THE USE OF ELECTROENCEPHALOGRAPHY AND MENTAL ABILITIES TESTS IN THE DIAGNOSIS OF BEHAVIORAL PROBLEM MALES

Thesis for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY

Robert Henley Woody

1964

THESIS

This is to certify that the

thesis entitled

THE USE OF ELECTROENCEPHALOGRAPHY
AND MENTAL ABILITIES TESTS IN THE DIAGNOSIS
OF BEHAVIORAL PROBLEM MALES

presented by

Robert Henley Woody

has been accepted towards fulfillment
of the requirements for

Ph.D. **degree in** Education

William W. Farquhar
Major professor
William W. Farquhar

Date September 17, 1964

ROOM USE ONLY

ABSTRACT

THE USE OF ELECTROENCEPHALOGRAPHY AND MENTAL ABILITIES TESTS IN THE DIAGNOSIS OF BEHAVIORAL PROBLEM MALES

by Robert Henley Woody

The study was conducted as part of the Psychological and Neurological Program sponsored by the Public Health Service, and administered by the St. Joseph County Health Department, Centreville, Michigan.

Problem

The purpose of the study was to determine if certain physical and psychological factors used as diagnostic indices differentiated between behavioral problem boys and well behaved boys as identified by classroom teachers.

The Sample

The classroom teachers who referred behavioral problem boys between the chronological ages of 8-0 years and 12-11 years, to the Psychological and Neurological Program during the 1962-63 academic year, were also asked to identify the two best well behaved boys in the same classroom. Thirty-five behavioral problem boys were paired with thirty-five well behaved boys from their same classrooms, with the following criteria controlled: referring teacher's

definition of the terms "well behaved" and "behavior problem," sex and race (all were Caucasian males), grade placement, approximately on chronological age, referring school district, and geographical area. Physical examinations revealed that all of the subjects were essentially normal in physical condition.

Procedure

Each of the well behaved and behavioral problem subjects were provided with the following: a parent-orientation to the diagnostic services, a physical examination, a psychological evaluation, and an electroencephalographic examination. On the basis of need, numerous children were provided an additional appointment with a consulting psychologist and/or a neurological examination. Subsequent to the diagnostic services, treatment services were available.

The data used to assess the differences between the groups were the Wechsler Intelligence Scale for Children, the Wide Range Achievement Test, and electroencephalograms. It was found that the groups did not differ significantly in chronological ages or actual grade placement. The electroencephalograms were re-rated after approximately eight months, and the electroencephalographer's intra-judge reliability was significantly different from zero ($r = .6676$). On the basis of a binomial

test (p = .059), the probability of being rated more normal or more abnormal on the second rating was not significant.

Findings

The level of significance was set at five per cent (.05) for all statistical computations. The three primary findings were:

(1) The well behaved and behavioral problem groups contributed identical numbers to each category on the EEG rating scale; that is, there was no significant difference in EEG abnormality between the two groups.

(2) On the basis of a point biserial coefficient of correlation (r_{pb} = -.07), there was no significant relationship between the abnormality of the electroencephalogram and the degree of difference between the Verbal and Performance Scales of the WISC.

(3) On the basis of a chi-square formula (X^2 = .0583), there was no significant difference in median variances of WISC subtest scores for subjects judged to have normal or borderline electroencephalograms and median variances for subjects judged to have mildly abnormal or abnormal electroencephalograms.

In addition, three secondary findings were:

(1) The well behaved subjects scored significantly higher than the behavioral problem subjects in WISC Verbal (t-value = 4.4039), Performance (t-value = 3.3825), and Full Scale (t-value = 4.6547) intelligence quotients.

(2) The well behaved subjects scored significantly higher than the behavioral problem subjects in both reading achievement (t-value = 3.6200) and arithmetic achievement (t-value = 3.5338)

(3) The two groups were compared on their mean scores on the eleven WISC subtests. The mean scores were not significantly different on the Comprehension, Picture Arrangement, Object Assembly, and Coding subtests; but the groups' mean scores were significantly different on the Information, Arithmetic, Similarities, Vocabulary, Digit Span, Picture Completion, and Block Design subtests.

Conclusions

Additional research is necessary to ascertain the intra-judge and inter-judge reliabilities in electroencephalography, especially when clinical judgment is involved. Similarly, the use of specific mental abilities subtests merits further investigation. If the findings of this study are verified in future replications, some of the diagnostic procedures currently practiced will have to be reappraised.

THE USE OF ELECTROENCEPHALOGRAPHY AND MENTAL ABILITIES TESTS IN THE DIAGNOSIS OF BEHAVIORAL PROBLEM MALES

By

Robert Henley Woody

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

College of Education

1964

ACKNOWLEDGMENTS

During the two academic years which this project has encompassed, many people have contributed an immeasurable amount of help in the operation of the diagnostic program, the collection and interpretation of the data, and the preparation of this manuscript.

Dr. William W. Farquhar, chairman of my doctoral guidance committee and personal friend, has given much assistance in critiquing the research at each stage in its development. He was especially helpful in the formulation of the research design and in the organization and presentation of the data. His personal guidance afforded to me throughout my graduate training has influenced my personal and professional philosophies.

Dr. James W. Costar and Dr. Norman Abeles, members of my guidance committee, have provided consultation on the project and have carefully critiqued this manuscript.

Dr. Ernest O. Melby, in addition to serving on my guidance committee and reviewing this manuscript, has provided me with a relationship that has influenced many of my personal beliefs, aspirations, and philosophical ideals. His stature, both personally and professionally, will continue to provide guidelines for my own life.

Dr. W. R. Storer, Director of the St. Joseph County Health Department, has given his cooperation from the initial planning stages to the compilation of data. Without his help in obtaining financial assistance and his approval of modifications in the program to facilitate the research, this project would not have been possible. Similarly, his staff have given tirelessly of their own efforts to insure that the Psychological and Neurological Program would be successful.

Dr. Donald W. Van Liere, Director of the Special Diagnostic Services at the Bronson Methodist Hospital in Kalamazoo, Michigan, has provided invaluable aid. He readily accepted me for a practicum in electroencephalography, made his EEG data available, made numerous suggestions on the development of the design and the interpretation of the data, assisted in the construction of the EEG ratings scale, and spent a considerable amount of time in making minute observations of the electroencephalograms in order to provide the types of ratings required for this research.

Miss Jane Divita has contributed needed editorial assistance. It is due to her efforts that poor communication, grammatical errors, and erroneous spellings have been eliminated.

Mrs. Barbara A. Bonawitz has helped in the computation of the statistical analysis.

Finally, all of the classroom teachers and administrators, the parents of the children, and the children themselves have each played small but meaningful parts in this entire project. It is through their roles that other behavioral problem children in the future may benefit from the results of this study.

R.H.W.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

CHAPTER I

THE PROBLEM

The modern classroom must provide a flexible curriculum that can be modified for each child. One of the major obstacles to creating an effective classroom learning environment is the behavioral problem child: the child who cannot or will not adjust to the socially acceptable norms for behavior and consequently disrupts his own academic progress and learning efforts of his classmates.

Statement of the Problem

The purpose of the study* was to determine if certain physical and psychological factors used as diagnostic indices differentiated between behavioral problem boys and well behaved boys as identified by classroom teachers.

Background and Need for Study

The behavioral problem child may present symptoms that result from both psychological disturbances and

---

*This project was supported in part by a Neurological and Sensory Disease Project Grant from the Public Health Service. Grant Number N2405 A62 was under the administration of Dr. W. R. Storer, Director, St. Joseph County Health Department, Centreville, Michigan.

neurological impairments. Research has revealed that any injury to the brain, regardless of how mild or minimal it may appear, is capable of producing behavioral changes.[1] Since more and more infants are surviving the potential hazards of prenatal life, childhood, and infancy, it may be assumed that there is an increase in the number of children who have at least some degree of minimal brain damage that, at least theoretically, may alter their behavior in learning and social situations.[2]

Brain damaged children are receiving far more attention at the present time than at any other point in the history of the behavioral sciences. No longer is the study of the physiological-behavioral relationship limited to medicine, but increased research and interest is being contributed by education, psychology, sociology, and anthropology. Diagnostic and treatment programs are developing rapidly on the national, state, and local levels. Colleges and universities are enlarging their curriculums to accommodate the professional training necessary to provide personnel for these flourishing

---

[1]H. Bakwin and Ruth M. Bakwin, Clinical Management of Behavior Disorders in Children, 2nd ed. (Philadelphia: W. B. Saunders, 1960).

[2]C. Bradley, "Characteristics and Management of Children with Behavior Problems Associated with Organic Brain Damage," Pediatric Clinics of North America (1957), 1049-1060.

services. The educator's increased responsibility for the brain damaged child has placed a new emphasis on the importance of the classroom teacher and other school personnel in the identification and diagnostic phases. Consequently, it is crucial that educational personnel, particularly the classroom teacher and members of the pupil personnel services staff, be prepared to contribute effectively their share in meeting the needs and problems presented by the behavioral problem child, regardless of etiology.

The initial question confronting the classroom teacher is: How do I identify the behavioral problem child? Then, after he has been identified: What should I do? But in many cases the classroom teacher may feel that her academic training does not qualify her to identify real behavior problems, at least not in the same manner as a skilled psychological or medical clinician. Regardless, the teacher is left with the responsibility of coping with the child's daily behavior and, in most instances, making the initial efforts to obtain the parents' cooperation in locating professional services.

In addition to the classroom teacher's difficulty in identifying the behavioral problem child and obtaining proper professional services for him, the auxiliary pupil personnel may not be equipped to provide all of the psychological services necessary. For example, in the

State of Michigan, the school psychologist or school diagnostician is approved through the Department of Public Instruction to evaluate children believed to be potentially suitable for a special education program for the mentally handicapped. Although this testing is to be restricted to children who are believed to be potentially mentally handicapped, personal experience has revealed that approximately two-thirds of the referrals involve children who are above the classification of mental retardation. In many school districts this estimate would be highly conservative, since there are many programs that do not attach this stipulation, despite the State recommendation, and will accept any referral regardless of what the child's difficulty may be. Because the training of the school diagnostician is aligned with the diagnosis of mental retardation, the referral system presents many cases that the diagnostician may or may not be capable of adequately confronting.

To accommodate the involvement of educational personnel in the identification, diagnosis, and treatment of the behavioral problem child, criteria must be established for each aspect. The teacher must know what types of behavior are suggestive of specific disorders; the objective instruments used in the diagnosis must be valid and reliable in delineating the disorder; and educational, psychological, and medical services must be provided to all children,

regardless of socio-economic level, race, or geographical location.

Bower[3] has stressed that the school, to uphold the commitments to the legal mandate of compulsory education, must have the "professional know-how" and the staff to implement the law and its intent for emotionally handicapped children. After personal visits to programs and a review of the literature, Bower[4] concludes that the problem of educating these children is a "critical" and "desperate" one for most school districts. He recommends that therapeutic activities be provided if the emotionally disturbed child is to succeed in learning, and that mental health consultation to teachers be a part of the preventive program. Knoblock[5] has also indicated the increasing "pressing need" to prepare professional workers, e.g., classroom teachers, to meet the educational programming needs of disturbed children.

To meet the needs of the behavioral problem child, numerous curricular changes must be made. These might include special staff personnel and referral sources for diagnosis and treatment, psychological and medical

---

[3]E. M. Bower, "The Emotionally Handicapped Child and the School," Exceptional Children, Vol. 26 (1959), 6-11.

[4]E. M. Bower, "The Emotionally Handicapped Child and the School: An Analysis of Programs and Trends," Exceptional Children, Vol. 26 (1959), 182-188.

[5]Knoblock, "Critical Factors Influencing Educational Programming for Disturbed Children," Exceptional Children, Vol. 30 (1963), 124-129.

consultants, and the inauguration of various types of educational-therapeutic activities, e.g., adjustment classes, child study programs, group and individual counseling, parent counseling, and human relations classes. The educator will have to be aware of new personal and professional responsibilities, and continually strive to develop the abilities necessary to cope with the problems.[6, 7]

The classroom teacher will find that criteria for referrals for professional services are ambiguous. For example, although some studies have shown that the lower the academic achievement the higher the problem tendencies,[8] the experienced teacher will recognize immediately that poor achievement alone does not necessarily reflect behavior problems. Therefore, there is a distinct need for incorporating both the classroom teacher's perception of behavior problems and the psychologist's clinical percepts into criteria that can be generalized to behavior problems exhibited in the classroom. Hopefully, these criteria would define objectively the relationship between

---

[6] E. M. Bower, "The Emotionally Handicapped Child and the School: Present Research Plans and Directions," Exceptional Children, Vol. 26 (1960), 232-242.

[7] K. D. Juul, "Education for the Mentally Ill," Michigan Education Association Journal, Vol. 37 (1959), 286, 314.

[8] W. C. Olson, Problem Tendencies in Children: A Method for Their Measurement and Description (Minneapolis: University of Minnesota, 1930).

teachers' opinions and the data obtained from diagnostic instruments and clinical judgments.

The comprehensive diagnosis of emotionally disturbed children and children with brain damage usually includes a physical examination, a social case history, psychological testing with the psychologist's clinical impressions, an electroencephalogram (EEG), and a neurological examination. Unfortunately, not all of the techniques are considered equally valid, since the criterion is frequently based on the opinions of the psychiatrist or the neurologist. Attempts to establish statistical inter-relationships between the various sources of diagnostic data have been rather minimal because of the uncertainty of an empirical basis for comparison. Consequently, there is a need for inter-test and intra-judge reliability and validity studies.

Because of the complexity involved in the identification, diagnosis, and treatment of children with behavior problems, it is apparent that a multi-discipline approach is advantageous. As Margaret Gildea has stated:

> The school mental health program cannot stand alone but must be closely integrated into the matrix of social institutions in the community. For optimum functioning a child guidance clinic should be available where psychiatric treatment for individual children and parents can be found, if necessary. And for the sickest children, an in-patient service should

> be at hand. The school mental health program should function as one branch of the comprehensive community mental health services. [9]

In other words, although the educator is indispensable in the professional services designed to meet the needs of the behavioral problem child and has personal and professional responsibility to initiate and assure continuation of treatment programs, other social agencies, e.g., the health department or child guidance clinic, must also be included within the constellation of referral sources.

In summary, there appears to be a great need for empirical research controlling all relevant variables that will establish criteria for: the identification of behavioral problem children; referral sources, i.e., which would be the best referral source; the relationship between the psychological data and the electroencephalographic data; the reliability of the clinicians' judgments using diagnostic instruments, e.g., the judgments made by the electroencephalographer; the value of psychological tests in diagnosing brain damage, e.g., specific mental abilities subtests in the Wechsler Intelligence Scale for Children;

---

[9]Margaret C.-L. Gildea, "School Mental Health: Orientation, Methods and Screening," Orthopsychiatry and the School (New York: American Orthopsychiatry Association, 1958), p. 133.

differentiating between "behavioral problem" children and "well behaved" children as perceived by the classroom teacher, i.e., employing psycho-educational data, such as achievement and mental abilities tests.

Limitations of the Study

There are numerous limitations inherent to research on the mental health problems of children. Iscoe[10] recognizes that research is restricted by four areas of difficulty: (1) There is great disagreement over the definition of principal terms, e.g., "emotional security"; specific behavior symptoms do not always reflect the same underlying anxiety; and the isolation and control of significant variables are usually unattained. (2) Assuming that the variables can be properly isolated, defined, and controlled, the assessment of the efficacy of preventive measures is uncertain. (3) The genetically oriented theories of personality development necessitate the inclusion of information from child and developmental psychology; i.e., many theoretical personality components are difficult, if not impossible, to validate experimentally. (4) School systems are not always cooperative with research workers and/or other mental health agencies; that is, there is a

---

[10] I. Iscoe, "Some Problems of Mental-Hygiene Research with Children," Mental Hygiene, Vol. 37 (1953), 441-444.

a distinct need for cooperative research in mental health, investigations that will include the sociological, psychiatric, psychological, and educational aspects of the problems. In addition to these, there is great financial expense involved in collecting psychological and medical data. Consequently, many published studies are based on rather small samples; in fact, many samples are so small that the data cannot be used to generalize about the total population. Similarly, there is great personal expense involved in this type of research. For example, although classroom teachers can refer behavioral problem children and diagnostic data can be collected, it is extremely difficult to compare the data to a similar group of normal or well behaved children. Obviously, this would require the cooperation of the parents of the normal or well behaved children. Many parents, perhaps lacking incentive or because there is no problem present, refuse to cooperate or volunteer for a normative study.

In view of the aforementioned factors, it is recognized that an attempt to identify behavioral problem children within the classroom, provide them with diagnostic and treatment services, and collect the data in such a manner that they will be usable for creating concepts that can be generalized to the entire population will necessitate a control group of normal or well behaved children, referred by the same classroom teachers, provided with the same

diagnostic services and, if necessary, treatment programs; finally, a high degree of parental cooperation is essential.

In order to adhere to these criteria, it is necessary to sacrifice several technical aspects that would be ideal from a research standpoint. Because the expense must be covered by an existing program, referrals cannot be clearly limited to a select type of behavioral problem child, but every child within a broad operational definition must be included. The diagnostic services must be provided by the same clinicians, and it is not possible to have duplicate services provided for reliability purposes. For example, it is feasible that an electroencephalogram should be interpreted by several judges, but because there is usually only one electroencephalographer in a particular institution and geographical area and the medical records will usually not be released by the hospital administration for use in other programs, the data from the electoence-phalograph must be based on the judgment of one clinician. It is possible, however, to ascertain intra-judge reliability, which should serve as a definite indication of the value of the protocols.

Definition of Terms

The key term that must be defined is "behavioral problem" child. As has been previously indicated, the

etiology of unacceptable behavior might be either emotional or neurological. A review of research reveals that children diagnosed as emotionally disturbed or neurologically damaged receive a variety of diagnostic labels. For example, the child with neurological damage may be placed into any one of the following categories, depending upon the preference of the diagnostician: brain damaged, brain injured, possessing organicity, neurologically impaired, perceptually disturbed, hyperkinetic, or representing the syndrome of cerebral dysfunction. Similarly, the emotionally disturbed child could receive a classification, many of which are inappropriate when used with children, that will supposedly distinguish him from other exceptional children. Bower[11] has noted the difficulty in selecting the proper term. He believes that the best definition should be operationally related to the possibility of early detection and intervention by school personnel. The controversies and the variety of modes for diagnostic classification will be exemplified in the chapter devoted to the review of the literature.

Because the data for the study were drawn from an existing psychological and neurological program designed to serve "behavioral problem children," the operational

---

[11]Bower, "The Emotionally Handicapped Child. . .," op cit., 6-11.

definitions used in the initial application for approval from the Federal Public Health Service must be used. The definition was provided to the school personnel in the service area by an information sheet (See Appendix A) and personal orientations in staff meetings provided by the county health nurses. The information sheet stated:

> WHAT CHILDREN ARE ELIGIBLE - Any child whose behavior is abnormal. He may be an aggressive trouble maker or a shy withdrawn child. He may exhibit anti-social or criminal tendencies or he may merely appear confused.
>
> WHAT CHILDREN ARE NOT ELIGIBLE - The definitely retarded. These should be referred to Special Education.

Essentially, any child, with the exception of the mentally handicapped, who was referred by the classroom teacher (from either public or private schools) was accepted in the diagnostic program. Occasionally a parent initiated the referral, but the classroom teacher always had to agree to the referral before the child would be accepted. Therefore, the behavioral problem children were defined by the opinions of the classroom teachers. Likewise, as will be clarified subsequently, their counterparts, the "well behaved" children, were selected from the same classrooms by the same classroom teachers. In other words, each classroom teacher who referred a "behavioral problem" child, and thus used her own definition, also referred a "well behaved" child from the same classroom, again using her own definition.

Hypotheses

In view of the relevant professional literature, the goals and objectives of the diagnostic program, and the established educational and psychological needs of the behavioral problem child, the following research hypotheses will be tested:

Research Hypothesis I: The behavioral problem subjects have more electroencephalograms ranked as abnormal than the well behaved subjects.

Research Hypothesis II: The subjects, regardless of group, with mildly abnormal or abnormal electroencephalograms have more difference between the Verbal Scale and the Performance Scale intelligence quotients on the Wechsler Intelligence Scale for Children than those with normal or borderline (non-specific) electroencephalograms.

Research Hypothesis III: The subjects, regardless of group, with mildly abnormal or abnormal electroencephalograms have more subtest scatter on the Wechsler Intelligence Scale for Children than those with normal or borderline (non-specific) electroencephalograms.

Research Hypothesis IV: The well behaved subjects obtain intelligence quotients on the Wechsler Intelligence Scale for Children that are significantly higher than those obtained by the behavioral problem subjects.

Research Hypothesis V: The well behaved subjects have less difference between their actual grade placements and their academic achievement grade placements in reading and arithmetic, as measured by the Wide Range Achievement Test, than the behavioral problem children.

Although the directional alternate hypothesis is not testable because of confusion and lack of support in previous studies, the groups' performance on each of the eleven WISC subtests will also be compared.

Organization of the Study

In Chapter II relevant professional literature will be reviewed. Emphasis will be placed on the teacher's role in the detection of the behavioral problem child, the psychology and neurology of the behavioral problem child, achievement data as indices of behavior problems, the use of mental abilities or intelligence tests in diagnosis, other psychological tests used in diagnosis, the use of electroencephalography, and several selected studies that are similar and especially applicable to this study. The design and methodology of the study will be presented in Chapter III. The limitations imposed by the administrative regulations, the referral procedure, the cooperating professional personnel, the population and sample, the diagnostic procedures, instrumentation, and the mode of statistical analysis will be discussed. Chapter IV will include a statistical analysis of the data. A summary, conclusions, discussion, and implications for research will be presented in Chapter V.

CHAPTER II

REVIEW OF THE LITERATURE

The identification, diagnosis, and treatment of the behavioral problem child involves research from several of the behavioral sciences. Education, psychology, sociology, and medicine, especially neurology and psychiatry, have made beneficial contributions. This chapter will review the major findings in the literature. The format will be: the teacher's role in the detection of the behavioral problem child, the psychology and neurology of the behavior problems, the use of mental abilities or intelligence tests, other psychological tests used in diagnosis, the use of electroencephalography, and selected studies that are similar and especially applicable to this study.

The Teacher's Role in the Detection of the Behavioral Problem Child

The primary underlying question is: Does the classroom teacher perceive behavior problems in the same manner as the clinician? It appears that the classroom teacher's ability to discriminate pathological behavior for purposes of referral is questionable. For example, Rivlin states:

> One reason why it is so difficult for the clinician and the teacher to discuss learning is that they see the problems so differently. Clinicians, thinking of the individual child's needs and problems, see the classroom as only one phase of the child's environment, and are apt to belittle the demands that the school makes to achieve its goals. Teachers, on the other hand, must deal with a group situation. While they, too, are concerned with the individual child, they cannot ignore the other youngsters in the class and they cannot ignore, either, the educational goals they are expected to reach by the end of the term or the year.[1]

Obviously, the objectives involved in a particular setting may affect the teacher's perception.

Despite the above limiting influence, there is support for the belief that the teacher can accurately perceive behavior problems. Bower[2] states:

> Research points to the fact that teachers can, with some help, make good judgments about the adjustment capacities of their pupils. The problem is how to synthesize the different kinds of information and put various perceptual parts, like Humpty-Dumpty, back together again.

In the conclusions of his study, Bower indicates that "Teachers' judgments of emotional disturbance were very much like the judgment of clinicians."[3]

---

[1]H. N. Rivlin, "Classroom Discipline and Learning," Orthopsychiatry and the School, M. Krugman (Ed.) (New York: American Orthopsychiatry Association, 1958), p. 113.

[2]E. M. Bower, Early Identification of Emotionally Handicapped Children in School (Springfield, Illinois: Charles C. Thomas, 1960), p. 28.

[3]Ibid., p. 62.

One of the earliest studies of teachers' attitudes toward children's behavior was done by Wickman[4] in 1928. This classic study has served as the basis for numerous subsequent studies. One of the most recent, by Beilin, summarizes as follows:

> Wickman's findings of 1927 are interpreted as indicative of the role of the teacher in that era. The role expectations of teachers have changed. Replications of the Wickman study indicate these changes have resulted in greater congruence between teachers' and clinicians' attitudes. It is suggested by virtue of the teachers' essential task-orientation and the clinicians' adjustment-orientation that complete or nearly complete congruence is not likely to be achieved.[5]

This lack of congruence has been exemplified by failure of teachers and psychiatrists to agree on classifications of children's behavior.[6]

In a fifteen year follow-up of children initially referred by the classroom teacher, Fitzsimons[7] concluded that teachers were capable of selecting the children who needed psychological or psychiatric services. Potential delinquents and asthmatics were more successfully designated than children who became mentally ill.

---

[4]E. K. Wickman, Children's Behavior and Teachers' Attitudes, (New York: Commonwealth Fund, 1928).

[5]H. Beilin, "Teachers' and Clinicians' Attitudes Toward the Behavior Problems of Children: A Reappraisal," Child Development, Vol. 30 (1959), 22.

[6]A. Goldfarb, "Teacher Ratings in Psychiatric Case-Findings," American Journal of Public Health, Vol. 53 (1963), 1919-1927.

[7]Marian J. Fitzsimons, "The Predictive Value of

Cooper, Ryan, and Hutcheson[8] tested the hypothesis that emotional disturbance is manifested in classroom behavior and may be identified by observation of this behavior. On the basis of ratings on a check list and reliance upon a psychiatric evaluation as the criterion of emotional disturbance, the comparison of thirty children revealed the instrument to be reliable; and a positive correlation between the ratings and the psychiatric criterion was obtained. The authors concluded that classroom observation is an effective screening device for emotional disturbances.

The California State Department of Education has derived a screening procedure to help classroom teachers identify the pupils who probably have emotional problems and who should be referred for special diagnostic services. The data indicate that:

> Only 30 per cent of the group so identified were nominated by the principal and/or school psychologist as children with emotional problems. This finding suggests that about seven out of the ten children who are most probably emotionally handicapped probably are not noted or observed by principal or school psychologist.[9]

Teachers' Referrals," Orthopsychiatry in the School, M. Krugman (Ed.) (New York: American Orthopsychiatry Association, 1958), 149-153.

[8]S. Cooper, W. Ryan and B. R. Hutcheson, "Classroom Screening for Emotional Distrubance," American Psychologist, Vol. 14 (1959), 341.

[9]Nadine M. Lambert and E. M. Bower, A Process for In-School Screening of Children with Emotional Handicaps: TECHNICAL REPORT for School Administrators and Teachers, California State Department of Education (Princeton, New Jersey: Educational Testing Service, 1961), p. 27.

The findings also support, however, that teacher, peers, and self ratings are sensitive to various types of behavioral and emotional maladjustment. In another publication, the authors also state:

> There is also some evidence indicating that teachers, along with other professional personnel, have greater difficulty perceiving the patterns of maladjustment in girls than in boys. Undoubtedly, the manifest overt symptoms in boys permit teachers to be more confident about their perception of acting-out behavior.[10]

The California Study, based on the belief that teachers and others can recognize indications of behavioral and emotional maladjustments, has developed a battery of indices, which is still in the process of being standardized.

Eaton, Weathers, and Phillips[11] have studies the reactions of classroom teachers to behavioral problem children. Two hundred classroom teachers enrolled for summer graduate study reacted to a questionnaire and checklist. The authors concluded: (1) The majority of the teachers did not feel that the incidence of behavior problems was significantly increasing. (2) The inability

---

[10]Nadine M. Lambert and E. M. Bower, A Process for In-School Screening of Children With Emotional Handicaps: MANUAL for School Administrators and Teachers, California State Department of Education (Princeton, New Jersey: Educational Testing Service, 1961), p. 31.

[11]M. T. Eaton, G. Weathers, and B. N. Phillips, "Some Reactions of Classroom Teachers to Problem Behavior in School," Educational Administration and Supervision, Vol. 43 (1957), 129-139.

to cope with behavioral problem children influenced many teachers, particularly beginning teachers and teachers on the secondary level, to leave the teaching field. (3) There was diversity in the way that teachers viewed problem behavior, but, in addition to normal growth and development, the three most perceived causes were: large classes, inadequate teacher personality, and poor teaching techniques. (4) Many of the teachers felt a "need and desire" to have administrative assistance in handling behavior problems, and it seemed that adequate help in understanding and coping with the difficulties was not being provided. (5) Many teachers requested more in-service training programs as a means to increase their effectiveness in dealing with behavior problems.

It appears that studies involving teacher perceptions of behavior problems have achieved varying degrees of success. It is logical that the different frames of reference and objectives required by the institutional settings result in the classroom teacher perceiving behavior differently than the clinician. Regardless, there is evidence that the classroom teacher is capable, perhaps by using a rating scale or similar observational technique, of recognizing potential behavioral and emotional maladjustments. The research has revealed a reciprocal effect; that is, not only does the teacher influence the development and behavior of the child, but the behavioral problem

child appears to influence the teacher's reactions. If it is assumed that the classroom teacher is capable of recognizing behavior problems and has the responsibility to refer the child for special diagnostic and treatment services, it is necessary that criteria for identification and for referral must be established. As Sarason, Davidson, and Blatt have indicated, the classroom teacher must be "an astute psychological observer and tactician."[12]

The Psychology and Neurology of the Behavioral Problem Child

The initial attempt to define the term "behavioral problem" child, as used in this study, was restricted by the administrative regulations of the psychological and neurological program from which these research data were obtained. A survey of the literature, however, reveals that there are numerous opinions on what overt and covert factors actually justify the term.

The Behavioral Problem Child

In an international comparative study, Wall[13] summarized eight studies, encompassing samples ranging from five to sixteen years of age. He concluded that: the estimates of children showing some symptoms

---

[12]S. B. Sarason, K. Davidson, and B. Blatt, The Preparation of Teachers (New York: John Wiley, 1962), p. 36.

[13]W. D. Wall, Education and Mental Health (Paris: UNESCO, 1955).

of maladjustment ranged from 22 per cent to 42 per cent of the population; the estimates of children appearing to be seriously maladjusted ranged from 4 per cent to 12 per cent; the estimates of total percentages of children showing evidence of maladjustment, including all degrees of severity, ranged from 7.6 per cent in New Zealand to 49 per cent in the United States of America. It is interesting to note that the studies in the United States, as compared to the United Kingdom, New Zealand, and France, consistently reported higher incidences of maladjustment.

Eaton, Weathers, and Phillips, in a study cited earlier, defined "problem behavior" as:

> . . . all types of misbehavior in school, including violations of rules and work requirements and violations of moral standards. Admittedly, there are some obvious limitations to using the term problem behavior in this way. Teachers differ in the way they look at pupil behavior and in what they consider to be problem behavior. However, this is the way such behavior is usually identified, so for the purposes of this study the teacher's judgment was considered efficient.[14]

It is apparent that this definition, as does the one used in the present study, allows for an individual interpretation by the classroom teacher.

Many studies indicate that behavior problems are reflected in specific actions within the classroom. Lyons

---

[14]Eaton, et al., op. cit., p. 130.

and Powers[15] found that most student exemptions from the Los Angeles City Schools during the 1960-1961 academic year were based on emotional instability and hyperkinetic behavior.

Cummings[16] provides the following frequencies, based on an analysis of 239 children between two and seven years of age, of symptoms that are suggestive of maladjustment and may be observed in the school setting: excitability and restlessness 28.9 per cent; day-dreaming, lack of concentration, and laziness 28.9 per cent; generalized anxiety, timidity, and shyness 23.0 per cent; specific fears 22.2 per cent; bladder control, frequency of micturition difficulties 21.3 per cent; nervous habits 18.9 per cent; cruelty and aggression 15.1 per cent; babyish behavior and frequent crying 11.3 per cent; and lying and stealing 10.1 per cent. It should be acknowledged that these frequencies were compiled on a British sample and may not necessarily be applicable to an American population. This study does exemplify, however, the variety of suggested indices of maladjustment.

---

[15]Dorothy F. Lyons and Virginia Powers, "Follow-up Study of Elementary School Children Exempted from Los Angeles City Schools during 1960-1961," Exceptional Children, Vol. 30 (1963), 155-162.

[16]J. D. Cummings, "The Incidence of Emotional Symptoms in School Children," British Journal of Educational Psychology, Vol. 14 (1944), Part 3.

Rogers, Lilienfeld, and Pasamanick,[17] in a comprehensive study of the developmental psychology of the behavioral problem child, have analyzed teachers' reports and concluded that the unacceptable behavior might be classified as follows: assaultive 30.9 per cent, withdrawn 14.9 per cent, delinquent 30.6 per cent, nonconforming verbalizations 32.2 per cent, nonconforming physical behavior 46.3 per cent, nonconforming attitudes 51.0 per cent, confused-disorganized 22.9 per cent, fear 10.2 per cent, sexual 4.1 per cent, inadequate school work 37.5 per cent, bodily manipulation 5.5 per cent, physical complaints 11.0 per cent, hypoactivity 0 per cent, hyperactivity 37.5 per cent, and other (behavior not classified) 14.6 per cent. The higher percentages seem to be compatible with Keating's[18] belief that the primary antisocial characteristics of epileptic school children are irritability, temper, aggressiveness, and moodiness.

Despite the variety of possible classifications for problem behavior, Quay notes:

> There are certain recurrent, observable symptoms of problem behavior in children and these symptoms tend

---

[17] M. E. Rogers, A. M. Lilienfeld, and B. Pasamanick, Prenatal and Paranatal Factors in the Development of Childhood Behavior Disorders (Baltimore, Maryland: Johns Hopkins University, 1954).

[18] L. E. Keating, "Epilepsy and Behavior Disorder in School Children," Journal of Mental Science, Vol. 107 (1961), 161-180.

> to cluster into two major syndromes or symptom-clusters. These have been called the acting-out or the "conduct problem" and the withdrawn or "personality problem."[19]

After considering all of the aforementioned frequencies, different approaches to classification, and the possibility of unique definitions, one might question the reliability of teachers' selections. In other words, it may be questioned whether the entire scope of behavior disorders is represented in referrals from classroom teachers. Bower[20] found that teachers did, indeed, select approximately equal numbers of children who were aggressive or defiant and who were withdrawn or timid. This finding might serve to disprove the belief held by many that teachers do not recognize the shy, passive child, who may possess a behavior problem, but tend to refer only the acting-out child for special diagnostic services.

Assuming that the classroom teacher can detect behavior problems, it is necessary to determine what are reliable and valid indicators. Bower concludes that there are five criteria that may be visible in the classroom:

> An inability to learn which cannot be explained by intellectual, sensory, or health functions. . . .

---

[19]H. C. Quay, "Some Basic Considerations in the Education of Emotionally Disturbed Children," Exceptional Children, Vol. 30 (1963), 28.

[20]Bower, Early Identification of Emotionally Handicapped Children in School, op cit.

> An inability to build or maintain satisfactory interpersonal relationships with peers and teachers. . . . Inappropriate types of behavior or feelings under normal conditions. . . . A general, pervasive mood of unhappiness or depression . . . . A tendency to develop illnesses, pains, or fears associated with personal or school problems.[21]

Therefore, it does appear that there are a number of behavior problems that can be delineated into specific criteria for referral purposes, and these may be observed in the classroom setting.

The Brain Damaged Child

There is extensive research to support that many of the behavior problems observed in the classroom are the manifestations of neurological impairment. The professional literature refers to this type of handicapped child as being brain damaged, perceptually disturbed, hyperkinetic, brain injured, or possessing organicity. To provide a distinct definition, Strauss and Lehtinen state:

> A brain injured child is a child who before, during, or after birth has received an injury to or suffered an infection of the brain. As a result of such organic impairment, defects of the neuromotor system may be present or absent; however, such a child may show disturbances in perception, thinking, and emotional behavior, either separately or in combination.[22]

---

[21] Bower, "The Emotionally Handicapped Child. . .," op. cit., 8-9.

[22] A. A. Strauss and Laura E. Lehtinen, Psychopathology and Education of the Brain-Injured Child (New York: Grune & Stratton, 1947), p. 4.

The behavioral aspect of this definition is given the greatest recognition by some writers. For example, Lewis believes that:

> Behavior is the main clue to the parent that a disturbance exists. Because of perceptual and conceptual disturbances, the child tends to behave incongruously. Oddities appear in his behavior pattern which becomes uneven and unpredictable from the normal viewpoint.[23]

The behavior, however, of the brain damaged child is, in many cases, different from that exhibited by the emotionally disturbed. Morris and Dozier[24] believe that the child with organicity will behave in the office or anywhere in the manner described by the parents, but the emotionally disturbed child may be a "holy terror" elsewhere, and yet be quiet and cooperative in the office. Another impression of the authors is that in a lesser degree of organicity, the child has a history of good first impressions, followed by a rapid "wearing out" process with exactly the same timing in all kinds of situations.

In considering the use of the term "brain damage," or one of its synonyms, Taft[25] believes that the term is

---

[23] R. S. Lewis, The Other Child: The Brain-Injured Child (New York: Grune & Stratton, 1951), p. 31.

[24] D. P. Morris and Elizabeth Dozier, "Childhood Behavior Disorders: Subtler Organic Factors," Texas State Journal of Medicine, Vol. 57 (1961), 134-138.

[25] L. Taft, Brain Injury--Its Definition, Diagnosis, Causes and Treatment, Printed Resume of a Lecture (New York: New York Association for Brain Injured Children, 1958).

"all-inclusive." He does, however, believe that the results of neurological impairment may possibly be observed in motor impairment, recurrent convulsions, mental subnormality, and/or organic behavior disorders. This latter term, organic behavior disorders, has been closely investigated to determine if there is a typical syndrome of organic behavior.

Numerous authors have offered evidence of symptoms of the organic or hyperkinetic behavior syndrome. Fostig, Lefever, and Whittelseg[26] indicate that perceptual disturbances appeared in a large percentage of brain damaged subjects in their study. Laufer and Denhoff[27] believe that the essential symptoms of hyperkinetic behavior disorders are hyperactivity, short attention span, variability, impulsiveness and inability to delay gratification, irritability, explosiveness, and poor school work. They point out that this syndrome is more frequent in males than in females and in firstborn than in subsequent children, but they fail to provide statistics to support these statements. Bradley[28] has provided a similar list of symptoms:

---

[26]M. Fostig, D. W. Lefever, and J. B. Whittelseg, "A Developmental Test of Visual Perception for Evaluating Normal and Neurologically Handicapped Children," Perceptual and Motor Skills, Vol. 12 (1961), 383-394.

[27]M. W. Laufer and E. Denhoff, "Hyperkinetic Behavior Syndrome in Children," Journal of Pediatrics, Vol. 50 (1947), 463-474.

[28]Bradley, op. cit., 1049-1060.

unpredictable variation in behavior, hyperactivity, distractibility or short attention span, impulsiveness, irritability, and difficulties in abstract thinking. A further elaboration on essentially the same types of symptoms has been made by Denhoff, Laufer, and Holden.[29] In fact, Beck[30] reviewed the literature and found forty-three different symptoms of brain damage. The number of symptoms per author ranged from six to thirty-two. In addition to the varied terms and classifications, he noted that the authors wrote for different purposes and stated, "As a consequence, it is almost impossible to compare these writings for the purpose of making a normative study."[31] Beck concludes that the symptoms of brain injury, based on the "majority of the writers," can fit into fifteen categories: perseveration, distractibility, disorganization or lack of integration, perceptual difficulties, conceptual difficulties, language disorders, motor incoordination, disparity in development, hyperactivity, emotional instability, insecurity, irritability, convulsions,

---

[29]E. Denhoff, M. W. Laufer, and R. H. Holden, "The Syndromes of Cerebral Dysfunction," Journal of the Oklahoma State Medical Association, Vol. 52 (1959), 360-366.

[30]H. S. Beck, "Detecting Psychological Symptoms of Brain Injury," Exceptional Children, Vol. 28 (1961), 57-62.

[31]Ibid., p. 58.

mental deficiency, and poor retention. He does not, however, believe that there is any one specific symptom that must be present in a child with brain damage. Pond[32] also believes that while one, a few, or all of these symptoms or characteristics may appear in a neurologically impaired child, there are many organic children who will not possess them. The best example is intelligence: many brain damaged children possess average or higher intelligence. Schulman, Kaspar, and Throne,[33] in a relatively well designed study of mentally handicapped children, believe that the most commonly mentioned symptoms of brain damage are not well-documented, but are merely clinical impressions that have gained acceptance because of the longevity of their usage. Their investigation on hyperactivity, distractibility, emotional lability, and inconsistency resulted in the following results: "The only variable which approached unequivocal support as a correlate of brain damage regardless of extent or location of

---

[32]D. Pond, "Is There A Syndrome of 'Brain Damage' in Children," Cerebral Palsy Bulletin, Vol. 2 (1960), 296-297.

[33]J. L. Schulman, J. C. Kaspar, and Frances M. Throne, The Brain Damage Syndrome: A Clinical-Experimental Study (Unpublished Manuscript, Children's Memorial Hospital, Chicago, Illinois, 1963).

extent was distractibility. . . ."[34] There was no evidence for the belief that hyperactivity is a correlate of brain damage.

These studies readily exemplify the effect of brain damage upon behavior. Consequently, it is logical that social relationships, learning ability, and self-concept may be influenced by the physiological condition. Likewise, there is evidence that personality manifestations result from brain damage.[35]

It is not within the scope of this paper to enter into a detailed description of the etiologies of brain damage. But several key points should be mentioned. Bradley has stated:

> Clinical experience indicates that the majority of children with behavior problems due to brain injury experience their trauma early in life--during the prenatal period, in association with the birth process, or during the first two or three years of infancy.[36]

Bakwin and Bakwin[37] provide a detailed account of the possible etiologies of brain damage. Similarly, Taft[38]

---

[34] Ibid., p. 118.

[35] K. Goldstein, "The Effect of Brain Damage on the Personality," Psychiatry, Vol. 15 (1952), 245-260.

[36] Bradley, op. cit., 1050.

[37] Bakwin, et al., op. cit.

[38] Taft, op. cit.

provides the primary causes of brain damage, separating them according to the pre-natal, para-natal, and post-natal periods.

Difficulties in Diagnosis

The ambiguity of using symptoms for the basis of identification of organicity is obvious. This uncertainty supports the need for inclusive criteria for the diagnosis of brain damage; for example, a positive neurological examination and a negative psychological examination should be explainable. Masland, Sarason, and Gladwin[39] suggest that contradictory diagnostic results may easily be due to a failure in the measurement; the test may not be accurately evaluating all phases of the criteria. They cite the use of the electroencephalograph which, depending on the study and the children in the sample, may be compatible or discordant with either the neurological or the psychological examination. The authors interpret this as evidence to support their belief that no single diagnostic procedure is adequate; the neurologist must use multiple neurological and neurophysical measures, just as the psychologist must employ a differential test battery.

---

[39]R. L. Masland, S. B. Sarason, and T. Gladwin, Mental Subnormality: Biological, Psychological, and Cultural Factors (New York: Basic Books, 1958).

Failure to recognize individuality may adversely affect the diagnosis. For example, Doll states: " . . . Behavior details are viewed as symptoms, whose temporal incidence, particular manifestations, and hidden import may suggest a variety of interpretations."[40] Doll urges that the diagnostic information be valued only in the frame of reference of the patient's total social adequacy; and he warns that the brain damaged child, who is often "physically hyperactive and interpersonally resistive," may, via accessibility, create false diagnostic impressions.

The difficulty in diagnosing the behavioral problem child, whether emotionally disturbed or brain damaged, may reflect misuse of basic principles. Ackerman surveyed existing systems of diagnosis of mental disorders in children. He emphasizes the developmental aspects of children and states:

> Fundamental to all considerations of diagnosis and etiology of children's disorders is the principle that the child is not just a small edition of an adult. A child is a distinct organism. The psychobiological principles which govern a child's development and adaptation are unique. They must, therefore, be derived from the unique characteristics of the child's life rather than from observation of the problems of living of the adult person. For these reasons, identical criteria for diagnostic

---

[40] E. A. Doll, "Mental Evaluation of Children with Expressive Handicaps," American Journal of Orthopsychiatry, Vol. 21 (1951), 150.

> classification cannot be applied to child and adult alike. The issues of diagnosis in children must be viewed independently and in a separate adaptational context.[41]

Further, Quay states another diagnostic difficulty:

> We have had enough experience with behaviorally abnormal children to know that the standard psychiatric nomenclature is most often inapplicable to children.[42]

These few difficulties underlying the diagnosis of behavioral problem children in general should serve as a preface for many of the considerations that will evolve from the subsequent review of the literature that is pertinent to the use of mental abilities or intelligence tests, other psychological tests used in diagnosis, and the use of electroencephalography.

Achievement Data as Indices of Behavior Problems

Previously cited studies have indicated that behavioral problems, regardless of etiology, frequently affect academic achievement. It would seem, therefore, that behavioral problem children might be characterized by poor or under-achievement. That is, it is feasible that the behavior disorders would restrict learning efficiency,

---

[41] N. W. Ackerman, "Psychiatric Disorders in Children -- Diagnosis and Etiology in Our Time," eds., P. H. Hock and J. Zubin, Current Problems in Psychiatric Diagnosis (New York: Grune & Stratton, 1953), 206-207.

[42] Quay, op. cit., p. 28.

and result in academic achievement lower than would be inferred from the child's actual grade placement and/or mental abilities.

There is generally consistent support for the belief that emotional disturbances and organicity can affect academic achievement. Fitzsimons[43] made the generalization that children in her study who needed psychological or psychiatric services were characterized as not performing educationally at the level their mental abilities suggested. In a study of first grade children in the Minneapolis Public Schools, Olson[44] found that the lower the achievement the higher the problem tendencies or the higher the achievement the lower the problem tendencies. In comparing reading and arithmetic achievement test scores at the fourth, fifth, and sixth grade levels, Bower[45] found that the emotionally disturbed children ranked significantly lower than the other children in the class. The difference between the two groups was greater in arithmetic than in reading. The older the emotionally disturbed child became, that is, the higher the

---

[43]Fitzsimons, op. cit., 149-153.

[44]Olson, op. cit.

[45]Bower, Early Identification of Emotionally Handicapped Children in School. op cit.

grade, the greater the difference. Tamkin,[46] in a study of emotionally disturbed children, found a high percentage of educational disability, but his analysis of the data possessed some limitations. Consequently, Stone and Rowley[47] replicated parts of Tamkin's study, and they too found that emotionally disturbed children did not achieve commensurately with either their chronological ages or their mental ages derived from the Wechsler Intelligence Scale for Children. As has been repeatedly indicated in a previous section, the brain damaged child may reflect achievement deficits. Lawrence[48] feels that many learning problems in the public schools reflect minimal brain damage, and cites the example of a non-reader with average intelligence. It appears, therefore, that poor academic achievement or educational disability may characterize the behavioral problem child. It has been indicated that the degree of deficiency in achievement may

---

[46]A. S. Tamkin, "A Survey of Educational Disability in Emotionally Disturbed Children," Journal of Educational Research, Vol. 53 (1960), 313-315.

[47]F. Beth Stone and V. N. Rowley, "Educational Disability in Emotionally Disturbed Children," Exceptional Children, Vol. 30 (1964), 423-426.

[48]Margaret M. Lawrence, "Minimal Brain Injury in Child Psychiatry," Comprehensive Psychiatry, Vol. 1 (1960), 360-369.

correspond with the probability of behavior problems, and the etiology may be based in emotional or organic difficulties.

The Use of Mental Abilities or Intelligence Tests

The educator's responsibility for the identification of the behavioral problem child depends in part on the use of psychometric data. The school psychologist or counselor may be especially concerned with this phase of the process. Mental abilities or intelligence tests are the most common instruments employed. This section will review several of the essential considerations for the use of these tests and will emphasize their applicability to diagnosing brain damage, the importance of over-all intelligence level, the significance of a difference between verbal and performance factors, and the use of profile analysis for detecting various behavior disorders. In view of the design of this study and the frequency of its usage,[49] emphasis will be placed on the Wechsler Intelligence Scale for Children (WISC). It is recognized, however, that occasionally other mental abilities tests must also be considered but that many of the principles related to the

---

[49] A. B. Silverstein, "Psychological Testing Practices in State Institutions for the Mentally Retarded," American Journal of Mental Deficiency, Vol. 68 (1963), 440-445

Wechsler Intelligence Scale for Children will be applicable to all or most other tests of mental abilities or intelligence.

Psychological Tests and the Diagnosis of Brain Damage

There is a need for additional research on the use of psychological tests in the diagnosis of brain damage. Yates has stated: "It is doubtful whether any aspect of psychological testing has been more inadequately treated than the diagnostic assessment of brain damage."[50] Yates' analysis of the validity of psychological tests in the diagnosis of brain damage reveals that tests vary in success. Gutman,[51] as well as Laufer and Denhoff,[52] has firmly stated belief in the value of the tests, and Teuber, in his chapter on neuropsychology, states that ". . . there are enough specialized tests available to attack the problem of regional localization of psychological functions."[53] This positive value is contradicted by others; for example, Pond has stated:

---

[50] A. J. Yates, "The Validity of Some Psychological Tests of Brain Damage," Psychological Bulletin, Vol. 51 (1954), 374.

[51] Bridgette Gutman, "The Application of the Wechsler-Bellevue Scale in the Diagnosis of Organic Brain Disorders," Journal of Clinical Psychology, Vol. 6 (1950), 195-198.

[52] Laufer, et al., op. cit.

[53] R. E. Harris, J. G. Miller, G. S. Muench, L. J. Stone, H. L. Teuber, and J. Zubin, Recent Advances in Diagnostic Psychological Testing (Springfield, Illinois: Charles C. Thomas, 1950), p. 45.

> These [psychological tests] have become notoriously unreliable in the diagnosis of brain damage and it is safe to say that no questionnaire, intelligence test or projective test as yet devised gives unequivocal evidence of brain damage.[54]

Despite such criticism, as exemplified by Pond, the majority of research recognizes the limitations of psychological tests, but concurrently recognizes their potential value if they are adequately researched. The main problem seems to be an inability to differentiate, which is evident in Beck's comment:

> The big problem in differential diagnosis seems to lie in the ability, or lack of ability, of tests to distinguish between organic brain damage and emotional disturbances. This, however, assumes that the symptoms are the same, or can be the same, in both conditions. If this be so, then it would seem impossible to devise a test to distinguish between the two conditions, since the overt behavior which the test measures would be the same in either case.[55]

The above comment directly relates to one of the subsidiary objectives of this study. That is, it is necessary to determine whether mental abilities tests can differentiate between children who appear to possess brain damage, perhaps as suggested by electroencephalography, and those who have behavior problems but do not appear to be brain damaged. The potential value of psychological tests in

---

[54]Pond, op. cit.

[55]Beck, "Detecting Psychological Symptoms. . .," op. cit.

discerning various types of behavior problems will be clarified in subsequent sections of this chapter.

Importance of Over-all Intelligence Level

Although there are many behavioral problem children, both emotionally disturbed or brain damaged, who have average or higher intelligence, most studies indicate that a sample of these children will have a lower mean intelligence level than a sample of controls or normal children. Ross[56] found that intelligence scores after a brain injury were lower than the pre-injury scores. Rogers, Lilienfeld, and Pasamanick,[57] using the Kuhlmann-Anderson group test and selecting only children with an intelligence quotient of eighty or higher, found that the behavioral problem children scored significantly lower than the controls. Bower[58] in his study of emotionally handicapped children, found that while there were no significant differences between the scores of the emotionally handicapped and the regular classroom samples on the individually administered intelligence tests, that is, the Wechsler

---

[56]A. O. Ross, "Brain Injury and Intellectual Performance," Journal of Consulting Psychology, Vol. 22 (1958), 151-152.

[57]Rogers, et al., op. cit.

[58]Bower, Early Identification of Emotionally Handicapped Children in School, op. cit.

Intelligence Scale for Children and the Stanford-Binet Intelligence Scale, the group test results revealed the emotionally handicapped children to be significantly lower. Bower interprets this to suggest that emotionally handicapped children have greater variability between measurements made by individual and group tests than the normal population of school children. In a comparison of juvenile Negro congenital syphilitics, with possible brain damage, with a general population of Negro children, Young and Pitts[59] found the experimental sample was significantly lower than the controls in intelligence quotients. Reitan[60] found that the Wechsler-Bellevue intelligence quotients were significantly lower for brain damaged groups than in groups without brain damage. Beck and Lam,[61] in a study of educable mentally handicapped children in the public schools, found that the intelligence quotients on the Wechsler Intelligence Scale for Children were lower for those believed to possess organicity than for those without. The research, therefore,

---

[59]Florence M. Young and Virginia A. Pitts, "The Performance of Congenital Syphilitics on the Wechsler Intelligence Scale for Children," Journal of Consulting Psychology, Vol. 15 (1951), 239-242.

[60]R. M. Reitan, "The Comparative Effects of Brain Damage on the Halstead Impairment Index and the Wechsler-Bellevue Scale," Journal of Clinical Psychology, Vol. 15 (1959), 281-285.

[61]H. S. Beck and R. L. Lam, "Use of the WISC in Predicting Organicity," Journal of Clinical Psychology, Vol. 11 (1955), 154-158.

suggests that a sample of children with behavior problems might be significantly lower in intelligence than a group of controls.

Difference Between Verbal and Performance Subtests

A difference between verbal and performance subtests seems to be a valid indication of abnormality. In their study of the mentally handicapped, Beck and Lam[62] found that the organic group and the group of subjects who were possible organics had mean intelligence quotients on the performance scale lower than their mean intelligence quotient on the verbal scale, while the non-organics scored higher on the verbal scale than on the performance scale. Denhoff, Laufer and Holden,[63] while making suggestions about what psychological test data may be used for identifying the syndrome of cerebral dysfunction, state that a performance scale IQ at least ten points lower than the verbal scale IQ on the WISC with children over eight years old is a good indicator. This belief was, however, based on unpublished evidence, and attempts at personal communication with the authors failed to produce copies of the

---

[62] Ibid.

[63] Denhoff, et al., op. cit.

evidence. Schulman, Kaspar, and Throne state that although research supports that a verbal-performance difference in either direction on the Wechsler Adult Intelligence Scale is indicative of brain damage, these findings are "not directly transferable to children."[64] Consequently, since the difference between verbal and performance scales seems to identify abnormality, especially organicity, additional refinement is merited. The present study will attempt to verify the significance with behavioral problem children.

Use of Profile Analysis

There is evidence indicating that a profile analysis of a mental abilities test, for example, the WISC, will provide a valid and reliable means for differential diagnosis. Haynes and Sells[65] and Taft[66] have indicated that this seems especially appropriate for identifying subjects

---

[64]Schulman, et al., op. cit.

[65]J. R. Haynes and S. B. Sells, "Assessment of Organic Brain Damage by Psychological Tests," Psychological Bulletin, Vol. 60 (1963), 316-326.

[66]Taft, op. cit.

with brain damage. Here again, much of the research has been confined to adults. Goldenberg states: "The diagnostic value of item or pattern analysis of performance on the Wechsler Intelligence Scale for Children is essentially an unexplored area."[67] Haines[68] found that the Merrill-Palmer Scale of Mental Tests was not capable of the differential diagnosis of brain injured children from behavioral problem or foster home children. But research with the WISC, although limited in amount, has been more successful. Morris and Dozier[69] found that children with behavior problems frequently fall below their mean level of ability in the following areas on the WISC: arithmetic, digit span, block design, object assembly, and coding. The most frequent combination of subtests showing the lowest scores were: arithmetic--digit span--block design. It was also suggested that arithmetic and digit span, with either object assembly or coding, might constitute a

---

[67]A. A. Strauss and N. C. Kephart, Psychopathology and Education of the Brain-Injured Child, Volume II. Progressive Theory and Clinic (New York: Grune & Stratton, 1955), p. 147.

[68]Miriam S. Haines, "Test Performance of Preschool Children With and Without Organic Brain Pathology," Journal of Consulting Psychology, Vol, 18 (1954), 371-374.

[69]Morris, et al., op. cit.

diagnostic combination. Balthazar[70] and others[71] have achieved limited success using a profile analysis of the Wechsler-Bellevue to localize brain damage. Young and Pitts[72] found that their sample of Negro congenital syphilitics had significantly different scores from the controls on the following WISC subtests: information, vocabulary, coding, similarities, and object assembly. Specific item and subtest analyses have also been contributed by Altus,[73] Bakwin and Bakwin,[74] Denhoff, Laufer, and Holden,[75] Laufer and Denhoff,[76] and Wunderlin and McPherson.[77] Essentially, all of these writers support that behavior disorders, particularly those resulting from neurological impairment, can be detected in the profile of

---

[70]E. E. Balthazar, "Cerebral Unilateralization in Chronic Epileptic Cases: The Wechsler Object Assembly Subtest," Journal of Clinical Psychology, Vol. 19 (1963), 169-171.

[71]E. E. Balthazar, R. E. Todd, D. H. Morrison and P. W. Ziebell, "Visuoconstructive and Verbal Responses in Chronic Brain-Damaged Patients and Familial Retardates," Journal of Clinical Psychology, Vol. 17 (1961), 293-296.

[72]Young, et al., op. cit.

[73]Grace T. Altus, "A WISC Profile for Retarded Readers," Journal of Consulting Psychology, Vol. 20 (1956), 1955-1956.

[74]Bakwin, et al., op. cit.

[75]Denhoff, et al., op. cit.

[76]Laufer, et al., op. cit.

[77]R. J. Wunderlin and Marion W. McPherson, "Sensitivity to Imbalance in Normal and Anoxic Damaged Children," Journal of Clinical Psychology, Vol. 18 (1962), 410-413.

the mental abilities subtests. But, there are numerous contradictions and inconsistencies as to which subtests reflect specific abnormalities, and there is a definite need for further study in this area.

Other Psychological Tests

Because the emphasis of this study is on mental abilities tests, only brief mention need be made of other psychological tests that are frequently used in differential diagnosis. Bender[78] has developed a visual-motor test that has proved to be successful in diagnosing various types of disorders, as supported in the following studies: Goldberg,[79] Inglis, Colwell, and Post,[80] and Throne, Kaspar and Schulman.[81] In fact, Lawrence has stated the opinion:

---

[78]Lauretta Bender, A Visual Motor Gestalt Test and Its Clinical Use, Research Monograph No. 3 (New York: American Orthopsychiatric Association, 1938).

[79]L. R. Goldberg, "The Effectiveness of Clinicians' Judgments: The Diagnosis of Organic Brain Damage from the Bender-Gestalt Test," Journal of Consulting Psychology, Vol. 23 (1959), 25-33.

[80]J. Inglis, Catherine Colwell, and F. Post, "An Evaluation of the Predictive Power of a Test Known to Differentiate Between Elderly 'Functional' and 'Organic' Patients," Journal of Mental Science, Vol. 106 (1960), 1486-1492.

[81]Frances M. Throne, J. C. Kaspar, and J. L. Schulman, "Performance Time and Brain Damage Ratings," American Journal of Mental Deficiency, Vol. 68 (1964), 656-659.

"The Bender Visual Motor Gestalt Test is probably the best supporting test for the diagnosis of organicity."[82] The use of the Archimedes Spiral has also been successful in the diagnosis of brain damage. But, although research continues to support its usefulness, for example, Price and Deabler[83] and Goldberg and Smith,[84] the enthusiasm for the technique appears to have decreased. Yates[85] has revealed a variety of single factor and multi-factored psychological tests that may be used for differential diagnosis. The consensus seems to be that psychological tests can make accurate diagnoses, but the single factor test, for example, a block design test, is not as good as a multi-faceted battery of tests, for example, the WISC. Haynes and Sells have emphasized that the behavioral effects of brain damage must be treated as ". . . a sequentially ordered, multidimensional problem. A unitary score would conceal the multivariate nature of brain damage."[86] Therefore, the research supporting the use of other psychological

---

[82]Lawrence, op. cit., 365.

[83]Price, et al. op. cit.

[84]L. R. Goldberg and Philip A. Smith, "The Clinical Usefulness of the Archimedes Spiral in the Diagnosis of Organic Brain Damage," Journal of Consulting Psychology, Vol. 22 (1958), 153-147.

[85]Yates, op. cit., 259-279.

[86]Haynes, et al., op. cit., 323

tests seems to support the ability of the mental abilities tests, such as the WISC, to be used in differential diagnosis. That is, the mental abilities tests are multifactored and appear to measure the types of intellectual functioning that have proved to be indicative of various disorders. Psychological tests are frequently used in conjunction with other diagnostic measures, such as electroencephalography.

Electroencephalography

Electroencephalography (EEG) was first described by Canton in 1875, when he detected the spontaneous electrical activity in the brains of rabbits and monkeys. The current application of EEG took shape between the years of 1924 to 1938. Since the early publications, much research has evolved, with many claims being made on the diagnostic value of the EEG, claims that are many times not adequately substantiated with empirical data.

The interpretation of the electroencephalogram is based on four factors: (1) the amplitude or height of the waves, which is sometimes referred to as voltage or potential; (2) the frequency, whether fast, medium, or slow; (3) the regularity or irregularity; (4) the symmetry or asymmetry of the record. Maturation may have a significant influence, but a relatively stable, well-organized EEG measurement may be achieved by eight to ten years of age.

Distinctive patterns are believed to reflect particular conditions of the brain, such as an epileptic or a convulsive condition; special stimuli, for example, photic, sound, or drugs, may be used to elicit activity that cannot be recorded when the brain is at rest. "Artifacts" may be produced by extraneous sources of stimuli, such as gritting the teeth, snapping fingers, or noises outside of the room; but the skilled clinician can readily recognize these in the record.[87]

Much of the value of the EEG is dependent upon clinical judgment. Torres[88] has provided several criteria that enable the electroencephalographer to present a meaningful report, both technically descriptive and understandable. One difficulty in establishing inter-judge reliability for the interpretation of EEG records lies in the different terminologies or descriptive terms that are used. For example, Henry states:

> A survey of the literature dealing with the incidence of abnormalities in the EEG's of behavior problem and delinquent children indicates a need for a more precise and restricted definition of what is meant by "abnormal" waves and the "abnormal" records.[89]

---

[87] G. H. Glaser, EEG and Behavior (New York: Basic Books, 1963).

[88] F. Torres, "Electroencephalography in General Practice," Lancet, Vol. 82 (1962), 22-26.

[89] C. A. Henry, "Electroencephalograms of Normal Children," Monographs of the Society for Research in Child Development, Vol. 9 (1944), 65.

The International Federation of Electroencephalography and Clinical Neurophysiology[90] has subsequently provided an approved dictionary of EEG terminology. This is offered as an aid to standardizing the technical terms and perhaps eventually creating common criteria for various diagnostic categories. Dondey[91] and Walter[92] have further emphasized the need to use precise terminology and the need to follow a definite method in interpreting EEG records. That is, even if the data are to be analyzed by computing machines, the misuse of data by erroneous and inconsistent terminology and semantics can create unnecessary "human artifact." The heavy reliance of the EEG's value upon the electroencephalographer, coupled with numerous technical ambiguities, has left its over-all value still dubious.

The validity of several assumptions inherent to electroencephalography may be questioned. Bucy[93] cites that about ten per cent of individuals with no evidence of any kind of neurological abnormality will have abnormal EEG's.

---

[90] International Federation for Electroencephalography and Clinical Neurophysiology, "Preliminary Proposal for an EEG Terminology," Electroencephalography and Clinical Neurophysiology, Vol. 13 (1961), 646-650.

[91] M. Dondey, "EEG Terminology and Semantics," Electroencephalography and Clinical Neurophysiology, Vol. 13 (1961), 612-619.

[92] W. G. Walter, "The Vocabulary of Psycho-Physiology," Electroencephalography and Clinical Neurophysiology, Vol. 13 (1961), 447-448.

[93] P. C. Bucy, "The Clinical Use of Electroencephalography," Journal of Neuro-Surgery, Vol. 14 (1947), 442-447.

Ford[94] relates that ten to fifteen per cent of apparently normal individuals will show abnormal EEG records and that a rather large per cent, which he does not specify, of known epileptics show a normal record. Gibbs, Rich, Fois, and Gibbs,[95] in a study of mentally retarded subjects, suggest that although the individual may be abnormal in some clinical aspect, his electroencephalogram will not necessarily be abnormal.

There is evidence that electroencephalography is of value in the differential diagnosis of behavioral problem children. Bakwin and Bakwin[96] state that approximately sixty per cent of children with behavior disorders have abnormal EEG records, whereas only approximately twelve per cent of the general population have records which could be classified to be outside of the normal range. Similarly, Torres[97] states that approximately sixty to seventy per-cent of children with behavior disorders will have abnormal EEG records, but the percentage may vary between cases that represent a functional rather than an organic abnormality.

---

[94]F. R. Ford, Diseases of the Nervous System in Infancy, Childhood and Adolescence (4th ed.) (Springfield, Illinois: Charles C. Thomas, 1960).

[95]E. L. Gibbs, C. L. Rich, A. Fois, and F. A. Gibbs, "Electroencephalographic Study of Mentally Retarded Persons," American Journal of Mental Deficiency, Vol. 65 (1960), 236-247.

[96]Bakwin, et al., op cit., 253-255.

[97]Torres, op. cit.

Kennard,[98] in a study of children admitted to a mental hospital, found that eighty-three per cent of the children with a history of and behavior patterns suggesting organicity revealed a strong positive correlation with EEG abnormality; forty-seven per cent of suspected organics had abnormal EEG records; and only twenty-nine per cent of non-organics had EEG abnormalities. Glaser[99] believes that research, over-all, suggests that children exhibiting behavior disorders (the term is not divided into clinical categories) show a high incidence of EEG abnormality, varying from forty to seventy-five per cent, and that the EEG has a definite place in the diagnostic procedure.

This belief is compatible with the research cited earlier that behavioral problem children tended to be lower than normal children in intelligence. Kløve and White[100] and Manning[101] have found evidence with adults that there is a positive relationship between the intellectual level

---

[98]Margaret A. Kennard, "The Characteristics of Thought Disturbances as Related to Electroencephalographic Findings in Children and Adolescents," American Journal of Psychiatry, Vol. 115 (1959), 911-921.

[99]Glaser, op. cit.

[100]H. Kløve and P. T. White, "The Relationship of Degree of Electroencephalographic Abnormality to the Distribution of Wechsler-Bellevue Scores," Neurology, Vol. 13 (1963), 423-430.

[101]C. G. Matthews and G. C. Manning, "Psychological Test Performances in Three Electroencephalographic Classifications of Mentally Retarded Subjects," American Journal of Mental Deficiency, Vol. 68 (1964), 485-492.

and the quality of the electroencephalogram. Henry[102] has also found support for this relationship with children, but the correlations tended to vary with age levels.

Recent studies (Aird[103] and Bucy[104]) seem to suggest that electroencephalography should constitute a part of the diagnostic procedure but should not be used as the sole means of diagnosing any type of disorder. It appears, however, that the many "loop-holes" that have been suggested by research may be controlled and accommodated, at least in part, in carefully designed studies.

Selected Studies

In a study that is particularly relevant to this paper, Lezak and Dixon hypothesized that

> . . . The group of children for whom there are minimal or no neurological findings and who are diagnosed brain-injured is composed of more boys, younger children, and children of lower intelligence than the group of child guidance patients given functional diagnoses.[105].

In an analysis of ninety-nine case records of children, ranging in chronological ages from seven to sixteen years,

---

[102]Henry, op. cit., 40-43.

[103]R. B. Aird, "Modern Concepts on the Value of EEG in Epilepsy," International Journal of Neurology, Vol. 1 (1959), 66-75.

[104]Bucy, op. cit.

[105]Muriel D. Lezak and H. H. Dixon, Jr., "The 'Brain-Injured' Child in a Clinic Population: A Statistical Description," Exceptional Children, Vol. 30 (1964), 237-238.

seen at a child guidance clinic in a twenty-six month period, Lezak and Dixon found that their hypothesis was valid: the children diagnosed as brain injured were significantly younger; there were more boys; and they were children of lower intelligence than the functional groups. It should be noted, however, that their samples varied from an N = 62 in the functional group to N = 31 and N = 6 in two different brain damaged or organic groups. Except for the fact that all children were seen by the clinic psychiatrist and psychologist at least once before the diagnosis was made, the diagnostic measures were not the same for all children; for example, electroencephalograms were available for only a few of the children.

In a well designed study of brain injured and hyperactive children, Cruickshank, Bentzen, Ratzeburg, and Tannhauser[106] divided forty clinical cases, selected from special education elementary classrooms, into four matched groups of ten students each; five in each group were diagnostically classified as brain damaged and five were classified as emotionally disturbed. The developmental patterns of brain damaged children were given. Thirteen psychological tests were used in the screening battery. Specific subtest difficulties on the intelligence tests

---

[106]W. M. Cruickshank, Frances A. Bentzen, F. H. Ratzeburg, and Miriam T. Tannhauser, A Teaching Method for Brain-injured and Hyperactive Children (Syracuse, New York: Syracuse University, 1961).

were noted. There were no significant differences between the pre-test and the post-test means, either for the whole groups or for the individual groups; moreover, a one-year follow-up also failed to find significant differences. Thirty-five of the children received an electroencephalographic examination: fourteen had normal and twenty-one had abnormal EEG patterns. The abnormal EEG group did not have achievement test scores significantly lower than the normal EEG group, although the normal EEG group consistently had higher mean achievement scores (but not statistically significant). The abnormal EEG group did have, however, a lower mean intelligence quotient than the normal EEG group, a result which the authors interpret to account for the achievement trend. Over-all, they believe that the EEG cannot discriminate between levels of academic achievement, if the records are merely classified on the basis of "normal" or "abnormal." This study, although providing interesting diagnostic data, was primarily concerned with educational procedures with the brain damaged and hyperactive child.

Daryn[107] has made an extensive study of behavioral problem children between the ages of three and fifteen who were referred to the Mental Health Clinic of Remat Hen, Tel

---

[107]E. Dayrn, "Problem of Children With 'Diffuse Brain Damage'," Archives of General Psychiatry, Vol. 4 (1961) 299-306.

Aviv, Israel. There was no difference between the "organics" and the "non-organics" on the basis of reason for referral, and there was uniformity in the history of physical illness for the two groups. The results indicated that 84 out of 170 random referrals showed evidence of "diffuse brain damage." The fact that diagnostic instruments varied according to the case eliminated a comparison of the instruments for the entire sample, but Daryn provides the relationships between four diagnostic procedures: clinical examination, skull x-ray, electroencephalogram, and psychological tests. He concluded that the skull x-ray and psychological tests were particularly "sensitive," but that the electroencephalograph was "approximately half as sensitive." This study presents interesting findings, but the design and presentation failed to clarify adequately the selection of the sample, the criteria for key terms, and the basis for therapeutic recommendations. Similarly, in view of the possible cultural influences, it is unlikely that the results could be generalized to an American sample.

Beck and Lam[108] have provided what seems to be one of the most applicable studies. From a sample of 104 educable mentally handicapped children, between the chronological ages of 6-0 and 15-11 years, three groups were

---

[108]Beck, et al., op. cit.

established: (1) the "organic group" consisting of 27 subjects with known neurological involvement; (2) the "suspected group" consisting of 48 children whose psychological data suggested the need for a neurological examination; (3) the "non-organic group" consisting of 29 children who possessed no evidence of organicity. At a later date, a fourth group of 11 "non-organics" was also formed. An analysis of the WISC data revealed that the non-organic groups possessed a mean performance IQ higher than the mean IQ on the verbal scale; but the organic group and the suspected groups had a mean performance scale IQ lower than the mean verbal scale IQ. It was also inferred that the lower the subjects intelligence quotient, the greater the probability of organicity and vice versa. Computing the deviation of each subject's subtest score from his own mean subtest score failed to reveal a WISC pattern that would characterize the children with organicity. The authors recognize the limitations of their study, for example, the fact that there is less chance for variation in subtest scores in a sample of mentally handicapped organic children. The results of this study and the authors' self-recognized limitations do, however, support the need for a study of children above the retarded range in intelligence, having a slightly higher chronological age for the lower level to avoid the pseudo-ability effect,

having a smaller chronological age range, employing varying degrees of inferred organicity, and controlling the sex of the subjects.

Summary

The review of the literature has encompassed research from education, psychology, sociology, and medicine.

It appears that:

1. Teachers, although possessing a frame of reference different from that of clinicians, are capable of recognizing behavior problems in children.

2. There are varied definitions of the term "behavior problem"; many distinguishing criteria are based upon specific behavioral actions or symptoms that may be observed in the classroom.

3. Many of the behavior problems observed in the classroom may result from neurological impairment.

4. Achievement data may be indices of behavior problems; there is evidence that behavioral problem children are frequently characterized by poor achievement, and it appears that the lower the achievement the higher the problem tendencies.

5. Psychological tests, especially multi-faceted tests, e.g., a mental abilities test such as the WISC, as opposed to a single-facet test, appear to be useful in the diagnosis of behavior problems, whether the etiology is emotional or neurological.

6. The over-all intelligence level of the behavioral problem child is usually lower than that of the other children in the classroom; an analysis of mental abilities data may be used to detect problems.

7. Electroencephalography, despite a fairly high degree of error, e.g., normal persons having abnormal electroencephalograms, has achieved an important role in the diagnosis of behavior problems; but certain limitations, such as intra-judge and inter-judge reliability, restrict its usefulness.

8. Children showing behavior disorders tend to show a higher incidence of abnormality in their electroencephalograms than well behaved children.

A review of several selected articles that are especially applicable or similar to this study provide support for further research on the use of electroencephalography and mental abilities tests in the diagnosis of behavioral problem children. There is a need for studies that control selection variables, allow for comparison of problem behavior with other types of behavior, use larger samples, measure reliability of clinical judgment, and facilitate investigation of the validity for diagnostic assumptions.

CHAPTER III

DESIGN AND METHODOLOGY

A discussion of the research design and the methodology used for the collection of the data will include the following: limitations imposed by the administrative regulations, the referral procedure, the cooperating professional personnel, the population and sample, the diagnostic procedures, instrumentation, statistical hypotheses, statistical analysis, and summary.

Limitations Imposed by the Administrative Regulations

The behavioral problem children included in this sample were obtained from the cases served by the Psychological and Neurological Program, St. Joseph County Health Department, Centreville, Michigan. The program was totally sponsored by Federal funds, Grant Number N2405 A62, Public Health Services, during the 1962-63 academic year, and by Federal funds and contributions from the school systems in St. Joseph County during the 1963-64 academic year. Consequently, the types of referrals accepted by the program were prescribed by the Plan of Procedure approved by the Federal Public Health Service (See Appendix A).

The diagnostic services, with the exception of a physical examination from the family physician, were provided without cost to each behavioral problem and each well behaved child.

The Referral Procedure

During the entire 1962-63 academic year, the classroom teachers in the public and private schools in St. Joseph County, Michigan, referred behavioral problem children in the grades kindergarten through twelve to the Health Department's Psychological and Neurological Program. Each school established its own referral system, but in most instances the classroom teacher's immediate administrative superior approved the referrals and mailed them to the Health Department (See Appendix B). No incident of an administrator refusing a referral from a teacher was reported; and it is assumed that any behavioral problem child referred, within the operational definition, was accepted by the Health Department.

Following the referral from the classroom teacher, a county public health nurse arranged an interview with the child's parents. These interviews were held in the family's home, but in many cases, because they took place during the day, the mother was the only parent involved. The interview was intended to orient the parents to the reasons underlying the teacher's referral, explain the

Psychological and Neurological Program, solicit their cooperation with the program, and obtain a social case history (See Appendices C and D). If the parents did not agree to cooperate with the program, the case was dropped, and the referring teacher and administrator were notified. The public health nurses estimate that there was approximately a 5% rejection by parents. Frequently, with the aid of a parent-teacher conference, uncooperative parents would become cooperative and participate in the program.

If the parents were cooperative, they were requested to obtain a general physical examination for their child from their family physician. A standard physical examination form was used (See Appendix E). Upon receipt of this form, mailed directly from the physician to the Health Department, appointments with the psychologist and electroencephalographer were made. In most cases, the appointments with the psychologist for diagnostic testing were scheduled for a Saturday, and the electroencephalogram was scheduled during the following week. The reports from each diagnostic source were written and submitted to the Director of the Health Department without knowledge of the data obtained in the other examinations (See Appendices F and G). The physical examination and social case history were made available to the psychologist prior to the interview. On the basis of the physical examination, social case history, psychological data, and the electroencephalograph

report, the Director of the Health Department would: (1) write a summary letter and recommendations to the superintendent of the referring school and another letter to the parents of the child or (2) make a recommendation to the parents that additional diagnostic and/or treatment services be obtained, e.g., a neurological examination, before a final diagnostic letter was written.

The referrals for the well behaved children (the selection process will be explained in a subsequent section) were processed in much the same manner with the exception that a social case history was not consistently obtained. But this difference is not relevant because (1) the children were not exhibiting unacceptable behavior and (2) social case history data are not involved in the analysis of data. A physical examination was, however, obtained on each well behaved child to assure that any effects noted could not be attributed to a physiological condition.

The Cooperating Professional Personnel

The entire Psychological and Neurological Program was administered by the Director of the St. Joseph County Health Department. Interviews with the school personnel and parents and the obtaining of the social case histories were performed by the county public health nurses. Family physicians, of the parents' choice, provided the physical examinations. All psychological data were obtained by the

same psychologist and all examinations administered in the Health Department office. The electroencephalograph examinations were obtained on an out-patient basis from the Special Diagnostic Services, Bronson Methodist Hospital, Kalamazoo, Michigan. Two different EEG technicians administered the examinations, and the Director of the Special Diagnostic Services served as electroencephalographer and interpreted all of the electroencephalograms (See Appendix H for a sample report). Neurological examinations were obtained on referral from a practicing neurologist in Ann Arbor, Michigan (See Appendix I for complete personnel roster).

The Population and Sample

St. Joseph County, with a population of 45,000, is located in southwestern Michigan. The total school population in the County is approximately 13,000, with two school districts contributing approximately one-third of the students. Although the County is without any large cities and is primarily rural, many of the residents commute to near-by industrial cities. There is no known reason to assume that St. Joseph County is not representative of other smaller, relatively rural, counties.

As previously explained, the behavioral problem children were referred by the classroom teachers in the public and private schools within St. Joseph County.

Despite differences in the size of school districts, there were no limitations placed on number of referrals from any particular district. In other words, it is feasible that a small district might refer more behavioral problem children than a larger district, but over the academic year, there were no indications of disproportionate frequencies of referrals. The sample of behavioral problem subjects includes 35 males, between the chronological ages of 8-0 years and 12-11 years. Initially there were forty-nine boys within the prescribed age range who had been referred to the Psychological and Neurological Program during the 1962-63 academic year. Two of these, despite the regulations on referrals, received Full Scale intelligence quotients below 80 on the Wechsler Intelligence Scale for Children in the psychological examination. Because mental retardation changes the considerations involved in electroencephalography, these two children were disqualified from this study. Attempts to pair the remaining forty-seven boys resulted in thirty-five well behaved boys. There is no reason to assume that the twelve children who failed to receive a well behaved partner are atypical from the remaining behavioral problem subjects. The chronological age range of 8-0 years to 12-11 years for the behavioral problem subjects was chosen for two reasons: (1) the applicability of the Wechsler Intelligence Scale for Children seems to

improve after eight years of age;[1] and (2) the electroencephalograph is more stable and avoids maturational effects after age eight, and the upper age limit preempts the effects of puberty that may influence the electroencephalogram.[2]

The well behaved sample represents boys referred by the same teachers who referred the behavioral problem boys. In other words, each classroom teacher who referred a behavioral problem boy who was included in the sample was requested (See Appendices J and K) to name the best "well behaved" boy in the same classroom as the behavioral problem boy that she referred, and to name an alternate "well behaved" boy in the same classroom (See Appendix L). The parents of the best "well behaved" boy were notified and given an explanation of the program (See Appendix M). To increase the probability of acceptance, the parents of the well behaved boys were reimbursed for travel expenses to Kalamazoo, Michigan (80 miles round-trip) for the electroencephalograph examination. If no response was received in two weeks, a follow-up letter was sent (See Appendix N). Parents rejecting the services and those who had not responded within a two-week period after the follow-up were dropped,

---

[1]D. Wechsler, Manual: Wechsler Intelligence Scale for Children (New York: The Psychological Corporation 1959).

[2]Glaser, op. cit.

and the second "well behaved" boy who was referred was contacted in the same manner. Because this phase of the Psychological and Neurological Program had to be completed in a three-month period, it was necessary to establish rather rigid cut-off points for acceptances from the parents. Out of the forty-seven behavioral problem boys who were included in the sample, thirty-five were paired with a well behaved boy from the same classroom, with the same classroom teacher defining the terms "well behaved" and "behavior problem" for one member of each group. Out of the thirty-five well behaved males whose parents accepted the services (See Appendix O), twenty-five were those deemed the best (first choice) and ten were the alternates (second choice) of the classroom teacher. The parents were then requested to obtain a physical examination for the child from their family physician. The diagnostic services for the well behaved sample were scheduled on the same basis and with the same personnel used for the behavioral problem sample. As with the behavioral problem sample, the same procedure for reporting results to schools and parents and for suggesting additional services was followed by the Director of the Health Department.

Chronological Ages

Although the classroom teachers were requested to refer both the behavioral problem boy and his well behaved

par

mig

age

mal

mal

wit

rel

An

wer

rev

pro

chr

Sta
eve
the
was
123
five

partner from the same classroom, it is feasible that there might be a significant difference in their chronological ages. For example, it is possible that behavioral problem males might be retained more often than well behaved males, and would consequently be in the same classroom with younger well behaved children. Table 3.1 includes relevant data.

TABLE 3.1

CHRONOLOGICAL AGES

Group	N	Mean C.A.	Variance
Well Behaved	35	10.39	2.33
Behavioral Problem	35	10.16	2.50

An F ratio indicates that the variances of the two groups were not significantly different. A t-test[3] score of 0.06 reveals that the well behaved sample and the behavioral problem sample were not significantly different in mean chronological ages.

[3]W. J. Dixon and F. J. Massey, Jr., Introduction to Statistical Analysis (New York: McGraw-Hill, 1957). Whenever a t-test was used, an F ratio was computed first. If the F ratio was not significant, the formula on 121-122 was used; if the F ratio was significant, the formula on 123-124 was used. The level of significance was set at five per cent for all computations.

Actual Grade Placements

To determine if the two groups were alike in actual grade placements, a t-test was computed. Table 3.2 includes relevant data.

TABLE 3.2

ACTUAL GRADE PLACEMENTS

Group	N	Mean G.P.	Variance
Well Behaved	35	4.90	2.18
Behavioral Problem	35	4.53	2.05

An F ratio indicates that the variances of the two groups were not significantly different. A t-test score of 1.05 reveals that the two groups were not significantly different in mean actual grade placements.

The Diagnostic Procedure

The specific diagnostic procedure included the following five stages.

Home Visits

The home visits were made by three public health nurses. Several group in-service training sessions were held to assure some degree of commonality in the format

and techniques used for this interview. For example, the psychologist provided the nurses with training in the use of the Vineland Social Maturity Scale.[4]

Psychological Evaluation

The psychological data were collected during a two-hour interview, usually scheduled on a Saturday. The sessions were held in the offices of the Health Department, and the same psychologist administered all of the tests. The tests, in the order of use, included: the Draw-A-Person Test, the Bender Visual Motor Gestalt Test, the Wechsler Intelligence Scale for Children, and the Wide Range Achievement Test. In some cases additional tests were used, or the child might also have been referred to the consulting psychologist for further examination. The consulting psychologist, who also provided counseling to children recommended by the psychologist and Director of the Health Department, usually used the Rorschach Test or the Thematic Apperception Test.

Electroencephalograph

The electroencephalograph was administered by two different EEG technicians in the Special Diagnostic Services

---

[4]E. A. Doll, Vineland Social Maturity Scale (Minneapolis, Minnesota: Educational Test Bureau, 1947).

at the Bronson Methodist Hospital, Kalamazoo, Michigan. The electroencephalogram was interpreted by the Director of the Special Diagnostic Services, and a report was written and sent to the Health Department.

Neurological Examination

Subject to the approval of the Director of the Health Department and based on the aforementioned diagnostic data, a neurological examination was provided to selected children by a practicing neurologist in Ann Arbor, Michigan. Although the neurological examination was free to the parents, they were responsible for the transportation (a distance slightly over one-hundred miles one-way), but there were no instances of refusal from parents who were requested to obtain this examination.

Reporting Diagnostic Results

The Director of the Health Department compiled the diagnostic data into a report. Separate letters were written to the superintendent of the referring school and to the parents to inform them of relevant diagnostic findings. Upon the parents' request, a copy of the electroencephalographer's report was mailed to the family's physician.

Instrumentation

The instrumentation for this study includes: mental abilities tests, academic achievement tests, and electroencephalography.

Mental Abilities

The Wechsler Intelligence Scale for Children (WISC) was selected to measure the child's mental abilities. Eleven subtests were administered: Information, Comprehension, Arithmetic, Similarities, Vocabulary, Digit Span, Picture Completion, Picture Arrangement, Block Design, Object Assembly, and Coding. The Mazes subtest was omitted. The WISC was scored immediately following the interview according to the method described in the Manual.[5]

Academic Achievement

Academic achievement was measured by use of the Wide Range Achievement Test. The Reading and Arithmetic sections were administered; the Spelling section was omitted. The survey of the literature revealed that this test was frequently used in relevant studies. This test was scored immediately following the interview according to the method described in the Manual.[6]

---

[5]Wechsler, op. cit.

[6]J. Jastak, Manual: Wide Range Achievement Test (Wilmington, Delaware: C. L. Story, 1946).

Electroencephalography

The EEG examination was performed with a Grass, Model IV, 8 channel Electroencephalograph (the recording procedure is presented in Appendix P). The electrodes were applied with bentonite or EKG solution to the scalp and ears (the positions are illustrated by the diagram in Appendix Q). Immediately following the examination, the electroencephalogram was reviewed, and the electroencephalographer dictated a diagnostic report to the Director of the Health Department (See Appendix H for a sample report).

The electroencephalograms for the original forty-nine behavioral problem boys and the thirty-five well behaved boys were randomly stacked in several piles in a small storage room. All identification was removed from the electroencephalogram except sex, chronological age, recording procedure, and a code number. No information was given as to the reason for referral or whether the child was a behavioral problem or well behaved subject. In view of the large number of referrals from a wide variety of sources, it is highly unlikely that the electroencephalographer could recognize any of the records from memory. The electroencephalographer reviewed each electroencephalogram and, using clinical judgment, completed a rating scale (See Appendix R). Definitions and criteria for rating were established for each level on the scale (See Appendix S).

To ascertain the reliability of the electroencephalographer's clinical judgment, fifteen pairs of electroencephalograms, i.e., the records of fifteen behavioral problem subjects and the records of their fifteen well behaved counterparts, were randomly selected and rejudged after approximately a period of eight months. A Pearson product-moment coefficient of correlation was computed on the two sets of rankings, and a correlation of $r = .6676$ was obtained. This correlation is significant between the two rankings.[7] It should be noted that, using five categories or levels of abnormality, the electroencephalographer judged fifteen of the records to be in the same category on both rankings, and the other fifteen cases were one category away on the second ranking. Of the fifteen electroencephalograms that were ranked one category apart, eleven were ranked more normal and four were ranked more abnormal the second time. To determine if there was a consistent difference in the electroencephalographer's judgments on the second ranking, a binomial test was computed. The probability score obtained of $p = .059$ indicates that there was no significant difference in the probability of being rated more normal or more abnormal the second time.

---

[7]Helen M. Walker and J. Lev, Statistical Inference (New York: Henry Holt and Company, 1953), 251-252 and Table XI, p. 470.

[8]S. Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill, 1956), p. 36-42.

Statistical Hypotheses

In order to perform the statistical analysis of the data, it was necessary to state the hypotheses in the null form. The three primary null hypotheses and their alternative hypotheses were:

H_oI: There is no significant difference between the behavioral problem subjects and the well behaved subjects in the electroencephalographer's ratings of the degree of abnormality in the electroencephalogram.

H_1I: The behavioral problem subjects have more electroencephalograms ranked as abnormal than the well behaved subjects.

H_oII: The abnormality of the electroencephalogram is not reflected in a difference between the Verbal Scale and the Performance Scale intelligence quotients on the Wechsler Intelligence Scale for Children for either the well behaved or the behavioral problem subjects.

H_1II: The subjects, regardless of group, with mildly abnormal or abnormal electroencephalograms have more difference between the Verbal Scale and the Performance Scale intelligence quotients on the Wechsler Intelligence Scale for Children than those with normal or borderline (non-specific) electroencephalograms.

H_oIII: The abnormality of the electroencephalogram is not reflected by more subtest scatter on the Wechsler Intelligence Scale for Children for either the well behaved or the behavioral problem subjects.

H_1III: The subjects, regardless of group, with mildly abnormal or abnormal electroencephalograms have more subtest scatter on the Wechsler Intelligence Scale for Children than those with normal or borderline (non-specific) electroencephalograms.

The secondary or subsidiary null hypotheses and their alternative hypotheses are:

H_oIV: The well behaved and behavioral problem groups do not differ significantly in intelligence quotients on the Wechsler Intelligence Scale for Children.

H_1IV: The well behaved subjects obtain intelligence quotients on the Wechsler Intelligence Scale for Children that are significantly higher than those obtained by the behavioral problem subjects.

H_oV: The well behaved and behavioral problem groups are not significantly different in the degree of difference between their academic achievement levels in reading and arithmetic and their actual grade placement.

H_1V: The well behaved subjects have less difference between their actual grade placements and their academic achievement grade placements in reading and arithmetic, as measured by the Wide Range Achievement Test, than the behavioral problem children.

H_oVI: The well behaved and behavioral problem groups do not have significant differences in their mental abilities, as measured by the Wechsler Intelligence Scale for Children.

Although the directional alternative hypothesis is not testable because of confusion and lack of support in previous studies, the groups' performances on each of the eleven WISC subtests merits investigation.

Statistical Analysis

All of the following statistical treatments were based on a level of significance set at the five per cent level. That is, the probability of the type I error or

the probability of rejecting the null hypothesis being tested when it is, in fact, true was .05.

The first null statistical hypothesis (H_oI) was analyzed with a chi-square test. The second null statistical hypothesis (H_oII) was tested with a point biserial coefficient of correlation. The third and last primary null statistical hypothesis (H_oIII) was determined with a median test and a chi-square formula.

The analysis of the data for the first two secondary null statistical hypotheses (H_oIV and H_oV) included: (1) the application of an F ratio to assure that the variances of the two samples were not significantly different and (2) the use of a t-test to test the hypotheses and determine whether there was a significant difference between the mean scores of the respective data for the two groups.

Summary

The design and methodology included the following: limitations imposed by the administrative regulations, the referral procedure, the cooperating professional personnel, the population and sample, the diagnostic procedures, instrumentation, statistical hypotheses, and statistical analysis.

The data were collected from the files of the Psychological and Neurological Program sponsored by the Public Health Service and administered by the Director of

the St. Joseph County Health Department, Centreville, Michigan. Referrals were restricted by the definitions set forth in the operational procedure as determined by the Public Health Service Grant. For the study, all males referred for behavior problems between the chronological ages of eight years and zero months and twelve years and eleven months were included. The referring classroom teacher for each of these boys (N = 47) was asked to refer the two best well behaved boys in the same classroom. The parents of the well behaved boys were oriented to the diagnostic program and their cooperation requested. If the parents of the best well behaved boy did not accept the diagnostic services, the parents of the second (alternate) well behaved boy were offered the services. Consequently, thirty-five of the possible forty-seven behavioral problem boys were successfully paired with a well behaved boy from each of their classrooms. The samples were controlled on the following bases: referring teacher's definition of the terms "well behaved" and "behavioral problem," sex and race (all were male Caucasian), grade placement, approximately on chronological age, referring school district, and geographical area. All subjects were classified as essentially normal in general physical condition. It will be

noted that the operational procedure did not allow for the control of socioeconomic level,[6] and only boys were included in the study.[7] Each boy, both the behavioral problem and

---

[6]Dorothy Laird ("The Performance of Two Groups of Eleven-Year-Old Boys on the Wechsler Intelligence Scale for Children," Journal of Educational Research, Vol. 51 [1957], 101-107) indicates that socioeconomic conditions may affect mental abilities scores; but Betsy W. Estes ("Influence of Socioeconomic Status on Wechsler Intelligence Scale for Children: Addendum," Journal of Consulting Psychology, Vol. 19 [1955], 225-226) holds that, despite a significant influence on the second grade level, the effects of socioeconomic factors in mental abilities data decrease until they are insignificant on the fifth grade level. Eli M. Bower (Early Identification of Emotionally Handicapped Children in School., op. cit.) concludes that the distribution of occupations of the fathers of emotionally disturbed children with behavior problems is not significantly different from that of the fathers of the other children in the classroom. But, Bower states: "Teachers however need to be aware of the significant role of socioeconomic status as it affects the values, the motivations and emotional conflicts of children (p. 41)." Jean R. Stifler ("Follow-up Study of Children Seen in the Diagnostic Centers for Handicapped Children," American Journal of Public Health, Vol. 53 [1963], 1743-1750) does not find the socioeconomic status to be a major factor in the progress of handicapped children. Harry Beilin ("Teachers' and Clinicians' Attitudes Toward the Behavior Problems of Children: A Reappraisal," Child Development, Vol. 30 [1959], 9-25) concludes that there is a serious lack in research on the relationship of socioeconomic influences to the evaluation of behavioral problem children. The survey of the literature in Chapter II is essentially void of any study similar to the present one that controlled the socioeconomic variables. Consequently, it seems practical to allow socioeconomic variables to enter at random within the referral system, but to recognize in the interpretation of the data that there are possible uncontrolled effects resulting from the child's or the sample's socioeconomic characteristics.

[7]Nadine M. Lambert and E. M. Bower, A Process for In-School Screening of Children With Emotional Handicaps: MANUAL for School Administrators and Teachers, California State Department of Education, (Princeton, New Jersey: Educational Testing Service, 1961), p. 31. The authors indicate that teachers and other professional personnel have more

well behaved subjects, received: a parent-orientation to the diagnostic services, a physical examination, a psychological examination, and an electroencephalogram. When deemed necessary by the psychologist and/or the Director of the Health Department, appointments with a consulting psychologist and a practicing neurologist were also provided.

---

difficulty perceiving "patterns of maladjustment" in girls than in boys. By including only boys in this study, the effects of sex differences in the test results and the teachers' over-all ability to perceive behavioral problems is somewhat controlled.

CHAPTER IV

ANALYSIS OF DATA*

The following results were obtained by the statistical procedures described in Chapter III. The level of significance was set at a = .05 for all facets of the statistical analysis.

Abnormality of Electroencephalogram

The first null hypothesis is:

H_o: There is no significant difference between the behavioral problem subjects and the well behaved subjects in the electroencephalographer's ratings of the degree of abnormality in the electroencephalogram.

And, based on the conclusions found in the relevant research literature, the alternative hypothesis is:

H_1: The behavioral problem subjects have more electroencephalograms ranked as abnormal than the well behaved subjects.

The results of the electroencephalographer's ratings are given in Table 4.1. In view of the identical number of ratings in each category for the two groups, no statistical analysis was made. Therefore, the null hypothesis is not

---

*The data will be deposited with the American Documentation Institute.

TABLE 4.1

EEG RATINGS

Group	Normal	Borderline	Mildly Abnormal	Abnormal	Markedly Abnormal
Well Behaved	4	11	12	8	0
Behavioral Problem	4	11	12	8	0

rejected; there was no significant difference between the two groups in the degree of the abnormality judged to be represented in their electroencephalograms.

EEG Abnormality and Difference Between WISC Verbal and Performance IQs

The second primary null hypothesis is:

H_o: The abnormality of the electroencephalogram is not reflected in a difference between the Verbal Scale and the Performance Scale intelligence quotients on the Wechsler Intelligence Scale for Children for either the well behaved or the behavioral problem subjects.

Because the research literature indicates that a difference in the two scales may reflect abnormality, particularly the hyperkinetic behavior syndrome, the alternative hypothesis is:

H_1: The subjects, regardless of group, with mildly abnormal and abnormal electroencephalograms have more difference between the Verbal Scale and the Performance Scale intelligence quotients on the Wechsler Intelligence Scale for Children than those with normal or borderline (non-specific electroencephalograms.

The differences between the Verbal and Performance Scales were computed (regardless of which scale was the highest) and the rankings of the electroencephalograms were dichotomized: the first category, normal, included all of the subjects ranked as normal or borderline (non-specific); the second category, abnormal, included all of the subjects ranked as mildly abnormal or abnormal. Computation of a point biserial coefficient of correlation[1] yielded an $r_{pb} = -.07$. Consequently, the null hypothesis is not rejected; the abnormality of the electroencephalogram was not significantly related to the difference between the Verbal and Performance Scales on the Wechsler Intelligence Scale for Children.

EEG Abnormality and WISC Subtest Scatter

The third and last primary null hypothesis is:

H_o: The abnormality of the electroencephalogram is not reflected by more subtest scatter on the Wechsler Intelligence Scale for Children for either the well behaved or the behavioral problem subjects.

Other studies have suggested that subtest scatter may reflect abnormality; e.g., neurological impairment may be inferred from significant differences in specific mental abilities. Therefore, the alternative hypothesis is:

---

[1]Walker, op. cit., 262-267.

H_1: The subjects, regardless of group, with mildly abnormal or abnormal electroencephalograms have more subtest scatter on the Wechsler Intelligence Scale for Children than those with normal or borderline (non-specific) electroencephalograms.

The variances of each subject's WISC subtest scores were computed and placed in rank order. On the basis of a chi-square formula,[2] a median test yielded a score of $X^2 = .0583$; thus the null hypothesis is not rejected. There was no significant difference in median variances of WISC subtest scores for individuals judged to have normal or borderline electroencephalograms and median variances for individuals judged to have abnormal electroencephalograms.

Further, the same statistical procedures were applied to the well behaved and behavioral problem groups separately. A chi-square score of $X^2 = .02$ was obtained for the well behaved subjects, and a chi-square score of $X^2 = .29$ was obtained for the behavioral problem subjects. Again, the null hypothesis cannot be rejected for either group. In other words, when considered separately, neither the well behaved nor the behavioral problem group possessed variances significantly related to the degree of EEG abnormality.

---

[2]Siegel, op. cit., 107 and 111-116.

Intelligence Quotients

The first secondary null hypothesis is:

H_o: The well behaved and behavioral problem groups do not differ significantly in intelligence quotients on the Wechsler Intelligence Scale for Children.

There are other studies that reveal that behavioral problem children may have more academic difficulty than well behaved children; consequently, their mental abilities, over a period of years, may not attain optimum development. Moreover, teachers' perceptions of behavior problems may be based, in part, on the child's academic achievement in the classroom; it is therefore feasible that a child with lower intelligence may be more readily labeled a behavioral problem than a child of above average intelligence who excels in classroom learning activities. It has been suggested that low intelligence and an inability to compete with the peer group in academic activities may lead many children into socially unacceptable behavior. On these bases, the following alternative statistical hypothesis is made:

H_1: The well behaved subjects obtain intelligence quotients on the Wechsler Intelligence Scale for Children that are significantly higher than those obtained by the behavioral problem subjects.

Relevant data are reported in Table 4.2, 4.3, and 4.4.

TABLE 4.2

WISC VERBAL SCALE INTELLIGENCE QUOTIENTS

Group	N	Mean IQ	Variance
Well Behaved	35	108.00	96.8824
Behavioral Problem	35	97.51	101.7866

TABLE 4.3

WISC PERFORMANCE SCALE INTELLIGENCE QUOTIENTS

Group	N	Mean IQ	Variance
Well Behaved	35	109.09	142.4336
Behavioral Problem	35	99.03	167.2639

TABLE 4.4

WISC FULL SCALE INTELLIGENCE QUOTIENTS

Group	N	Mean IQ	Variance
Well Behaved	35	109.51	90.9630
Behavioral Problem	35	98.14	117.9496

An F test revealed that the hypothesis of no significant difference in variances between the behavioral problem and well behaved males cannot be rejected. In contrasting the mean intelligent quotients of the two groups, Verbal Scale, Performance Scale, and Full Scale t-values of t = 4.4039, t = 3.3825, and t = 4.6547, respectively, were found; all values were significant at the .05 level; thus the null hypothesis of no significant difference between the groups on each of the WISC intelligence quotients is rejected.

Academic Achievement

The second subsidiary null hypothesis tested relates to academic achievement:

> H_o: The well behaved and behavioral problem groups are not significantly different in the degree of difference between their academic achievement levels in reading and arithmetic and their actual grade placement.

But numerous studies indicate that behavioral problem children are often significantly lower than the peer group in achievement in the core academic areas, and the alternative hypothesis states:

> H_1: The well behaved subjects have less difference between their actual grade placements and their academic achievement grade placements in reading and arithmetic, as measured by the Wide Range Achievement Test, than the behavioral problem subjects.

Relevant data to test the above hypothesis are reported in Table 4.5 and Table 4.6.

TABLE 4.5

DIFFERENCE BETWEEN ACTUAL GRADE PLACEMENT AND READING GRADE PLACEMENT

Group	N	Mean in Months	Variance
Well Behaved	35	+.79	1.8467
Behavioral Problem	35	-.54	2.8795

TABLE 4.6

DIFFERENCE BETWEEN ACTUAL GRADE PLACEMENT AND ARITHMETIC GRADE PLACEMENT

Group	N	Means in Months	Variance
Well Behaved	35	-.29	0.4320
Behavioral Problem	35	-.86	0.4789

An F test on the variances indicated that there was no significant difference for either reading or arithmetic achievement. A t-test on the means of the reading achievement data yielded a t-value of t = 3.6200; thus the null hypothesis must be rejected: the mean reading grade placement of the well behaved subjects was significantly higher than the mean reading grade placement of the behavioral problem subjects. Similarly, a t-test on the means

of the arithmetic grade placements yielded a t-value of $t = 3.5338$; this provides the basis for the rejection of the null hypothesis: the mean arithmetic grade placement of the well behaved subjects was also significantly higher than the mean arithmetic grade placement of the behavioral problem subjects.

Difference in Mental Abilities

The last subsidiary null hypothesis states:

H_o: The well behaved and behavioral problem groups do not have significant differences in their mental abilities, as measured by the Wechsler Intelligence Scale for Children.

Other research studies have found that behavioral problem children, particularly those with brain damage, have significant differences in selected mental abilities; but there is no consensus as to which subtests reflect which specific abnormalities. Although the directional alternative hypothesis is not testable because of confusion and lack of support in previous studies, the groups' performances on each of the eleven subtests were investigated.

The variance and mean were computed for each of the eleven subtests; an F ratio was applied to determine if there were significant differences in the variances of the two group's scores on each subtest,[3] and a sub-test

---

[3]All of the F ratios were insignificant, except for the Picture Arrangement subtest. Therefore, as noted earlier, a different formula was used for the t-test.

used to determine whether the groups differed significantly in their mean scores on any of the eleven WISC subtests. Table 4.7 includes the means, variances, t-values, and whether the t-value was significant, i.e., whether the null hypothesis was accepted (no significance) or rejected (significant). The results indicated that the well behaved and behavioral problem groups did not differ significantly on the following WISC subtests: Comprehension, Picture Arrangement, Object Assembly, and Coding. The null hypothesis is not rejected for the four aforementioned subtests. The two groups did, however, differ significantly on the following WISC subtests: Information, Arithmetic, Similarities, Vocabulary, Digit Span, Picture Completion, and Block Design. The null hypothesis is rejected for these seven subtests.

TABLE 4.7

THE t-TEST BETWEEN THE GROUPS' WISC SUBTEST SCORES

WISC Subtest	$\bar{X}_1$	$\bar{X}_2$	S_1^2	S_2^2	t	Significant
Information	11.80	9.11	6.34	7.81	4.21	Yes
Comprehension	9.94	9.43	6.11	3.90	0.96	No
Arithmetic	11.00	8.57	7.76	4.49	4.10	Yes
Similarities	12.51	11.06	6.37	5.11	2.53	Yes
Vocabulary	12.66	11.00	4.23	5.94	3.06	Yes
Digit Span	9.63	8.37	6.65	4.36	2.23	Yes
Picture Completion	12.91	10.46	7.85	13.43	3.14	Yes
Picture Arrangement	11.06	9.74	6.53	13.61	1.74	No
Block Design	11.37	9.49	5.48	5.14	3.13	Yes
Object Assembly	10.09	9.49	6.26	4.08	1.10	No
Coding	11.06	10.11	6.64	8.75	0.04	No

$N_1 = N_2 = 35$ $\bar{X}_1$ = Well Behaved $\bar{X}_2$ = Behavioral Problem

Summary

An analysis of the data was made, with the level of significance set at .05. The first null hypothesis is not rejected; there was no significant difference between the two groups in the degree of abnormality judged to be represented in their electroencephalograms. The second null hypothesis is not rejected; the abnormality of the electroencephalogram was not significantly related to the difference between the WISC Verbal and Performance Scales. The third null hypothesis is not rejected; there was no significant difference in median variances of WISC subtest scores for individuals judged to have normal or borderline electroencephalograms and median variances for individuals judged to have abnormal electroencephalograms; this lack of significance was present in the behavioral problem and well behaved groups separately, as well as when the groups were combined. The first subsidiary hypothesis is rejected; the groups were significantly different in their mean WISC Verbal Scale, Performance Scale, and Full Scale intelligence quotients. Similarly, the second subsidiary hypothesis is rejected; the mean reading and arithmetic achievement scores of the well behaved subjects were significantly higher than those of the behavioral problem subjects. The groups were not significantly different in their mean scores on the Comprehension, Picture Arrangement, Object Assembly, and Coding subtests; but the groups were

significantly different in their mean scores on the Information, Arithmetic, Similarities, Vocabulary, Digit Span, Picture Completion, and Block Design subtests.

CHAPTER V

SUMMARY, CONCLUSIONS, DISCUSSION, AND IMPLICATIONS FOR RESEARCH

Included in this chapter is a summary of the basic problem and methodology involved in the study, a description of the conclusions derived from the data by the application of appropriate statistical measures, a discussion of the results within the present research design and the relevant professional literature, and discussion of several implications for further research.

Summary

According to the relevant professional literature, behavioral problems in children may result from emotional disturbances, neurological impairments, or a combination of the two factors. Studies have indicated that: classroom teachers are capable of identifying behavioral problem children; psychological tests can be used to diagnose behavioral problems, including neurological damage; and electroencephalography may be used to detect neurological and emotional abnormalities. Many of the abnormalities detected by psychological tests and electroencephalography are manifested in inappropriate social behavior. There are, however, few if any studies that approach the diagnosis

of behavioral problem children from an empirical frame of reference and thereby attain the validity and reliability of the clinical judgments that are necessary in the diagnostic process.

The purpose of the study was to determine if certain physical and psychological factors used as diagnostic indices differentiated between behavioral problem boys and well behaved boys as identified by classroom teachers.

During the 1962-63 academic year, the classroom teachers in St. Joseph County, Michigan, referred forty-nine behavioral problem boys between the chronological ages of 8-0 ⌣ years and 12-11 years to the Psychological and Neurological Program administered by the St. Joseph County Health Department, Centreville, Michigan. Each teacher who referred a behavioral problem boy in this age group, with the exception of two subjects who were disqualified because of mental retardation, was requested to refer the best well behaved boy and the second best or alternate well behaved boy from the same classroom. The parents of well behaved boys were contacted, and their cooperation solicited. After several follow-ups, thirty-five behavioral problem boys, as defined by their classroom teacher, were paired with thirty-five well behaved boys. Consequently, the thirty-five pairs, composed of a well behaved boy and a behavioral problem boy from the same classroom, were controlled on: referring teacher's definition of the

terms "well behaved" and "behavior problem," sex and race (all were Caucasian males), grade placement, approximately on chronological age, referring school district, and geographical area.

The parents of each boy were oriented to the diagnostic services. They were requested to obtain a physical examination for their son; all of the subjects in both groups were essentially normal in over-all physical condition. The psychological evaluation included the following diagnostic instruments: the Draw-A-Person Test, the Bender Visual Motor Gestalt Test, the Wide Range Achievement Test, and the Wechsler Intelligence Scale for Children. An electroencephalographic evaluation was also obtained. In special cases, on the recommendation of the psychologist or the Director of the Health Department, an additional examination by a consulting psychologist and/or a practicing neurologist was provided.

To ascertain the success of the selection procedure, the differences between the two groups' chronological ages and actual grade placements were measured. It was found that the selection had been successful; that is, the groups were not statistically different in either chronological ages or in actual grade placements. This fact obviously strengthens the bases for assumptions derived from these data.

A study of the electroencephalographer's intra-judge reliability was made; this is an area that seems to be totally omitted in the professional literature. Fifteen pairs of electroencephalograms, i.e., fifteen from each of the two groups, were re-rated after approximately eight months. The computation of a Pearson product-moment coefficient of correlation ($r = .6676$) revealed that the two ratings were significantly correlated; and, on the basis of a binomial test ($p = .059$), the probability of being rated more normal or more abnormal the second time was not significant.

Conclusions

Three major findings emerged from the study:

(1) The electroencephalograms for each of the fifteen behavioral problem subjects and each of the fifteen well behaved subjects, with the subject's group membership concealed, were rated on a five-category scale. It was found that each category on the scale contained exactly the same number of subjects from each of the two groups. In other words, the behavioral problem group and the well behaved group each contributed four subjects to the normal EEG category, eleven subjects to the borderline EEG category, twelve subjects to the mildly abnormal EEG category, eight subjects to the abnormal EEG category, and zero subjects to the markedly abnormal EEG category.

(2) Numerous studies suggest that a difference between the Verbal Scale and the Performance Scale of the Wechsler Intelligence Scale for Children may be a valid indication of abnormality, especially neurological impairment. The computation, however, of a point biserial coefficient

of correlation (r_{pb} = -.07) between the degree of EEG abnormality and the difference between the two WISC scales failed to obtain significance. It appears, therefore, that the abnormality of the electroencephalogram is not reflected in the difference between the Verbal and Performance Scales of the WISC.

(3) Further, studies have suggested that the degree of subtest scatter on the WISC may reflect abnormality. Again, on the basis of a chi-square formula (X^2 = .0583), there was no significant difference in median variances of WISC subtest scores for subjects judged to have normal or borderline electroencephalograms and median variances for subjects judged to have mildly abnormal or abnormal electroencephalograms. Moreover, a test of the groups separately (X^2 = .02 was obtained for the well behaved subjects and X^2 = .29 was obtained for the behavioral problem subjects) revealed that the rejection of the null hypothesis was applicable to both behavioral problem and well behaved boys.

In addition to the major findings, three secondary findings were also identified:

(1) It is feasible that classroom teachers' perceptions of behavioral problems rely heavily on academic criteria. On the basis of t-tests applied to the data, it was found that: the well behaved subjects scored significantly higher than the behavioral problem subjects in WISC Verbal (t-value = 4.4039), Performance (t-value = 3.3825), and Full Scale (t-value = 4.6547) intelligence quotients.

(2) Similarly, it was found that the well behaved subjects scored significantly higher than the behavioral problem subjects in both reading achievement (t-value = 3.6200) and arithmetic achievement (t-value = 3.5338).

(3) Observation of the data and other research studies failed to provide support for proceeding to a profile analysis of the Wechsler Intelligence Scale for Children, but

> the two groups' scores on each of the eleven subtests were compared. It was concluded that the variances of the subtests, with the exception of the variance for the Picture Arrangement subtest, were not significantly different for the two groups; the groups were not significantly different in their mean scores on the Comprehension, Picture Arrangement, Object Assembly, and Coding subtests; but the groups were significantly different in their mean scores on the Information, Arithmetic, Similarities, Vocabulary, Digit Span, Picture Completion, and Block Design subtests (see Table 4.7 for t-values).

These statistical results provide the bases for several considerations, which will subsequently be discussed.

Discussion

The indications are that the over-all selection or sampling procedure was successful: of the possible forty-seven behavioral problem males, thirty-five or 74.48% were paired with well behaved males that adequately met numerous selection criteria; the instrumentation was consistent for both groups; and the groups did not differ significantly in either chronological age or actual grade placement.

The reliability results and the implications relative to the use of electroencephalography are especially noteworthy. Although the correlation estimate ($r = .6676$) was significant from zero, it was lower than the generally accepted standards for adequate criterion measures. The effect of the unreliability is unpredictable, but it probably served to increase the type II error. As far as

can be ascertained, the lack of concern of other investigations for estimating the reliability of electroencephalography, particularly when clinical judgment is involved, causes one to cast some serious doubts on the conclusions of these previous studies.

Similarly, as cited earlier, relevant research suggests that electroencephalography is capable of detecting emotional problems and neurological abnormalities, and that the incidences of both of these factors are greater in behavioral problem children than in well behaved children. Emphasis was placed earlier on the unacceptable social behavior of children with neurological impairment, e.g., the hyperkinetic behavior syndrome, which includes many of the types of behavior that are commonly labeled "problems" in the classroom. Nonetheless, on the basis of the controls maintained in this study, behavioral problem boys, as defined by classroom teachers, did not possess a higher degree of abnormality in their electroencephalograms than well behaved boys.

Psychological and psychiatric studies have stated that a difference between verbal and performance factors, e.g., the difference between the Verbal Scale and the Performance Scale of the Wechsler Intelligence Scale for Children, offers a good indication of abnormality, particularly brain damage. Likewise, electroencephalography is reported to be one of the best diagnostic instruments,

especially for neurological problems such as brain damage. Regardless of these previous reports, no relationship between the degree of abnormality in the electroencephalogram and the difference between verbal and performance factors was found for the sample of this study. This finding raises questions about some of the assumptions that are currently being used in clinical diagnosis.

Diagnosticians have assumed that an erratic profile for the Wechsler Intelligence Scale for Children reflects emotional problems and possible organicity. This assumption also was not supported by the data of this study; furthermore, the relationship was not present in the data for the behavioral problem subjects considered separately from the well behaved subjects.

Educational factors are involved in a classroom teacher's identification of behavioral problems. That is, whereas the clinician may emphasize other objectives, such as the wish to establish a therapeutic relationship, the classroom teachers are prone to involve educational objectives into their perceptions of behavior. This difference is exemplified in this study in that the teacher-selected well behaved boys were significantly higher than the behavioral problem boys in intelligence quotients, reading achievement, and arithmetic achievement. In view of the scores, it is feasible, however, that teachers classify the lack of behavioral problems, i.e., the well behaved

subjects, on the basis of how easy it is to teach the child, rather than by using low educational attainment for determining the behavioral problem child; e.g., note that the mean intelligence quotients for the behavioral problem subjects were in the average range.

The lower intelligence quotients and poor academic achievement that distinguish the behavioral problem male from the well behaved male in educational activities may be the bases for the significant differences found between the two groups on the following WISC subtests: Information, Arithmetic, Similarities, Vocabulary, Digit Span, Picture Completion, and Block Design. The first four of these subtests have obvious relationships to classroom learning, and the last four subtests might easily reflect a poor academic incentive or motivational factor that might have resulted from a period of poor educational achievement and unsatisfactory social relationships. It is particularly surprising, however, that the groups were not significantly different in their mean scores on the Comprehension subtest. This subtest is typically interpreted as suggesting a child's logical reasoning and judgment in social problem-solving situations; thus the behavioral problem children would be expected to score lower than the well behaved children on this subtest.[1] The Picture Arrangement subtest

---

[1]Some of the socially-oriented questions on the Comprehension subtest include: "What is the thing to do if

might be interpreted to reflect a child's perception of and ability to cope with a social environment; i.e., the themes of the picture-stories depict social relationships. Thus, behavioral problem children would be expected to score lower than well behaved children on the Picture Arrangement subtest; yet, the two groups were not significantly different and the null hypothesis was not rejected. It might further be noted that the results of the Object Assembly and Coding were not significantly different between the two groups; but these performance subtests tend to possess rationales similar to those of the Digit Span, Picture Completion, and Block Design subtests, subtests on which the two groups were significantly different.

Implications for Research

One of the primary points brought out by this study was the low reliability of clinical judgment in electroencephalography. Certainly replication is called for to substantiate or repudiate this finding. The rating scale used for the

---

a fellow (girl) much smaller than yourself starts to fight with you?" "Why are criminals locked up?" "Why should women and children be saved first in a shipwreck?" and "Why should a promise be kept?" These questions and others on the Comprehension subtest obviously possess content that should result in different types of answers from children considered to be "behavioral problems" and "well behaved." That is, the behavioral problem children would be expected to have more incorrect responses.

electroencephalograms complies with accepted standards,[2] and the education and experience of the electroencephalographer would support optimum reliability.[3] But, in the routine procedure of an electroencephalography laboratory that is serving numerous referral sources, it is impossible to control all influencing variables; for example, the number of severely abnormal electroencephalograms interpreted for other referrals sources on the same day or during the same week as the ratings of the electroencephalograms of this sample might have influenced the electroencephalographer's diagnostic frame of reference. Therefore, it is recommended that further study on the use of clinical judgment in electroencephalography be made; this research, moreover, should include: well defined diagnostic categories that rely on quantifiable data as well as clinical impressions, carefully constructed rating instruments, controlled selection of subjects, and special facilities and personnel that will restrict and measure uncontrolled

---

[2]A. W. Bendig, "The Reliability of Self-Ratings as a Function of the Amount of Verbal Anchoring and of the Number of Categories on the Scale," Journal of Applied Psychology, Vol. 37 (1953), 38-41. The number of categories and anchoring points appear to be compatible with the conclusions and recommendations of Bendig's research.

[3]A. W. Bendig and Janine Sprague, "Rater Experience and the Reliability of Case History Ratings of Adjustment," Journal of Consulting Psychology, Vol. 18 (1954), 207-211.

variables. The use of several electroencephalographers, to allow an investigation of inter-judge reliability, would be especially valuable.

In view of the inferred discrepancies between teachers' perceptions and clinicians' perceptions of behavioral problem children, a careful analysis of the components of the definitions used by both teachers and clinicians should be made. This might be obtained through interviews or by a comparative analysis of descriptions of behavior; e.g., a video tape of a child's behavior in a classroom setting might be rated by both clinicians and teachers.

The use of the subtests of the Wechsler Intelligence Scale for Children as indices of emotional problems or for inferring neurological impairment, a practice that is too frequently used by diagnosticians, necessitates additional research before reliability and validity can be assumed. Similarly, many of the problems inherent to using clinical judgment in electroencephalography are applicable to the use of clinical judgment with mental abilities tests. In other words, the tests, such as the WISC, are standardized to yield intelligence quotients that have a relatively common frame of reference for interpretation, but the subtest scores are not as easy to interpret consistently. It seems that research should be conducted on the intra-judge and inter-judge reliabilities for the interpretation

of subtest scores; i.e., the question might be asked: Are the diagnosticians consistent in their clinical interpretations of the WISC profile? Furthermore, it is necessary to determine the validity of the assumptions underlying the clinical interpretation of mental abilities tests. This problem was exemplified by the fact that the behavioral problem males were not significantly different from the well behaved males on the Comprehension subtest.

Both the professional literature and the statistical contradictions point to the need for a review and revision of existing behavioral syndromes, many of which over-lap, and a rigorous empirical investigation, employing more than medical opinion, on what behavioral symptoms are valid indicators of emotional disturbance and neurological impairment. Many of the "clinical facts" used in research might be more appropriately termed "clinical opinions." It would be desirable, therefore, to investigate the relationship between the behavior symptoms that may be observed in varied settings, e.g., in the classroom as well as in the clinic, and the diagnostic value of psychological tests, electroencephalography, and neurological examinations.

Many studies are based on few subjects, yet broad conclusions are generalized. Some include subjects with heterogeneity in chronological ages; and many include specific types of subjects; but the authors still

generalize the results to the general population. Such practices not only defy common sense, but contradict the objectives of scientific research. It is recommended that the study be replicated in total in another setting. Essential to such a study would be: controlling variables that have been mentioned, considering the developmental effects, and using sample sizes that will allow for generalizations. For example, although the present study used a chronological age range of only five years, which is narrower than that of previous studies and attempted to account for possible developmental effects, it is feasible that a more limited range would provide more precision, especially in the use of electroencephalography.

The need for multi-faceted diagnostic services for behavioral problem children is accented by the present results. It does not appear that the results obtained by a single diagnostician, whether he be psychologist, electroencephalographer, or physician, can be accepted unquestionably. In other words, there are enough discrepancies contradictions, and ambiguities in the research literature and in the findings of these data to justify the assertion that the diagnosis of behavioral problem children must include educational, social-developmental, psychological, and medical information. Then, it is requisite to combine these data and objectively weight each pertinent bit of

information; neither the uniting nor weighting of diagnostic data has been adequately investigated.

The behavioral sciences must strive for improved understanding of the behavioral problem child. Psychological, educational, sociological, and physiological factors must be prudently yet rigorously investigated. Objective bases for the previously subjective assumptions must be sought; at the same time the child's personal welfare must be maintained as the primary motive for research efforts.

BIBLIOGRAPHY

BIBLIOGRAPHY

Ackerman, N. W. "Psychiatric Disorders in Children--Diagnosis and Etiology in Our Time," In P. H. Hoch and J. Zubin (Eds.), Current Problems in Psychiatric Diagnosis. New York: Grune & Stratton, 1953, 205-230.

Aird, R. B. "Modern Concepts on the Value of EEG in Epilepsy," International Journal of Neurology, 1959, 1, 66-75.

Altus, Grace T. "A WISC Profile for Retarded Readers," Journal of Consulting Psychology, 1956, 20, 155-156.

Bakwin, H. and Bakwin, Ruth M. Clinical Management of Behavior Disorders in Children. (2nd ed.) Philadelphia: W. B. Saunders, 1960.

Balthazar, E. E. "Cerebral Unilateralization in Chronic Epileptic Cases: The Wechsler Object Assembly Subtest," Journal of Clinical Psychology, 1963, 19, 169-171.

Balthazar, E. E., Todd, R. E., Morrison, D. H., and Ziebell, P. W. "Visuoconstructive and Verbal Responses in Chronic Brain-Damaged Patients and Familial Retardates," Journal of Clinical Psychology, 1961, 17, 293-296.

Beck, H. S. "Detecting Psychological Symptoms of Brain Injury," Exceptional Children, 1961, 28, 57-62.

Beck, H. S. and Lam, R. L. "Use of the WISC in Predicting Organicity," Journal of Clinical Psychology, 1955, 11, 154-158.

Beilin, H. "Teachers' and Clinicians' Attitudes Toward the Behavior Problems of Children: A Reappraisal," Child Development, 1959, 30, 9-25.

Bender, Lauretta. A Visual Motor Gestalt Test and Its Clinical Use. Research Monograph No. 3. New York: American Orthopsychiatric Association, 1938

Bendig, A. W. "The Reliability of Self-Ratings as a Function of the Amount of Verbal Anchoring and of the Number of Categories on the Scale," Journal of Applied Psychology, 1953, 37, 38-41.

Bendig, A. W. and Sprague, Janine. "Rater Experience and the Reliability of Case History Ratings of Adjustment," Journal of Consulting Psychology, 1954, 18, 207-211.

Bower, E. M. "The Emotionally Handicapped Child and the School," Exceptional Children, 1959, 26, 6-11.

Bower, E. M. "The Emotionally Handicapped Child and the School: An Analysis of Programs and Trends," Exceptional Children, 1959, 26, 182-188.

Bower, E. M. Early Identification of Emotionally Handicapped Children in School. Springfield, Ill.: Charles C. Thomas, 1960.

Bower, E. M. "The Emotionally Handicapped Child and the School: Present Research Plans and Directions," Exceptional Children, 1960, 26, 232-242.

Bradley, C. "Characteristics and Management of Children With Behavior Problems Associated With Organic Brain Damage," Pediatric Clinics of North America, 1957, 4, 1049-1060.

Bucy, P. C. "The Clinical Use of Electroencephalography," Journal of Neuro-Surgery, 1957, 14, 442-447.

Cohn, R. Clinical Electroencephalography. New York: McGraw-Hill, 1949.

Cooper, S., Ryan, W., and Hutcheson, B. R. "Classroom Screening for Emotional Disturbance," American Psychologist, 1959, 14, 341.

Cruickshank, W. W., Bentzen, Frances A., Ratzeburg, F. H. and Tannhauser, Mirian T. A Teaching Method for Brain-Injured and Hyperactive Children. Syracuse: Syracuse University, 1961.

Cummings, J. D. "The Incidence of Emotional Symptoms in School Children," British Journal of Educational Psychology, 1944, 14, Part 3.

Daryn, E. "Problem of Children With 'Diffuse Brain Damage'," Archives of General Psychiatry, 1961, 4, 299-306.

Denhoff, E., Laufer, M. W., and Holden, R. H. "The Syndromes of Cerebral Dysfunction," Journal of the Oklahoma State Medical Association, 1959, 52, 360-366.

Dixon, W. M. and Massey, F. J., Jr. Introduction to Statistical Analysis. New York: McGraw-Hill, 1957.

Doll, E. A. Vineland Social Maturity Scale. Minneapolis: Educational Test Bureau, 1947.

Doll, E. A. "Mental Evaluation of Children With Expressive Handicaps," American Journal of Orthopsychiatry, 1951, 21, 148-154.

Dondey, M. "EEG Terminology and Semantics," Electroencephalography and Clinical Neurophysiology, 1961, 13, 612-619.

Eaton, M., Weathers, G., and Phillips, B. N. "Some Reactions of Classroom Teachers to Problem Behavior in School," Educational Administration and Supervision, 1957, 43, 129-139.

Estes, Betsy W. "Influence of Socioeconomic Status on Wechsler Intelligence Scale for Children: Addendum," Journal of Consulting Psychology, 1955, 19, 225-226.

Fitzsimons, Marian J. "The Predictive Value of Teachers' Referrals," In M. Krugman (Ed.), Orthopsychiatry and the School. New York: American Orthopsychiatric Association, 1958, 149-153.

Ford, F. R. Diseases of the Nervous System: In Infancy, Childhood, and Adolescence. (4th ed.) Springfield, Ill.: Charles C. Thomas, 1960.

Fostig, W., Lefever, D. W., and Whittelseg, J. B. "A Developmental Test of Visual Perception for Evaluating Normal and Neurologically Handicapped Children," Perceptual and Motor Skills, 1961, 383-394.

Gibbs, E. L., Rich, C. L., Fois, A., and Gibbs, F. A. "Electroencephalographic Study of Mentally Retarded Persons," American Journal of Mental Deficiency, 1960, 65, 236-247.

Gildea, Margaret C.-L. "School Mental Health: Orientation, Methods, and Screening," In M. Krugman (Ed.), Orthopsychiatry and the School. New York: American Orthopsychiatric Association, 1958, 131-134.

Glaser, G. H. (Ed.) EEG and Behavior. New York: Basic Books, 1963.

Goldberg, L. R. "The Effectiveness of Clinicians' Judgments: The Diagnosis of Organic Brain Damage from the Bender-Gestalt Test," Journal of Consulting Psychology, 1959, 23, 25-33.

Goldberg, L. R. and Smith, P. A. "The Clinical Usefulness of the Archimedes Spiral in the Diagnosis of Organic Brain Damage," Journal of Consulting Psychology, 1958, 22, 153-157

Goldfarb, A. "Teachers Ratings in Psychiatric Case-Finding," American Journal of Public Health, 1963, 53, 1919-1927.

Goldstein, K. "The Effect of Brain Damage on the Personality," Psychiatry, 1952, 15, 245-260.

Gutman, Bridgette. "The Application of the Wechsler-Bellevue Scale in the Diagnosis of Organic Brain Disorders," Journal of Clinical Psychology, 1950, 6, 195-198.

Haines, Miriam S. "Test Performance of Preschool Children With and Without Organic Brain Pathology," Journal of Consulting Psychology, 1954, 18, 371-374.

Harris, R. E., Miller, J. G., Muench, G. A., Stone, L. J., Teuber, H. L., and Zubin, J. Recent Advances in Diagnostic Psychological Testing. Springfield, Ill.: Charles C. Thomas, 1950.

Haynes, J. R. and Sells, S. B. "Assessment of Organic Brain Damage by Psychological Tests," Psychological Bulletin, 1963, 60, 316-325.

Henry, C. A. "Electroencephalograms of Normal Children," Monographs of the Society for Research in Child Development, 1944, 9 (Serial No. 39).

Hill, D. and Parr, G. Electroencephalography: A Symposium On Its Various Aspects. New York: MacMillan, 1950.

Inglis, J., Colwell, Catherine, and Post, F. "An Evaluation of the Predictive Power of a Test Known to Differentiate Between Elderly 'Functional' and 'Organic' Patients," Journal of Mental Science, 1960, 106, 1486-1492.

International Federation for Electroencephalography and Clinical Neurophysiology. "Preliminary Proposal for an EEG Terminology," Electroencephalography and Clinical Neurophysiology, 1961, 13, 612-619.

Iscoe, I. "Some Problems of Mental-Hygiene Research With Children," Mental Hygiene, 1953, 37, 441-444.

Jastak, J. Manual: Wide Range Achievement Test. Wilmington, Delaware: C. L. Story, 1946.

Juul, K. D. "Education for the Mentally Ill," Michigan Education Association Journal, 1959, 37, 286 & 314.

Keating, L. E. "Epilepsy and Behavior Disorder in School Children," Journal of Mental Science, 1961, 107, 161-180.

Kennard, Margaret A. "The Characteristics of Thought Disturbances as Related to Electroencephalographic Findings in Children and Adolescents," American Journal of Psychiatry, 1959, 115, 911-921.

Kløve, H. and White, P. T. "The Relationship of Degree of Electroencephalographic Abnormality to the Distribution of Wechsler-Bellevue Scores," Neurology, 1963, 13, 423-430.

Knoblock, P. "Critical Factors Influencing Educational Programming for Disturbed Children," Exceptional Children, 1963, 30, 124-129.

Laird, Dorothy. "The Performance of Two Groups of Eleven-Year-Old Boys on the Wechsler Intelligence Scale for Children," Journal of Educational Research, 1957, 51, 101-107.

Lambert, Nadine M. and Bower, E. M. A Process for In-School Screening of Children With Emotional Handicaps: MANUAL for School Administrators and Teachers. Princeton, New Jersey: Educational Testing Service, 1961.

Lambert, Nadine M. and Bower, E. M. A Process for In-School Screening of Children With Emotional Handicaps: TECHNICAL REPORT for School Administrators and Teachers. Princeton, New Jersey: Educational Testing Service, 1961.

Laufer, M. W. and Denhoff, E. "Hyperkinetic Behavior Syndrome in Children," Journal of Pediatrics, 1957, 50, 463-473.

Lawrence, Margaret M. "Minimal Brain Injury in Child Psychiatry," Comprehensive Psychiatry, 1960, 1, 360-369.

Lewis, R. S. The Other Child: The Brain-Injured Child. New York: Grune & Stratton, 1951.

Lezak, Muriel D. and Dixon, H. H. "The 'Brain-Injured' Child in a Clinical Population: A Statistical Description," Exceptional Children, 1964, 30, 237-240.

Lyons, Dorothy F. and Powers, Virginia. "Follow-Up Study of Elementary School Children Exempted From Los Angeles City Schools During 1960-1961," Exceptional Children, 1963, 30, 155-162.

Masland, R. L., Sarason, S. B., and Gladwin, T. Mental Subnormality: Biological, Psychological, and Cultural Factors. New York: Basic Books, 1958.

Matthews, C. G. and Manning, G. C. "Psychological Test Performances in Three Electroencephalographic Classifications of Mentally Retarded Subjects," American Journal of Mental Deficiency, 1964, 68, 485-492.

Morris, D. P. and Dozier, Elizabeth. "Childhood Behavior Disorders: Subtler Organic Factors," Texas State Journal of Medicine, 1961, 57, 314-318.

Olson, W. C. Problem Tendencies in Children: A Method for Their Measurement and Description. Minneapolis: University of Minnesota Press, 1930.

Pond, D. "Is There a Syndrome of 'Brain Damage' in Children?" Cerebral Palsy Bulletin, 1960, 2, 296-297.

Price, A. D. and Deabler, H. L. "Diagnosis of Organicity by Means of Spiral Aftereffect," Journal of Consulting Psychology, 1955, 19, 299-302.

Quay, H. C. "Some Basic Considerations in the Education of Emotionally Disturbed Children," Exceptional Children, 1963, 30, 27-31.

Reitan, R. M. "The Comparative Effects of Brain Damage on the Halstead Impairment Index and the Wechsler-Bellevue Scale," Journal of Clinical Psychology, 1959, 15, 281-285.

Rivlin, H. N. "Classroom Discipline and Learning," In M. Krugman (Ed.), Orthopsychiatry and the School. New York: American Orthopsychiatric Association,

Rogers, M. E., Lilienfeld, A. M., and Pasamanick B. Prenatal and Paranatal Factors in the Development of Childhood Behavior Disorders. Baltimore: Johns Hopkins University, 1954.

Ross, A. O. "Brain Injury and Intellectual Performance," Journal of Consulting Psychology, 1958, 22, 151-152.

Sarason, S., Davidson, K., and Blatt, B. The Preparation of Teachers. New York: John Wiley & Sons, 1962.

Schulman, J. L., Kaspar, J. C., and Throne, Frances M. The Brain Damage Behavior Syndrome: A Clinical-Experimental Study. Unpublished Manuscript. Chicago: Children's Memorial Hospital, 1963.

Schwab, R. S. Electroencephalography in Clinical Practice. Philadelphia: W. B. Saunders, 1951.

Siegel, S. Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill, 1956.

Silverstein, A. B. "Psychological Testing Practices in State Institutions for the Mentally Retarded," American Journal of Mental Deficiency, 1963, 68, 440-445.

Stone, F. Beth and Rowley, V. N. "Educational Disability in Emotionally Disturbed Children," Exceptional Children, 1964, 30, 423-426.

Strauss, A. A. and Kephart, N. C. Psychopathology and Education of the Brain-Injured Child. New York: Grune & Stratton, 1947.

Taft, L. Brain Injury--Its Definition, Diagnosis, Causes and Treatment. Printed Resume of a Lecture. New York: New York Association for Brain Injured Children, 1958.

Tamkin, A. S. "A Survey of Educational Disability in Emotionally Disturbed Children," Journal of Educational Research, 1960, 53, 313-315.

Throne, Frances M., Kaspar, J. C., and Schulman, J. L. "Performance Time and Brain Damage Ratings," American Journal of Mental Deficiency, 1964, 68, 656-659.

Torres, F. "Electroencephalography in General Practice," Lancet, 1962, 82, 22-26.

Walker, Helen M. and Lev, J. Statistical Inference. New York: Henry Holt, 1953.

Wall, W. D. Education and Mental Health. Paris: UNESCO, 1955.

Walter, W. G. "The Vocabulary of Psycho-Physiology," Electroencephalography and Clinical Neurophysiology, 1961, 13, 447-448.

Wechsler, D. Manual: Wechsler Intelligence Scale for Children. New York: Psychological Corporation, 1949.

Wickman, E. K. Children's Behavior and Teachers' Attitudes. New York: The Commonwealth Fund, 1928.

Wunderlin, R. J. and McPherson, Marion W. "Sensitivity to Imbalance in Normal and Anoxic Damaged Children," Journal of Clinical Psychology, 1962, 18, 410-413.

Yates, A. J. "The Validity of Some Psychological Tests of Brain Damage," Psychological Bulletin, 1954, 51, 359-379.

Young, Florence M. and Pitts, Virginia A. "The Performance of Congenital Syphilitics on the Wechsler Intelligence Scale for Children," Journal of Consulting Psychology, 1951, 15, 239-242.

RELATED BIBLIOGRAPHY

Aird, R. B. "Electroencephalographic Diagnosis," In J. R. Green and P. F. Steelman (Eds.), Epiletic Seizures. Baltimore: Williams and Wilkins, 1956.

Alimena, B. "Norms for Scatter Analysis on the Wechsler Intelligence Scales," Journal of Clinical Psychology, 1951, 7, 289-290.

Allen, R. M. "The Test Performance of the Brain-Injured," Journal of Clinical Psychology, 1947, 3, 225-230.

Altus, Grace T. "A Note on the Validity of the Wechsler Intelligence Scale for Children," Journal of Consulting Psychology, 1952, 16, 231.

American Public Health Association. Services for Children With Emotional Disturbances. New York: American Public Health Association, 1961.

Andermann, K. "Cerebral Abnormality and the Electroencephalogram in Relation to Psychiatry," Medical Journal of Australia, 1960, 1, 722-727.

Anderson, Camilla M. "Early Brain Injury and Behavior," Journal of the American Medical Woman's Association, 1956, 11, 113-119.

Anderson, Camilla M. and Plymate, H. B. "Management of the Brain-Damaged Adolescent," American Journal of Orthopsychiatry, 1962, 32, 492-500.

Bakwin, H. "Cerebral Damage and Behavior Disorders in Children," Journal of Pediatrics, 1959, 34, 311.

Beck, H. S. "The Incidence of Brain Injury in Public School Special Classes for the Educable Mentally Handicapped," American Journal of Mental Deficiency, 1956, 60, 818-822.

Bender, Lauretta. Psychopathology of Children With Organic Brain Disorders. Springfield, Ill.: Charles C. Thomas, 1956.

Benton, A. L. and Spreen, O. "Visual Memory Test Performance in Mentally Deficient and Brain-Damaged Patients," American Journal of Mental Deficiency, 1964, 68, 630-633.

Berko, M. J. "A Note on 'Psychometric Scatter' as a Factor in the Differentiation of Exogenous and Endogenous Mental Deficiency," Cerebral Palsy Review, 1955, 16.

Bloomberg, Claire and Salzman, Ann. Training of Teachers in Application of Mental Health Principles: A Study of Teachers' Classroom Problems and Needs. Washington, D. C.: Washington School of Psychiatry, 1957.

Bower, E. M., Tashnovian, P. J., and Larson, C. A. A Process for Early Identification of Emotionally Disturbed Children. Sacramento: California State Department of Education, 1958.

Bradley, C. "Problem Children: Electroencephalographic Diagnosis and Pharmacologic Treatment," Connecticut Medical Journal, 1942, 6, 773.

Bradley, C. "Organic Factors in Psychopathology of Childhood," In H. B. Hock and J. Zubin (Eds.), Psychopathology of Childhood. New York: Grune and Stratton, 1955.

Brazier, Mary A. B. (Ed.) Bibliography of Electroencephalography: 1875-1948. International Federation of Electroencephalography and Clinical Neurophysiology, 1950.

Burko, H. F. "The Characteristics of Poor and Good Readers as Disclosed by the WISC," Journal of Educational Psychology, 1955, 46, 488-493.

Butz, G. K., Hunsicker, A. L., and Hurd, D. E. " A Short Screening Test for Organic Deficit," Journal of Clinical Psychology, 1959, 15, 274-280.

Canton, R. "The Electrical Currents of the Brain," British Medical Journal, 1875, 2, 278.

Carleton, F. O. and Stacey, C. L. "An Item Analysis of the Wechsler Intelligence Scale for Children," Journal of Clinical Psychology, 1955, 11, 149-154.

Chazan, M. "Maladjusted Pupils: Trends in Post-War Theory and Practices," Journal of Educational Research, 1963, 6, 29-4o.

Darrow, C. W. " A New Frontier: Neurophysiological Effects of Emotion on the Brain," In M. L. Reymert (Ed.), Feelings and Emotions. New York: McGraw-Hill, 1950.

Deisher, R. W. and Justice, R. S. "Effectiveness of Community Resources in Helping Mentally Retarded Children," American Journal of Public Health, 1960, 50, 43-49.

Doll, E. A. "Varieties of Slow Learners," Exceptional Children, 1953, 20, 61-64.

Fois, A. The Electroencephalogram of the Normal Child. Springfield, Ill.: Charles C. Thomas, 1961.

Frazeur, Helen A. and Hoakley, Z. Pauline. "Significance of Psychological Test Results of Exogenous and Endogenous Children," American Journal of Mental Deficiency, 1947, 51, 384-388.

Friedman, A. M. "Day Hospitals for Severely Disturbed Schizophrenic Children," American Journal of Psychiatry, 1959, 115, 893-898.

Gehman, I. H. and Matyos, R. P. "Stability of the WISC and the Binet Tests," Journal of Consulting Psychology, 1956, 20, 150-152.

Gesell, A. and Amatruda, Catherine S. Developmental Diagnosis: Normal and Abnormal Child Development. New York: Paul B. Hoeber, 1947.

Gibbs, F. A. and Low, N. L. "Electroencephalography in Children," Pediatric Clinics of North America, 1955, 2, 291-303.

Glidewell, J. C. (Ed.) "Mental Health in the Classroom," Journal of Social Issues, 1959, 15, 1-62.

Goldberg, Ilsa. "Use of Remedial Reading Tutoring as a Method of Psychotherapy for Schizophrenic Children With Reading Disabilities," Quarterly Journal of Child Behavior, 1952, 4, 273-281.

Goldenberg, S. Some Aspects of Diagnosis of Cerebral Damage in Children. Unpublished Doctoral Thesis, University of Washington, Seattle, 1953.

Goldfarb, A. "Reliability of Diagnostic Judgment Made by Psychologists," Journal of Clinical Psychology, 1959, 15, 392-396.

Graham, E. E. "Wechsler-Bellevue and WISC Scattergrams of Unsuccessful Readers," Journal of Consulting Psychology, 1952, 16, 268-271.

Griffiths, W. Behavior Difficulties of Children as Perceived and Judged by Parents, Teachers, and Children Themselves. Minneapolis: University of Minnesota, 1952.

Gronlund, N. E. The Accuracy of Teachers' Judgments Concerning the Sociometric Status of Sixth-Grade Pupils. New York: Beacon House, 1951.

Haan, Norma. "When the Mentally Ill Child Returns to School," Elementary School Journal, 1957, 57, 379-385.

Hagen, Elizabeth P. "A Factor Analysis of the Wechsler Intelligence Scale for Children," American Psychologist, 1951, 6, 297 (Abstract).

Halstead, W. C. "Preliminary Analysis of Grouping Behavior in Patients with Cerebral Injury by the Method of Equivalent and Nonequivalent Stimuli," American Journal of Psychiatry, 1940, 96, 1263-1294.

Hamil, B. M. and Stitt, H. M., Jr. "Detroit School--Community Behavior Projects," Michigan State Medical Society Journal, 1962, 61, 1119-1123.

Hanvik, L. J. "The Goodenough Test as a Measure of Intelligence in Child Psychiatric Patients," Journal of Clinical Psychology, 1953, 9, 71-72.

Haring, N. G., Stern, G., and Cruickshank, W. M. Attitudes of Educators Toward Exceptional Children. Syracuse, New York: Syracuse University, 1958.

Hewson, Louise R. "The Wechsler-Bellevue Scale and the Substitution Test as Aids in Neuro-Psychiatric Diagnosis," Journal of Nervous and Mental Disorders, 1949, 101, 158-183 & 246-266.

Hutt, M. L. "A Clinical Study of 'Consecutive' and 'Adaptive' Testing with the Revised Stanford-Binet," Journal of Consulting Psychology, 1946, 11, 93-103.

Jahoda, Marie. Current Concepts of Positive Mental Health. New York: Basic Books, 1958.

Jasper, H. H. "Electroencephalography in Child Neurology and Psychiatry," Pediatrics, 1949, 3, 783.

Jasper, H. H., Solomon, P., and Bradley, C. "Electroencephalographic Analyses of Behavior Problem Children," American Journal of Psychiatry, 1938, 95, 641.

Jenkins, R. L. and Pacella, B. L. "Electroencephalographic Studies of Delinquent Boys," American Journal of Orthopsychiatry, 1943, 13, 107-120.

Jung, C. C. "Public School Programs for the Socio-Emotionally Handicapped Children," Mimeographed, Institute for Social Research, University of Michigan, Ann Arbor, 1962.

Kennard, Margaret A., Rabinovitch, M. S., and Fister, W. P. "The Use of Frequency Analysis in the Interpretation of the EEGs of Patients with Psychological Disorders," Electroencephalography and Clinical Neurophysiology, 1955, 7, 29.

Kiloh, L. G. and Osselton, J. W. Clinical Electroencephalography. London: Butterworths, 1961.

Kløve, H. "Relationship of Differential Electroencephalographic Patterns to Distribution of Wechsler-Bellevue Scores," Neurology, 1959, 9, 871-876.

Knobel, M., Wolman, W. B., and Mason, E. "Hyperkinesis and Organicity in Children," Archives of General Psychiatry, 1959, 1, 310-321.

Kotinsky, Ruth and Witmer, Helen L. (Eds.) Community Programs for Mental Health. Cambridge, Mass.: Harvard University, 1955.

L'Abate, L. "Investigation of Intellectual Functioning in Problem Children," St. Louis, Mo.: Washington University School of Medicine, Study in Progress.

Lapouse, R. and Monk, M. A. "An Epidemiologic Study of Behavior Characteristics in Children," American Journal of Public Health, 1958, 48, 1134-1144.

Lapouse, R. and Monk, M. A. "Fears and Worries in a Representative Sample of Children," American Journal of Orthopsychiatry, 1959, 29, 803-818.

Levine, M., Spivack, G., and Fernald, D. "Discrimination in Diffuse Brain Damage," American Journal of Mental Deficiency, 1962, 67, 287-300.

Levy, S. "Post-encephalitis Behavior Disorder--A Forgotten Entity: A Report of 100 Cases," American Journal of Psychiatry, 1958, 115, 1062-1067.

Lindsley, D. B. "Electroencephalography," In J. McV. Hunt (Ed.), Personality and the Behavior Disorders, Volume II. New York: Ronald Press, 1944, 1033-1103.

Little, S. "The Child Who is Emotionally Disturbed," In E. E. Martmer (Ed.), Child With a Handicap. Springfield, Ill.: Charles C. Thomas, 1959.

Mackie, R. P., Kvaraceus, W. C., and Williams, H. M. Teachers of Children Who Are Socially and Emotionally Maladjusted. Office of Education, Bulletin 1957, No. 11, Washington, D. C.: U. S. Department of Health, Education and Welfare, 1957.

Margerison, J. H. "Measurement of Electroencephalographic Variables," Bulletin of the British Psychological Society, 1963, 16, 11-14.

Matunas, Marian I. "Test Performance of Psychotic Children with Organic Brain Pathology: A Study to Determine Whether the Bender-Gestalt Test, the Benton Visual Retention Test, and the Marble Board Test can Detect the Presence of Organic Brain Pathology in Psychotic Children," Dissertation Abstracts, 1960, 21, 1257.

McKeever, W. F. and Gerstein, A. I. "Validity of the Hewson Ratios: Investigation of a Fundamental Methodological Consideration," Journal of Consulting Psychology, 1958, 22, 150.

Michigan Department of Mental Health. The Development and Growth of Michigan's Mental Health Program. Lansing, Mich.: State of Michigan, Department of Mental Health, 1962.

Milma, Doris H. "Organic Behavior Disorder," Journal of Diseases of Children, 1956, 91, 521-528.

Mussen, P., Dean, S. and Rosenberg, M. "Some Further Evidence on the Validity of the WISC," Journal of Consulting Psychology, 1952, 16, 410-411.

Newman, J. R. and Loos, F. M. "Differences Between Verbal and Performance IQs with Mentally Defective Children on the Wechsler Intelligence Scale for Children," Journal of Consulting Psychology, 1955, 19, 16.

Newman, Ruth G. "Conveying Essential Messages to the Emotionally Disturbed Child at School," Exceptional Children, 1961, 28, 199-204.

Noshpitz, J. D. and Spielman, P. "Diagnosis Study of the Differential Characteristics of Hyperaggressive Children," American Journal of Orthopsychiatry, 1961, 31, 111-112.

Oppenheimer, E. and Mandel, M. R. "Behavior Disturbances of School Children in Relation to the Preschool Period," American Journal of Public Health, 1959, 49, 1537-1542.

Pacella, B. L. "The Electroencephalogram in Behavior Disorders," In N. D. Lewis and B. L. Pacella (eds.), Modern Trends in Child Psychiatry. New York: International Universities Press, 1945, 103-123.

Pate, J. "Research Findings and Frontiers in the Area of Emotionally Disturbed Children," Exceptional Children, 1962, 28, 497-499.

Rabin, A. I. "The Use of the Wechsler-Bellevue Scales with Normal and Abnormal Persons," Psychological Bulletin, 1945, 42, 410-422.

Raleigh, W. H. "A Study of the Relationships of Academic Achievement in Sixth Grade with the Wechsler Intelligence Scale for Children and Other Variables," Studies in Education - 1952, Indiana University, School of Education, 1953, 263-266.

Rankin, P. T. and Dorsey, J. M. "The Detroit School Mental-Health Project: A Five-Year Report," Mental Hygiene, 1953, 37, 228-248.

Reynell, W. R. "A Psychometric Method of Determining Intellectual Loss Following Head Injury," Journal of Mental Science, 1944, 90, 710-719.

Rhodes, W. C. "Curriculum and Disordered Behavior," Exceptional Children, 1963, 30, 61-66.

Richards, T. W. and Hooper, Sara. "Brain-Injury at Birth (Cerebral Palsy) and Perceptual Response During Childhood and Adolescence," Journal of Nervous and Mental Disorders, 1956, 123, 117-124.

Richardson, Helen, and Surko, Elise. "WISC Scores and Status in Reading and Arithmetic of Delinquent Children," Journal of Genetic Psychology, 1956, 89, 251-262.

Roach, J. L. Gurrslin, O. R., and Hunt, R. G. "Some Social-Psychological Characteristics of a Child Guidance Clinic Caseload," Journal of Consulting Psychology, 1958, 22, 183-186.

Robinowitz, R. "Learning the Relation of Opposition as Related to Scores on the Wechsler Intelligence Scale for Children," Journal of Genetic Psychology, 1956, 88, 25-30.

Rogers, C. R. The Clinical Treatment of the Problem Child. Boston: Houghton-Mifflin, 1939.

Sakoda, J. M., Cohen, B. H., and Beall, G. "Test of Significance for a Series of Statistical Tests," Psychological Bulletin, 1954, 51, 172-175.

Sarason, S. B. and Sarason, Esther K. "The Discriminatory Value of a Test Pattern with Cerebral Palsied Defective Children," Journal of Clinical Psychology, 1947, 3, 141-147.

Seashore, H. G. "Differences Between Verbal and Performance IQs on the Wechsler Intelligence Scale for Children," American Psychologist, 1950, 5, 319 (Abstract).

Seashore, H. G. "Differences Between Verbal and Performance IQs on the Wechsler Intelligence Scale for Children," Journal of Consulting Psychology, 1951, 15, 62-67.

Seashore, H. G. Wesman, A., and Doppelt, J. "The Standardization of the Wechsler Intelligence Scale for Children," Journal of Consulting Psychology, 1950, 14, 99-110.

Silverman, D. "Electroencephalographic Study of Acute Head Injury in Children," Neurology, 1962, 12, 273-281.

Stacey, C. L. and Portnoy, B. "A Study of the Differential Responses on the Vocabulary Subtest of the Wechsler Intelligence Scale for Children," Journal of Clinical Psychology, 1950, 6, 401-403.

Stringer, Lorene A. "Identifying Achievement Patterns Associated with Certain Kinds of Emotional Disturbance," American Orthopsychiatric Association Journal of Papers, 1962.

Stroud, J. B. "The Intelligence Test in School Use: Some Persistent Issues," Journal of Educational Psychology 1957, 48, 77-85.

Stroud, S., Bloomers, P., and Lauber, M. "Correlation Analysis of WISC and Achievement Tests," Journal of Educational Psychology, 1957, 48, 18-26.

Stuart, H. C. and Prugh, D. G. (Eds.) The Healthy Child: His Physical, Psychological, and Social Development. Cambridge, Mass.: Harvard University, 1960.

Sundberg, N. D. "The Practice of Psychological Testing in Clinical Services in the United States," American Psychologist, 1961, 16, 79-83.

Swift, J. W. "Matching of Teachers' Descriptions and Rorschach Analyses of Preschool Children," Child Development, 1944, 15, 217-224.

Tamkin, A. S. "The Effectiveness of the Bender-Gestalt in Differential Diagnosis," Journal of Consulting Psychology, 1957, 21, 355-357.

Taylor, F. M. "One Type of Undisciplined Child," American Journal of Nursing, 1958, 58, 842-844.

Thompson, Alice C. Analysis and Interpretation of Subtests of the Stanford-Binet and Wechsler Scales of Intelligence. Los Angeles: Los Angeles State College, 1963.

Thorne, F. C. "Clinical Judgment: A Clinician's Viewpoint," Journal of Clinical Psychology, 1960, 16, 128-134.

Thorne, F. C. Clinical Judgment: A Study of Clinical Error. Brandon, Vermont: Journal of Clinical Psychology, 1961.

Throne, Frances M., Schulman, J. L., and Kaspar, J. C. "Reliability and Stability of the Wechsler Intelligence Scale for Children for a Group of Mentally Retarded Boys," American Journal of Mental Deficiency, 1962, 68, 455-457.

Timme, A. R. "What Has Neurology to Offer Child Guidance?" Neurology, 1952, 2, 435.

Tindall, R. H. "Relationships Among Indices of Adjustment Status," Educational and Psychological Measurement, 1955, 15, 152-162.

Tolor, A. and Schulberg, H. C. An Evaluation of the Bender-Gestalt Test. Springfield, Ill.: Charles C. Thomas, 1962.

Trippe, M. F. "Conceptual Problems in Research on Educational Provisions for Disturbed Children," Exceptional Children, 1963, 29, 400-406.

Ullman, C. A. Identification of Maladjusted School Children. Monograph No. 7. Washington, D.C.: U.S. Public Health Service, 1952.

Ullman, C. A. "Teachers, Peers, and Tests as Predictors of Adjustment," Journal of Educational Psychology, 1957, 48, 257-267.

Wall, W. D. (Ed.) Psychological Services for Schools. Paris: UNESCO, 1956.

Wallace, H. M. and Starr, H. M. "School Services for Handicapped Children in Urban Areas," American Journal of Public Health, 1960, 50, 173-180.

Walter, W. G. "Electroencephalography," Annual Report of the Board of Regents of the Smithsonian Institution, 1950, Publication No. 4025, 243-253.

Walton, D. and Mather, M. D. "A Further Study of the Predictive Validity of a Psychological Test of Brain Damage," British Journal of Medical Psychiatry, 1961, 34, 73-75.

Wechsler, D. "Intellectual Development and Psychological Maturity," Child Development, 1950, 21, 44-50.

Weir, H. F. and Anderson, R. L. "Organic and Organizational Aspects of School Adjustment Problems," Journal of the American Medical Association, 1958, 166, 1708-1710.

Wepman, J. M. A Selected Bibliography on Brain Impairment, Asphasia, and Organic Psychodiagnosis. Chicago: Language Research Assoc., 1961

Werner, H. and Strauss, A. A. "Impairment in Thought Processes of Brain-Injured Children," American Journal of Mental Deficiency, 1943, 47, 291-295.

Williams, H. L., Lubin, A., Giescking, C., and Rubinstein, I. "The Relation of Brain Injury and Visual Perception to Block Design Rotation," Journal of Consulting Psychology, 1957, 20, 275-280.

APPENDICES

APPENDIX A

Operational Definition of Behavior Problems

INFORMATION SHEET

PSYCHOLOGICAL AND NEUROLOGICAL PROGRAM

WHO ADMINISTERS THIS PROGRAM - The County Health Department.

WHAT CHILDREN ARE ELIGIBILE - Any child whose behavior is abnormal. He may be an aggressive trouble maker or a shy withdrawn child. He may exhibit anti-social or criminal tendencies or he may merely appear confused.

WHAT CHILDREN ARE NOT ELIGIBLE - The definitely retarded. These should be referred to Special Education.

WHAT DOES THE PROGRAM DO - It provides a complete psychological evaluation including a personality appraisal. It provides an electroencephalogram to determine abnormalities in brain function. It provides consultation with Clinical Psychologists and Neurologists for recommendations for treatment.

WHAT WILL THE PROGRAM DO FOR THE SCHOOL - A complete report on the results will provide the school with a full knowledge of the child and his problems. It will make recommendations for action by school personnel to benefit the child.

HOW LONG DOES IT TAKE TO GET A REPORT - About two months from date of referral.

WHAT DOES THE PROGRAM COST THE PARENTS - The only cost to parents is for the physical exam and transportation to testing sites.

HOW IS REFERRAL MADE - The teacher fills out a referral form in detail. She must also notify the parents that she is referring the child and the reasons therefore.

INFORMATION SHEET, Continued

WHAT WILL THE PROGRAM DO FOR THE CHILD - Recommendations for treatment will be given the parents, the school, the family physician and any others concerned with the child. A treatment program for emotionally disturbed children is planned for the near future. Nurses will follow-up the program, to assist in recommended treatment where needed.

APPENDIX B

Referral Form Used by Classroom Teachers

Referral of Child to Psych. and Neur. Program

Child's Name _____
Last First Middle

Address _____
Street or Road City or Township

Parents' Names _____

Age _____ Birth date _____ Grade _____

Sex _____ Race _____

Reason for Referral - (Be specific and give details)

(Use additional sheet if needed)

Physical handicaps or abnormalities

Summarize school progress by subjects below

Person Making Referral _____

Title _____

School _____

Date _____

APPENDIX C

Report Form Used for Nurse's Home Visit

Nurse's Report of Home Visit Psych. and Neur. Program

Child's Name _____
Last First Middle

Address _____

Age _____ Birthdate _____ Grade _____

Describe Home

Medical History (Include birth difficulties and virus diseases)

Congenital and Acquired Defects

History of Behavior Problem

Attitude of Parents

_____
Nurse's Signature

_____
Date

APPENDIX D

Form Used for Nurse's Follow-up Report

Nurse's Follow-up Report Psych. and Neur. Program

Child's Name _____
Last First Middle

Address _____

Age Birth Date Grade

Report from School

Report from Home

_____
Nurse's Signature

_____
Date

APPENDIX E

Form Used for

Physical Examination

Physical Examination for Psych. and Neur. Program

Child's Name _____
Last First Middle

Age _____ Sex _____ Race _____

(Please note only abnormal findings)

General Appearance

Nutrition

Head

Ears, Eyes, Nose, Throat

Neck

Chest

Heart

(over)

Abdomen

Genitals

Extremeties

Reflexes

Abnormalities not noted above

Summary of Physical Examination

_____
Physician's Signature

_____
Address

_____
Date

APPENDIX F

Form Used for

Psychologist's Report

Psychologists Report Psych. and Neur. Program

Child's Name
Last First Middle

Address

Age Sex Grade

Results of Testing

Narrative Summary of Testing

(over)

Conclusions

Recommendations

Refer to Clinical Psychologist Yes No

_____
Signature of Psychologist

_____
Date

APPENDIX G

Form Used for

Clinical (Consulting) Psychologist's Report

Clinical Psychologists Report Psych. and Neur. Program

Child's Name _____
Last First Middle

Address _____

Age _____ Sex _____ Grade _____

Narrative Report of Interview:

(over)

Conclusions

Recommendations

_____

Signature of Clinical Psychologist

_____

Date

APPENDIX H

Sample EEG Diagnostic Report

BRONSON METHODIST HOSPITAL KALAMAZOO, MICHIGAN

ELECTROENCEPHALOGRAPH REQUISITION

NAME: AGE: 12 years DATE: 8-22-63

ADDRESS:

HOSPITAL ROOM # ADMISSION #

HISTORY: (Type and frequency of seizures, if any, age at onset, approximate frequency, significant trauma or organic brain disease.)

MEDICATION DURING PAST WEEK:

DIAGNOSIS OR DIFFERENTIAL DIAGNOSIS:

TYPE OF STUDY (Check one): Routine X Localization
ARE THE FOLLOWING PERMITTED:
Photic Stimulation Yes X No
Hyperventilation Yes X No

EEG FINDINGS AND INTERPRETATION: DATE:9-16-63 EEG.NO.5008-R

Background pattern shows rather well formed 9-10cps. bi-occipital alpha. Anteriorally in addition to the alpha there is considerable 5-7cps. theta with superimposed low voltage fast activity. Frequency and amplitude modulation are fairly good. Drowsiness produces loss of background detail, some bi-parietal slow wave activity, but does not reach the deeper stages of sleep. Triangles and vertex reference recording show no definitive lateralising signs. Photic stimulation produces considerable driving but no paroxysmal activity or lateralising signs. Hyperventilation produces considerable slowing with voltage build-up, some suggestion of a spike-wave like discharge, much notching and shouldering of theta frequencies, but no paroxysmal seizure discharges. Recovery is prompt.

INTERPRETATION
Record is within normal limits and contains no localising or lateralising signs.

REFERRING PHYSICIAN: W.R.Storer, M.D. (SIGNED)_____
Donald W.VanLiere,Ph.D.

REPORT TO BE SENT TO: St. Joseph County Health Dept. Centreville, Mich.

Form 406 ER
Rev. 3-62

APPENDIX I

Roster of Personnel

ROSTER OF PERSONNEL

Name	Position	Education and Experience
W. R. Storer	Administrator	M.D., Indiana University, 1934; eight years public health administration; seventeen years private practice.
Mabel Critchfield	Public Health Nurse	Cook County School of Nursing; R.N., State of Michigan; R. N., State of Illinois; eleven years public health nursing.
Georgia Weir	Public Health Nurse	St. Joseph School of Nursing; R.N., State of Michigan; six years public health nursing.
Marion Benit	Public Health Nurse	Mercy Central School of nursing; R.N., State of Michigan; two years public health nursing.
Robert H. Woody	Psychologist	B.M., Western Michigan University; M.A., Michigan State University; Ed.S., Western Michigan University; Now enrolled for Ph.D. program at Michigan State University; two years teacher and counselor; three years school diagnostician; one year public health psychologist.
John Warfield	Clinical (consulting) Psychologist	B.A., Kalamazoo College; M.A., University of Denver; two years clinical psychologist; one year public health clinical psychologist.
Donald W. Van Liere	Electroencephalographer	Ph.D., Indiana University; Post-doctoral study in electroencephalography at the University of Michigan of Michigan; Director,

		Special Diagnostic Services, Bronson Methodist Hospital, Kalamazoo, Michigan, and Chairman, Department of Psychology, Kalamazoo College.
Claude M. Lowry	Neurologist	M.D., University of Michigan; Diplomate of American Board of Psychiatry and Neurology in Neurology; eight years practicing neurologist.

APPENDIX J

Letter to Referring Teachers Regarding Well-Behaved Boys

Health Department
St. Joseph County
Centreville, Michigan

July 9, 1963

Dear

As you may recall, you referred _____ to the St. Joseph County Health Department for diagnostic testing regarding his behavioral problems.

We are going to pair a small group of boys that have exhibited behavioral problems with a group of boys from the same classes that are well-behaved. Perhaps through this comparison of test data, the research will provide recommendations to eliminate adverse conditions that are associated with behavioral problems.

Would you, therefore, please complete the enclosed form, giving the names and addresses of the two best-behaved boys, i.e., boys that do not exhibit behavioral problems, that were in the same _____ grade classroom as _____ during the 1962-63 school year.

It will not be necessary for you to contact the parents of these well-behaved children, as we will mail them a description of the diagnostic services and ask for their cooperation. There will be no charge to these parents and the test data obtained will be provided to both the parents and the school, so that the results may be used to the advantage of the child.

Since our time schedule for completing this research is limited, would you please aid us by returning this form at your earliest convenience. Your cooperation will be sincerely appreciated.

Yours truly,

W. R. Storer, M. D.
Director

Enc.

APPENDIX K

Follow-up Letter to Referring Teachers

Regarding Well-Behaved Boys

Health Department
St. Joseph County
Centreville, Michigan

August 12, 1963

Dear Mrs. :

As you may recall, I mailed you a letter a few weeks ago requesting the name of the best-behaved boy that was in your classroom, i.e., in the same grade as _____, the boy that you referred to the Diagnostic Program during the past school year.

I realize that the summer is a hectic period for the teacher, with vacations and summer school, but our testing program requires that we complete the diagnostic services for well-behaved boys by the end of September. Therefore, at you earliest convenience, would you return the form providing the names of the best-behaved boy and the next to the best behaved boy (to be used as an alternate) that were in _____ classroom during the 1962-63 school year.

I am enclosing a duplicate copy of the form, in case the first letter has been misplaced.

If there are any questions, please feel free to call me at my office in Centreville, 467-2795.

Sincerely yours,

W. R. Storer, M. D.
Director

Enc.

APPENDIX L

Referral Form For

Well-Behaved Children

WELL-BEHAVED BOYS

Referral for Diagnostic Services

The following two boys were in _____'s _____ grade classroom during the 1962-63 school year and did not present any behavioral problems, i.e., they were well-behaved and opposite of a definition of "behavioral problem" as I (the classroom teacher) understand it.

The best-behaved boy was:

Child's Name _____

Parents' Name _____

Address _____

City _____

The second best-behaved boy (to be used as an alternate) was:

Child's Name _____

Parents' Name _____

Address _____

City _____

This form was completed by: _____
Teacher's Name

_____
School and School District

Please return this form immediately to:

Dr. W. R. Storer, Director
St. Joseph County Health Department
Centreville, Michigan

APPENDIX M

Letter to Parents of Well-Behaved Children

St. Joseph County
HEALTH DEPARTMENT
Telephone HO 7-2795
Centreville, Michigan

Dear

The St. Joseph County Health Department received a Federal grant for the study of behavioral problems in children. In the past year, over one hundred and twenty-five children with behavioral problems have received diagnostic services; and in many cases, provisions were made for treatment.

For research purposes, we are now offering the same diagnostic services to a small group of boys who are not behavioral problems, but are, according to their teachers, well-behaved in the classroom. By comparing the test scores of these well-behaved boys with some of the boys that have behavioral problems, we hope to be able to eliminate adverse conditions that frequently limit a child's opportunity for learning.

Your son, _____, has been recommended by his past teacher as being an example of a well-behaved boy, and we would like to offer him the diagnostic services at no charge.

The diagnostic services will proceed in the following manner:

1. Physical Examination: A blank will be filled out by your family physician regarding your son's general physical health. This, if there is a charge, will be the only cost to the parents.

2. Electroencephalograph: This EEG measurement, which does not require drugs and does not cause any pain or physical reaction, determines if the brain of the child is functioning properly. Frequently, this examination may uncover convulsive disorders or other problems that the parents may not have been aware of, but had, nonetheless, been affecting the child's development. Since this examination is done at Bronson Hospital in Kalamazoo, requiring about two

hours, we will pay you approximately four dollars ($4.00) to cover your travel expense, and, of course, there will be no charge for the examination.

3. Psychological Examination: Each child will receive an assessment of mental abilities, academic achievement, personality characteristics, and perceptual skills. This examination will be done at the Health Office in Centreville. This interview will provide insight into your son's learning abilities and, perhaps, provide recommendations to you and the school that can be used to help your son fully achieve his potential and avoid certain problems that might otherwise develop. Again, there will be no charge for this service.

At the completion of the examination series, a report of the findings will be sent to you and the school.

Since we sincerely believe that these services will be a distinct benefit to your son, as well as to the other children that are affected by the results of the research study, and since there is no charge, we urge you to accept this offer.

Will you please complete the enclosed form and return it to our office immediately. If you do wish to accept the diagnostic services, we will then contact you to arrange convenient times for the appointments. If there are any further questions, please feel free to write or call me at Centreville 467-2795.

Yours truly,

W. R. Storer, M. D.
Director

Enc.

APPENDIX N

Follow-up Letter to Parents of

Well-Behaved Children

Health Department
St. Joseph County
Centreville, Michigan
August 12, 1963

Dear Mr. and Mrs. :

On July __, 1963, I mailed you a letter describing a diagnostic program for well-behaved children that is being offered by the St. Joseph County Health Department. Your son, _____, was recommended by his classroom teacher as the best behaved boy in his classroom last year.

The parents of other well-behaved children who have received these services have stated that they believe the program will help to insure continued success in school for their son. As a physician, I would also recommend these services, as they provide an excellent opportunity to guard against any unforseen physiological or psychological problems.

As you may recall, these medical services are being offered to you at no expense. The only cost to you, if any, will be a physical examination by your family physician. The interview with the psychologist, Mr. Robert Woody, in Centreville, and the electroencephalogram in Kalamazoo will be paid for by the Health Department. You will also be reimbursed for your travel expense to Kalamazoo.

I am enclosing another copy of the form, which I would appreciate having returned to me at your earliest convenience, indicating whether you would or would not like to have these services reserved for your son. Since this opportunity is being offered to only fifty (50) well-behaved boys in the entire County, we will offer the services to another child if you do not choose to participate.

If there are any questions, please feel free to call me at my office in Centreville, 467-2795.

Sincerely yours,

W. R. Storer, M. D.
Director

APPENDIX O

Acceptance Form For

Well-Behaved Children

ACCEPTANCE FORM

Re: _____

Please return immediately to: Dr. W. R. Storer, Director
St. Joseph County Health Dept.
Centreville, Michigan

After reading your description of the diagnostic services that are being offered, at no charge, to a small select group of well-behaved boys, we have decided that: (check one)

_____ Yes, we will accept the offer and cooperate with the diagnostic program. We understand that we and the school will be provided with the results, which may prove useful in avoiding problems that might limit our son's learning ability.

_____ No, we do not wish to accept your offer of the diagnostic services.

Parents' Name _____

Address _____

_____

Telephone _____

APPENDIX P

EEG Recording Procedure

EEG Recording Procedure

Electrodes are applied with bentonite or EKG solution to the scalp or ears at the positions determined by the attached diagram. Routinely 17 electrodes are used as indicated by the numbers.

Recording procedure is as follows: Square wave calibration at 20 and 50 microvolts. Brain wave calibration using G_1 = G_2 - 23/24 (see electrode placement diagram for locations of numbers used. G_1 = grid one and G_2 = grid two on push-pull amplifiers of a Grass Model IV 8 channel Electroencephalograph). Each of the following 2 minute epochs is then recorded.

1.	G_1	- 1	2	3	4	5	6		
	G_2	-23/24	23/24	23/24	23/24	23/24	23/24		
2.	G_1	- 1	2	3	4	5	6		
	G_2	24	24	24	24	24	24		
3.	G_1	- 1	2	3	4	5	6		
	G_2	- 23	23	23	23	23	23		
4.	G_1	- 1	2	3	4	7	8	7	8
	G_2	- 3	4	5	6	3	4	5	6
5.	G_1	- 1	2	3	4	9^1	10^1	7	8
	G_2	- 3	4	11	12	19	20	5	6
6.	G_1	- 7	3	4	7	8	7	5	6
	G_2	- 3	4	8	23/24	23/24	5	6	8
7.	G_1	- 1	3_1	9^1	11	2	4_1	10^1	12
	G_2	- 3	9^1	5	19	4	10^1	6	20
8.	G_1	- 1	2	11	12	7	8	19	20
	G_2	- 11	12	7	8	19	20	5	6
9.	G_1	- 1	7	3	11	12	2	8	4
	G_2	- 7	3	1	3	4	8	4	2
10.	G_1	- 7	3	5	19	20	8	4	6
	G_2	- 3	5	7	3	4	4	6	8
11.	G_1	- 1	2	11	12	7	8	19	20
	G_2	- 21 (vertex)							

12. G_1 - 1 2 5 6 7 8 9^1 10^1
G_2 - 21 (vertex)

13. Photic stimulation using a Buffington stimulator. Electrode placement as for epoch 4. One channel is used to record photic stimulation. Activation frequencies are as follows: 15 - 2 - 4 - 6 - 8 - 10 - 12 - 14 - 16 - 18 - 20 - 22 - 24 - 26. Alternating ten seconds of activation and resting record are done.

14. 3 minutes of hyperventilation (HV) is obtained. Electrode placement is the same as epoch 4. Sufficient post HV recording is obtained to permit record to return to pre HV level.

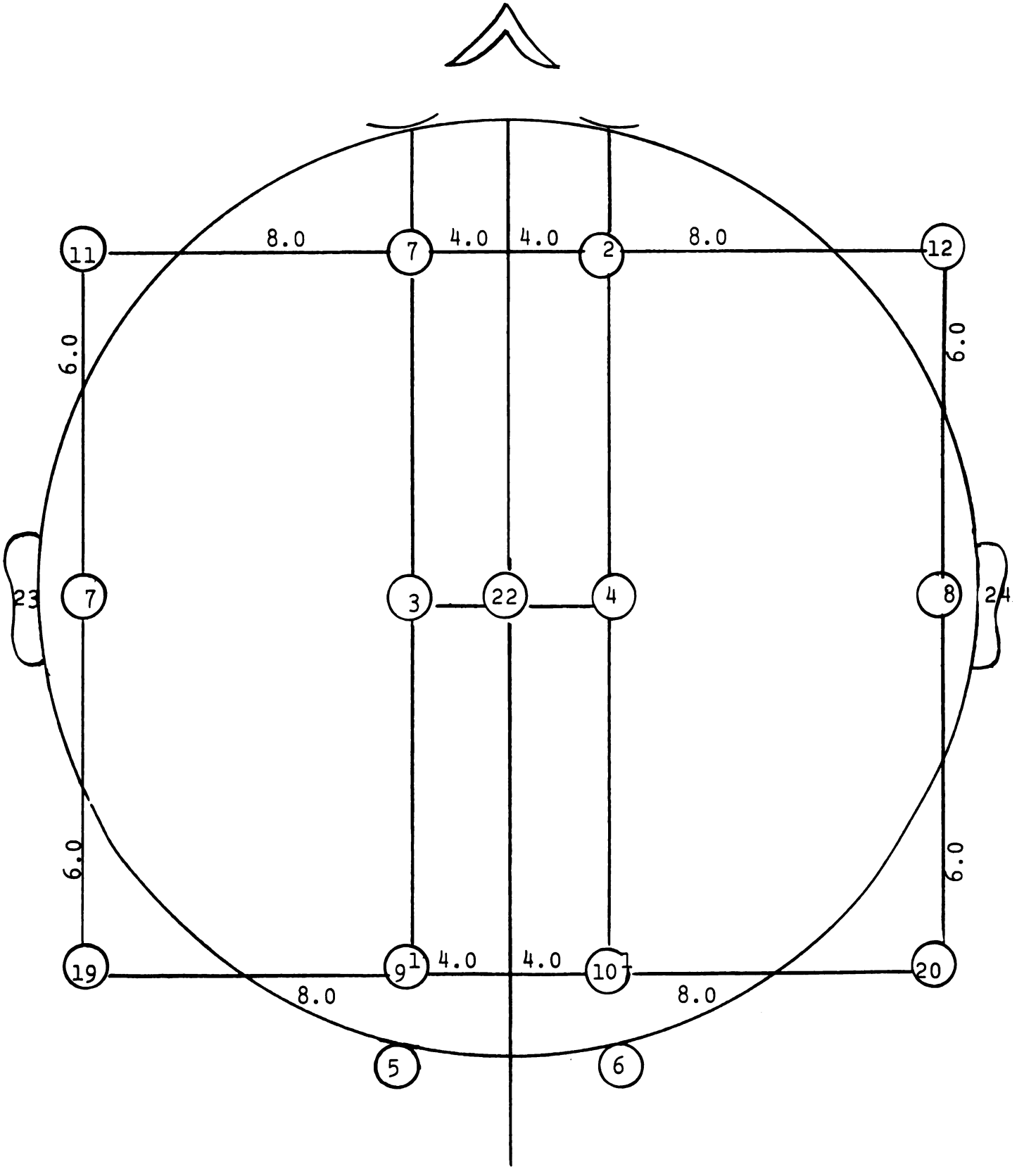
15. Repeat epoch 1.

Brain wave and square wave calibrations are repeated.

Donald W. Van Liere, Ph.D.
Electroencephalographer

APPENDIX Q

EEG Electrode Placement Diagram



ELECTRODE PLACEMENT DIAGRAM

APPENDIX R

EEG Rating Scale

Code number _____ Name _____ Group _____

CLASSIFICATION OF EEG'S

1. Predominant frequencies

   Frontal _____
   Parietal _____
   Occipital _____
   Temporal _____

2. Alpha pattern

   Good _____
   Poorly formed _____
   Notched and shouldered _____
   Spiky - positivities _____
   negativities _____

3. Organization

   Good _____
   Fair _____
   Poor _____

4. General Characteristics

   Normal areal voltage distribution present _____
   Anterior voltage displacement _____
   Overall low amplitude _____
   Hemisphere asymmetry- right _____
   left _____

5. Change with sleep

   Alpha loss _____
   Slowing _____
   Bi-parietal slow waves _____
   Sleep spindles _____
   Spikiness _____
   Burstiness _____
   Sleep patterns- normal _____
   atypical _____

6. Photic stimulation

   Alpha blocking- yes___ no___
   Driving
   all frequencies _____
   slow " _____
   fast " _____
   Spiking _____
   Paroxysmal _____
   Notching and shouldering _____
   Focal signs _____

7. Hyperventilation effect

   None _____
   Slowing _____
   Voltage build-up _____
   Spike wave _____
   Paroxysmal _____
   Time of occurrence of major hyperventilation abnormality _____

8. Record classification

   Normal _____
   Borderline _____
   Mildly abnormal _____
   Abnormal _____
   Markedly abnormal _____

9. Clinical correlates

	Suggestive of	consistent with	diagnostic of
Petit mal	___	___	___
Grand mal	___	___	___
Mixed type	___	___	___
Temporal lobe	___	___	___
Brain damage- generalized	___	___	___
focal	___	___	___
Personality disorder	___	___	___
Other focal conditions	___	___	___

APPENDIX S

Criteria for Rating The Electroencephalograms

Criteria for Rating The Electroencephalograms

The ratings of the over-all quality of the electroencephalograms were based on the following definitions:

> Normal EEG--An EEG recording in which frequencies, their amplitude and areal distribution are similar to those found in individuals with normal clinical histories and of comparable age.
>
> Borderline (non-specific)--A record which cannot be classified as normal, has minor atypicalities, such as slowing, disorganization, poor frequency and amplitude modulation but for which there are no specific clinical correlates.
>
> Mildly Abnormal--A record which has greater atypicalities than the above and for which a specified clinical correlate or correlates can be given.
>
> Abnormal--A record which shows marked atypicality of frequency, amplitude, and organization. Spikes, spike-wave discharges, and focal signs may be present. These abnormalities have specified clinical correlates.
>
> Severely Abnormal--Similar to the "Abnormal" category, but the records contain a poorer quality in the aforementioned areas.

The electroencephalographer believes that his diagnostic frame of reference is similar to that discussed by Schwab,[1] and Cohn.[2] The criteria used in classifying an EEG are identical to those discussed by Hill and Parr.[3]

---

[1] R. S. Schwab, Electroencephalography in Clinical Practice (Philadelphia: W. B. Saunders, 1951).

[2] R. Cohn, Clinical Electroencephalography (New York: McGraw-Hill, 1949).

[3] D. Hill and G. Parr, Electroencephalography: A Symposium on Its Various Aspects (New York: MacMillan, 1950), pp. 88-89.