker than he ever could be as a student. Teachers now are completely diverted away from any learning problems and concentrate solely on how to deal with the child's behavior. He gets further and further behind, becomes more and more of a problem. Eventually he's suspended, drops out or is thrown out of school to roam the streets, and the inevitable road to delinquency is well under way. The original problems have never been dealt with; the child is thought of as incorrigible. His problems are seen as psychogenic, not as the result of deflated self-esteem and fears of inadequacy, all of which have been generated by disability. His prophecy of himself as a loser has been fulfilled.

Once the cycle begins it is vicious and insidious. Once a child appears in court it has already been mentioned that 80% will be back. What hasn't been mentioned is that, when they return, it will usually be for continually increasing seriousness of offenses. While the first offense may be for truancy or breaking and entering, later offenses usually involve assault or the use of dangerous weapons. And we also know that 75% of the inmates of most adult prisons began their careers as juvenile offenders. The record is discouraging. It is all the more frustrating since at no point

in this destructive cycle has the basic disability been addressed:  
not in school, not in the courts, not in rehabilitation institutions. Teachers, who should be the most logical personnel to discover learning problems, are hopelessly untrained to do so. Judges can't be expected to be able to diagnose disabilities, but even if they could, most correctional institutions wouldn't know what to do with them. The youngsters are treated either as criminals or as seriously psychopathological, with no attention directed toward the basic disability

#### Summary and Conclusions

Forty-five incarcerated juvenile delinquents and controls, who had been matched on age, race, sex and socio-economic background, were examined using the Halstead Neuropsychological Battery. The significant differences which were observed to exist between the sample means on almost all of the Wechsler scales and on the majority of Halstead's tests indicate, rather clearly, that the delinquent group showed marked impairment in most critical adaptive abilities when compared with normal controls. The delinquents, as a group, produced neuropsychological protocols in which the most striking deficits occurred in the areas of concept formation and utilization, verbal-symbolic manipulations and perceptual organization.

The results of a discriminant analysis of the neuropsychological protocols indicated that the difference in patterning of adaptive abilities which was observed to exist between the delinquents and their controls was marked. The use of discriminant functions based on five neuropsychological predictors permitted correct classification of 87 percent of the delinquents as delinquents.

The delinquent group was, therefore, shown to have a relatively stable and predictable profile of neuropsychological characteristics which was indigenous to a substantial portion of the delinquents who were studied. Those neuropsychological measures which best discriminated delinquents from controls were, in order, Performance IQ, Halstead's Impairment Index, Verbal IQ and Parts A and B of the Trailmaking Test.

The identification of such a well-defined pattern of deficits in a substantial portion of those delinquents who were studied, raises the question of the role which these neuropsychological characteristics played in the etiology of the delinquent life-style which these boys have evolved. Although post-facto speculations have been offered in the present discussion, longitudinal studies of children with and without the delinquent neuropsychological profile would clarify the etiological role which these patterns of adaptive deficits play in the genesis of delinquent behavior.

Several hard recommendations seem in order as a result of this research.

1. Since undetected adaptive or learning disabilities have been found to play an important etiological role in the development of the life style that results in delinquency, there is an urgent need to detect these high-risk youngsters before they encounter the frustration and failure that results in the insidious delinquency cycle. These detection programs are available, and specifically:

- 1A) Every school system in the state should be required to provide mandatory disability detection screening

during the year prior to entrance to the first grade. This can be done through the use of any one of a number of detection systems currently available. Existing school personnel could be used, or nonprofessional assistants could easily be trained to administer them. This would cost relatively little and would screen out approximately 20% of children for further evaluation. The system used by Warwick Project Team or Project First Step, or the SPELD system used in Australia, are only two of the possible types of detection systems which should be used. No youngster should be allowed to enter first grade without this screening.

- 1B) The 20% screened out should then be evaluated in more detail by appropriately trained school psychology personnel, or should be referred to practitioners in the community trained to identify incipient disabilities. It cannot be over-emphasized that personnel doing this advanced screening must present evidence of adequate and substantial training in the detection of early learning disabilities. Simple holding of certification or professional degrees does not insure training in disability detection.
- 1C) Approximately half of those further evaluated, or about 10% of school students will probably be found to have significant enough skill deficit. These students will probably be able to be

handled in the mainstream of regular school classes with extra resource teacher support. Important is that the disability will have been identified and addressed before it gets to the point where the child gets too far behind and fails.

- 2) The results presented here call for a wholesale restructuring of the kinds of things done in the Rhode Island Training Schools for the rehabilitation of delinquency. This data, and other research supporting it in different parts of the country, indicate that what delinquents need most is not psychotherapy or medical treatment, but a detailed analysis of their skill deficits and appropriate remediation or skill-building. A program of this type is already available and in practice in the Lathrop Park Youth Camp near Denver, Colorado (instituted directly as a result of this research) and has shown great success with over 400 boys (Compton, 1974).

- 2A) Boys admitted to the Training School should undergo a detailed skill assessment battery sufficiently specific to allow assessment of the strengths and weaknesses of skills and adaptive abilities.

- 2B) Once skills and skill deficits have been determined, remediative programs should be available for helping to strengthen the deficit skills of those boys whose assessments indicate that they could benefit from it.

- 2C) In the cases of those youngsters where the assessment have indicated skill deficits too severe to be remediated, programs should be

- 2C) constructed that would develop vocational skills utilizing the youngster's strengths and minimizing his deficits. The youngster must be in a skill building program where he can feel successful or feel the hope of becoming so.
- 2D) Psychotherapy, counseling or medical treatment should be minimized as useful treatment procedures for delinquents. 70 years of failure should have convinced us that these approaches just don't work. The entire approach of a Training School should be on assessment of skills and skill deficits and appropriate remediation and training.
- 3) It is useless to assume that these youngsters will ever be able to get anything out of regular academic school. This goal should be abandoned as frustrating and demoralizing for delinquents.
- 4) The Division of Vocational Rehabilitation must make itself available as a resource for these youngsters once their skills have been strengthened and they are ready for employment. The use of arbitrary age cut-offs for eligibility for DVR is detrimental to the best interests of these youngsters. Evaluative and assessment testing, as well as skill-building, will have been done. DVR will need to provide counseling, in the Training School, to help acquaint the youngsters with necessary job attitudes and habits, as well as to help in choosing vocational objectives. Then DVR

4): Continued.

must assist in placement.

5) The emphasis in treatment of delinquency should be away from large institutions emphasizing custody and counseling. While it is admitted that for a few youngsters such security and treatment are necessary, most delinquents have been found to react so favorably to the interruption of the failure cycle and the building up of useful skills that security is no longer a problem (Compton, 1974). Smaller, cottage-oriented, group living situations should be provided as an after care policy after the youngsters are released from the training school.

5A) Release from the training school should be based on a system that defines whether or not the youngster has acquired necessary skills and vocational plans to be able to care for himself. This will require the combined cooperation of Family Court, DVR, and RITS personnel.

5B) Release should not be to the home, but to one of the "halfway" or after care group living facilities, where staff personnel would be trained in assisting youngsters through the early frustrations of job-placement. If this cannot be done through group living centers counselors should be available for frequent home and on-the-job visits.

- 6) Staffing patterns of Training Schools should minimize psychological personnel, except those used in the assessment and skill building stages. Most staff members should be trained in helping disabled people gain useful skills, and rehabilitation counselors.
  
- 7) Disability detection training MUST be an absolute part of the training of every school teacher. Schools, teachers as a whole are scandalously unable to detect the difference between an unmotivated child and one who simply cannot perform any differently than he does. Most teacher training institutions fail in their responsibility to require that teachers be able to recognize and follow up on signs that a child may be having school learning problems related to disabilities.

Usually the most significant concern about instituting programs such as these is the cost factor. People, legislators ask "How much will it cost to do these things?" While there will be necessary some initial expenses, I think it might be more appropriate to ask "How much does it cost us not to be instituting such programs?" In Rhode Island, according to recent figures, it costs the taxpayers \$26,000 per year for each youngster in the R.I. Training Schools. Thus, for the average delinquent, who spends 3-5 years in a reformatory, the cost is around \$100,000 per child. This figure, though startling, does not include the expenses generated when 3/4's of these kids get older and become adult prisoners. Nor does the financial factor account for the misery and devastation

of human potential that current juvenile rehabilitation practices cause in this country.

Instead of sending delinquents to euphemistically named prisons, we should realize that these kids are pathetic, disabled, people who have never been successful at anything, who hate themselves for their inadequacies and who need disability remediation, encouragement and compassion in order to have a chance at making their lives useful or staisfying.

My experience with adolescent delinquents has been a frustrating thing, because I have become convinced by how miserable most of these young people feel about themselves. They hate themselves, have given up hope that anyone cares about them, and they make me feel miserable because I realize how much we have failed to be able to help them. I have joined the ranks of the many frustrated people who have attempted to become involved in the improvement of the quality of life of young people we call delinquent. Two statistics in particular have been most discouraging. The first is that recidivism rates among delinquents has climbed to a rate hovering around 85%. This is not a drastic increase from what has existed previously, but the rate has not declined and has even escalated somewhat from that reported 10 years ago. Secondly, the average age for first incarceration for delinquents is now below age 13 years for the first time, and this age is decreasing yearly. That means, that chances are strong that delinquents will be labelled by age 12 or 13 and will most likely remain so for the rest of their lives.

These numbers are stark testimony to the fact that, despite all the best efforts of judges, mental health and rehabilitation professionals, there has still been no systematic success in the fight against the waste of young lives. It seems to me that after 70 years of trying the best methods known to psychology, psychiatry and other areas of rehabilitation - after 70 years of utter failure and the waste of thousands of young lives - we ought to think about the possibility that we may have been approaching the problem the wrong way. Even a rat learns that after banging his head on the door he ought to try a different one.

List of References

- Aichorn, A. Wayward youth. New York: Viking Press, 1935.
- Perman, A. "Learning disabilities in juvenile delinquents." Paper presented to Dallas A.C.L.D., March, 1974. To be published in Academic Therapy
- Berman, A. and Siegal, A.H. "Estimate of the incidence of cerebral dysfunction in delinquent males: a neuropsychological study." Presented to Arkansas A.C.L.D., December 1974
- Birch, H.G. The problem of brain damage in children. In Herbert G. Birch (Ed.), Brain Damage in Children. Baltimore: Williams and Wilkins, 1964.
- Bradley, C. Behavior disturbances in epileptic children. Journal of the American Medical Association, 1951, 146, 436-441.
- Burks, H.F. The effect of brain pathology on learning. Exceptional Child, 1957, 24, 160-172.
- Casey, M. D., Blank, C. E., Street, D. R. K., Sevall, L. J., McDougall, J. H., and Skinner, J. L. XY chromosomes and anti-social behavior. Lancet, 1966, 2, 859-860.
- Compton, Richard. A plan for skill deficit training at Lathrop Park Youth Camp. Unpublished personal communication, 1974.
- Denhoff, E., Laufer, H.H., & Holden, R. H. "The Syndromes of Cerebral Dysfunction." Journal of Oklahoma Medical Assoc., 1959, 52, 360-366.
- Denhoff, E. Cerebral Palsy, the Pre-School Years. Charles C. Thomas: Springfield, Illinois, 1967.
- Denhoff, E. "The Relationship of Syndromes of Cerebral Dysfunction to Pediatric Practice." Pediatrics Digest, 1969, 11, 30-35.
- Denhoff, E. Unpublished paper, 1970.
- Diller, J. C. A comparison of the test performances of male and female juvenile delinquents. Journal of Genetic Psychology, 1955, 86, 217-236.
- Dixon, W. J., ed. BMD Biomedical Computer Programs. Berkeley: University of California Press, 1973.
- Eisenberg, L. Behavioral manifestations of cerebral damage in childhood. In Herbert G. Birch (Ed.) Brain Damage in Children. Baltimore: Williams and Wilkins, 1964.

- Eissler, K. R., ed. Searchlights on Delinquency. New York: International Universities Press, 1949.
- Ervin, F. R. Psychiatric aspects of epilepsy. In A. M. Freedman and H. I. Kanlan, Comprehensive Textbook of Psychiatry. Baltimore: Williams and Wilkins, 1967.
- Field, J. G. The performance - verbal IQ discrepancy in a group of sociopaths. Journal of Clinical Psychology, 1960, 16, 321-323.
- Filskov, B. and Goldstein, S. G. Diagnostic validity of the Halstead - Reitan Neuropsychological Battery. Journal of Consulting and Clinical Psychology, 1974, 42, 382-385.
- Foster, A. L. A note concerning the intelligence of delinquents. Journal of Clinical Psychology 1959, 15, 78-79.
- Freedman, Marcia. Sociopathic personality disorders I: Sociological aspects of juvenile delinquency. In A. M. Freedman and H. I. Kanlan, Comprehensive Textbook of Psychiatry, Baltimore: Williams and Wilkins, 1967.
- Gibbs, F. A. and Gibbs, F. L. Atlas of Electroencephalography, Vol. II: Epilepsy. Reading, Mass.: Addison-Wesley, 1952.
- \_\_\_\_\_. Atlas of Electroencephalography, Vol. III: Neurological and Psychiatric Disorders. Reading, Mass.: Addison-Wesley, 1964.
- Glasser, G. H. The normal EEG and its activity. In G. H. Glasser, EEG and Behavior. New York: Basic Books, 1963.
- Glasser, G. H. and Dixon, M. S. Psychomotor seizures in childhood. Neurology, 1956, 6, 606.
- Graham, F. E. and Kamano, D. Reading failure as a factor in the WAIS subtest patterns of youthful offenders. Journal of Clinical Psychology, 1958, 14, 302-305.
- Green, J. B. Association of behavior disorder with an EEG focus in children without seizures. Neurology, 1961, 11, 337-344.

- Gruenberg, F. M. Some epidemiological aspects of congenital brain damage. In Herbert C. Birch (Ed.), Brain Damage in Children. Baltimore: Williams and Wilkins, 1964.
- Guertin, H. H., Frank, G. H., Rabin, A. I., and Ladd, C. E. Research with the Wechsler Intelligence Scale for Adults: 1955-1960. Psychological Bulletin, 1962, 59, 2-26.
- \_\_\_\_\_ Research with the Wechsler Intelligence Scale for Adults: 1960-1965. Psychological Bulletin, 1966, 66, 365-409.
- Hare, R. D. Psychopathic Behavior: A Bibliography, Excerpta Criminologica. 1968, 7, 365-386.
- Hare, R. Some empirical studies of psychopathy. Canada's Mental Health, 1970-18, 4-9.
- Haufer, M. W., E. Denhoff & G. Solomons. Hyperkinetic impulse disorder in children's behavior problems. Psychosomatic Medicine, 1957, 19 (1), 38-49.
- Heimburger, R. F. and Reitan, R. M. Easily administered test for lateralizing brain lesions. Journal of Neurosurgery, 1961, 18, 301-312.
- Henry, C. E. Positive spike discharges in the EEG and Behavior abnormality. In Gilbert H. Claser (Ed.), EEG and Behavior. New York: Basic Books, 1963.
- Ingram, T. T. S. Pediatric Aspects of Cerebral Palsy. Edinburgh & London: E. & S. Livingstone LTD 1964.
- Knobel, M., Holman, M. & Mason, E. "Hyperkinesis and Organicity in Children." AMA Archives of General Psychiatry, 1956, 1, 319-321.
- Laufer, M. W. Cerebral dysfunction and behavior disorder in adolescents. American Journal of Orthopsychiatry, 1962, 32, 501-507.
- \_\_\_\_\_ Brain disorders. In A. M. Freedman and H. I. Kaplan (Ed.), Comprehensive Textbook of Psychiatry. Baltimore: Williams and Wilkins, 1963.
- Lehman, H. E. Psychophysiological and related approaches to psychopathology. In Silvano Arieti (Ed.), World Biennial of Psychiatry and Psychotherapy. Vol. I. New York: Basic Books, 1970.
- Levy, S. Post-encephalitic behavior disorder: A forgotten entity: A report of 100 cases. American Journal of Psychiatry, 1959, 115, 1, 602-1, 607.

- Manne, S. H., Kandel, A. and Posenthal, D. Differences between performance IQ and verbal IQ in a severely sociopathic population. Journal of Clinical Psychology, 1962, 18, 73-77.
- Marinello, T. J., Berkson, R. A., Edwards, J. A. and Bannerman, R. M. A study of the XYY syndrome in tall men and juvenile delinquents. Journal of the American Medical Association, 1960, 203, 321-325.
- Mark, V. H. and Ervin, F. R. Violence and the Brain. New York: Harper & Row, 1970.
- Maughs, S. B. Criminal psychopathology. In E. A. Spiegel (Ed.), Progress in Neurology and Psychiatry. Vol. 22. New York: Grune and Stratton, 1967.
- Mohr, G. J. August Aichorn: Friend of the wayward youth. In F. Alexander, S. Eisenstein, & M. Grotjahn (Eds.), Psychoanalytic Pioneers. New York:
- Morris, D. D. and Dolier, E. Childhood behavior disorders: Subtler organic factors. Texas State Medical Journal, 1961, 57, 134-138.
- Morrison, J. R. and Stewart, M. A. A family study of the hyperactive child syndrome. Biological Psychiatry, 1971, 3, 189-195.
- Poremba, Chester. Learning disabilities in troubled youth. Symposium on Youth in Trouble, Dallas ACLD, 1974.
- Prentice, M. M. and Kelly, F. J. Intelligence and delinquency: A reconsideration. Journal of Social Psychology, 1963, 60, 327-337.
- Rabin, A. I. The use of the Wechsler-Bellevue scales with normal and abnormal persons. Psychological Bulletin, 1945, 42, 410-423.
- Redlich, F. C. and Freedman, D. X. The Theory and Practice of Psychiatry. New York: Basic Books, 1966.
- Reed, H. B. C. "Biological Intelligence." Neuropsychology Laboratory, Indiana University Medical Center, 1959.
- Reitan, R. H. The Effects of Cerebral Lesions on Adaptive Abilities in Human Beings. 1959 ( mimeographed.)
- \_\_\_\_\_. Investigation of the validity of Halstead measures of biological intelligence. Archives of Neurology and Psychiatry, 1955, 73, 28-35.
- \_\_\_\_\_. Investigation of relationships between "psychometric" and "biological" intelligence. Journal of Nervous and Mental Disease. 1956, 123, 536-541.

- \_\_\_\_\_. The comparative effects of brain damage on the Halstead Impairment Index and the Wechsler-Bellevue Scale. Journal of Clinical Psychology . 1959, 15, 281-285.
- \_\_\_\_\_. : A research program on the psychological effects of brain lesions in human beings. In Norman R. Ellis (Ed.) International Review of Research in Mental Retardation. New York: Academic Press, 1966.
- \_\_\_\_\_. The needs of teachers for specialized information in the area of neuropsychology. In H. Cruickshank (Ed.) The Teacher of Brain Injured Children. Syracuse, New York: Syracuse University Press, 1966.
- \_\_\_\_\_. "Example of children with brain lesions and children with neuropsychological diagnostic problems." 1969. ( mimeographed.)
- \_\_\_\_\_. "Psychological effects of cerebral lesions in children." ( mimeographed.) Personnel Communication, 1972)
- Reitan, R. M. and Heineman, C. E. Interactions of neurological deficits and emotional disturbances in children with learning disorders: Methods for differential assessment. In Learning Disorders. Vol. III. Seattle: Special Child Publications, 1968.
- Richardson, S. A. The social environment and individual functioning. In Herbert G. Birch, Brain Damage in Children. Baltimore: Williams and Wilkins, 1964.
- Rodin, E. A. Psychomotor epilepsy and aggressive behavior. Archives of General Psychiatry, 1973, 28, 210-215.
- Rosenfield, G. B. & C. Bradley. Childhood behavior sequelae of asphyxia in infancy. Pediatrics, 1948, 2, 74.
- Schwade, E. D. and Geiger, S. G. Matricide with EEG evidence of thalamic or hypothalamic disorder. Diseases of the Nervous System. 1953, 14, 18-20.
- \_\_\_\_\_. Severe behavior disorders with abnormal EEGs. Diseases of the Nervous System, 1960, 21, 616-620.
- Shaw, C. R. The Psychiatric Disorders of Childhood. New York: Appleton-Century-Crofts, 1966.
- Siegel, A. M. "Annual Progress Report and Continuation Proposal: Neuropsychology Laboratory and Diagnostic Clinic." Presented to State of Rhode Island Governors' committee on Crime, Delinquency and Criminal Administration, 1973. ( mimeographed.)
- Silverman, D. Implications of the electroencephalographic abnormalities in the psychopathic individual. Archives of Neurology and Psychiatry, 1949, 32, 870-873.

- Smith, W. L. and Meyl, T. C. The effects of ethosuximide (Zarontin) on intellectual functions of children with learning deficits and cortical brain dysfunction. In W. L. Smith, M. J. Phillipus and G. L. Schmock (Eds.), Neuropsychological Testing in Organic Brain Dysfunction. Springfield, Illinois: C. C. Thomas, 1969.
- Smith, W. L., Phillipus, M. J. and Guard, H. L. Psychometric study of children with learning problems and 14-6 positive spike EEG patterns, treated with ethosuximide (Zarontin) and placebo. In W. L. Smith, M. J. Phillipus and G. L. Schmock (Eds.), Neuropsychological Testing in Organic Brain Dysfunction. Springfield, Illinois: C.C. Thomas, 1969.
- Small, J. G. The organic dimension of crime. Archives of General Psychiatry, 1966, 15, 82-89.
- Snence, J. T., Underwood, R. J., Duncan, C. P. and Cotton, J. W. Elementary Statistics. New York: Appleton Century & Crofts, 1968.
- Stehle, H. C. Thalamic dysfunction involved in destructive aggressive behavior directed against persons and property. Electroencephalography and Clinical Neurophysiology. 1960, 12, 264-265.
- Stubblefield, R. L. Anti-social and dyssocial reactions. In A. M. Freedman and H. I. Kaplan (Eds.), Comprehensive Textbook of Psychiatry. Baltimore: Williams and Wilkins, 1967.
- Sullivan, H. S. The Interpersonal Theory of Psychiatry. New York: W. W. Norton, 1953.
- Wagar, Lois. Unpublished Demographic Study of Training School Residents. Governor's Commission on Crime, 1972.
- Wechsler, D. The Measurement and Appraisal of Adult Intelligence. (4th Ed.) Baltimore: Williams and Wilkins, 1958.
- Weiner, J. H., Delano, J. G. and Klass, D. W. An EEG study of delinquents and non-delinquents. Archives of General Psychiatry. 1966, 15, 144-150.
- Weir, H. F. and Anderson, R. L. Organic organizational aspects of school adjustment problems. Journal of the American Medical Association. 1958, 166, 1,708-1,710.
- Weiss, G., Glinde, K. Perry, J. S., Doughas, V. and Nemeth, E. Studies on the hyperactive child. Archives of General Psychiatry. 1971, 24, 409-415.
- Wheeler, L. and Reitan, R. M. Discriminant functions applied to the problem of predicting cerebral damage from behavioral tests: A cross validation study. Perceptual and Motor Skills, 1963, 16, 681-701.

Winfield, D. L. and Ozturk, O. EEG findings in matricide; a case report. Diseases of the Nervous System, 1959, 20, 176-178.

Hoods, S. M. Adolescent violence and homicide: Ego disruption and the 6-14 dysrhythmia. Archives of General Psychiatry, 1964, 5, 528-534.

**END**

7 10/23/1944