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A COMPARISON OF THE RESPONSES OF NEUROLOGICALLY IMPAIRED,  
PSYCHOGENIC EMOTIONALLY DISTURBED, AND NORMAL,  
WELL-ADJUSTED CHILDREN TO THE  
GOLDSTEIN-SCHERER TESTS  

DISSERTATION  

Presented in Partial Fulfillment of the Requirements for  
the Degree Doctor of Philosophy in the Graduate  
School of The Ohio State University  

By  

Marlene Bergman Bireley, B.S., M.A.  

* * * * * *  

The Ohio State University  
1966  

Approved by  

[Signature]  
Adviser  
Department of Psychology
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To the many professional co-workers who took time from their busy schedules to identify possible subjects and to those subjects and their parents, the writer acknowledges the unselfish contribution of their time and of themselves.

To her family, whose tolerance of such unscholarly conditions as unmade beds and unmended socks has permitted her to find the many hours needed for the completion of this study, she extends a sigh of mutual relief.
VITA

March 11, 1936  Born, Edgerton, Ohio

1957. . . . .  B.S., Bowling Green State University, Bowling Green, Ohio

1957-1959 . .  Elementary Teacher, Worthington, Ohio

1960-1961 . .  Graduate Assistant, The Ohio State University, Columbus, Ohio

1961. . . . .  M.A., The Ohio State University, Columbus, Ohio

1961. . . . .  Special Education Teacher, Columbus, Ohio

1962-1963 . .  Instructor, Department of Psychology, Area of Exceptional Children, The Ohio State University, Columbus, Ohio

1963-present. . Intern School Psychologist and School Psychologist, Franklin County Public Schools, Franklin County, Ohio

1963-present. . Occasional Lecturer, Department of Psychology, Area of Exceptional Children, The Ohio State University, Columbus, Ohio

FIELDS OF STUDY

Major Field: Psychology of Exceptional Children

Studies in the Psychology and Education of Exceptional Children. Dr. Viola M. Cassidy

Studies in School Psychology. Dr. Donald C. Smith

Minor Field: Developmental Psychology

Studies in Child Development. Dr. George G. Thompson and Dr. John Horrocks
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CHAPTER I

INTRODUCTION

The problem

The diagnosis, treatment, and education of neurologically impaired children have stimulated much interest and research since the early work of Strauss and Lehtinen (1947). Much has been written about each of these three facets of the problem and some progress has been made. The fact remains, however, that many children whose developmental history and psycho-educational problems indicate possible neurological impairment are being programmed in regular classrooms and taught by ordinary methods because of lack of proper diagnosis and inadequate knowledge of proper methodology.

In addition to separating these neurologically impaired children from essentially normal children with learning problems, another differentiation must be made. The problems concomitant with neurological impairment often lead to frustrations, family problems, and eventual maladjustment so that many of these children become similar to psychogenic emotionally disturbed children in overt behavior patterns and therapeutic counseling needs. It is important to differentiate between these two groups so that the proper approach to medical, psychological, and educational management can be made. The continuing search for a more sensitive psychological instrument to aid in the diagnosis and consequent programming of both types of children prompted this study.
While much of the present research centers around the perceptual motor difficulties that characterize many neurologically impaired children, such an approach samples a limited portion of the processes involved in the reception and communication of knowledge. Adler (1964) summarized these processes in the following manner:

1. End organ sensation—the ability to sense the experience offered by one's environment and to make the proper adjustments to these experiences.

2. Neuro-motor development—the ability to select appropriate motor patterns and to refine muscle tonus.

3. Muscular response—the ability to make the appropriate response.

4. Perceptual learning—the ability to recognize and discriminate these sensations and to learn from one's responses to them.

5. Conceptual development—the ability to abstract similarities from among different perceptions and categorize or classify them.

6. Symbolic development—the ability to communicate ideas, emotions, and desires through a language consisting of signs, signals, or words.

7. Feedback system—the ability to scan and analyze the response within our brain and to correct it if necessary.

Of major interest to this writer were the problems of perceptual motor and conceptual impairment and the means by which such impairment could be evaluated. A survey of the literature discussed in Chapter II revealed that both types of impairment exists in neurologically impaired children so that the use of these areas of communicative functioning as means of differentiating the neurologically impaired from the normal child appeared to be a logical task. Studies supporting similar impairment in the mentally ill were also abundant. Since adult schizophrenics
were the primary subjects in these studies (see Chapter II), the question of whether or not emotionally disturbed children would be identifiable from both neurologically impaired and normal children on tests of perceptual-motor functioning and concept formation remained interesting but unanswered.

Initial exploration revealed that sorting tests were the most common method used in the evaluation of concept formation and that these tests were patterned after the work of Goldstein and Scheerer (1941) in spite of major criticisms of the soundness of their research methodology. Examination of the Goldstein-Scheerer test manual verified the shortcomings cited by critics, but also raised the possibility that the criticisms were not insurmountable. Since two of the Goldstein-Scheerer Tests primarily stressed perceptual-motor functioning (the Stick and Cube Tests) and three stressed concept formation (the Object Sorting, Color Form Sorting, and Color Sorting Tests), further study of these tests as possible instruments for the differential diagnosis of neurologically impaired, psychogenic emotionally disturbed, and normal was considered to be a worthwhile pursuit. (The Color Sorting Test later was omitted to conserve time and since a survey of the literature revealed minimal interest in it.)

The specific problem

The specific purpose of this study was to determine the usefulness of the Goldstein-Scheerer Cube Test, the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, the Weigl-Goldstein-Scheerer Color Form Sorting Test, and the Goldstein-Scheerer Stick Test (hereafter referred
to collectively as the Goldstein-Scheerer Tests) as instruments for the differential diagnosis of neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children.

Significance of the problem

The enormous amount of literature written about neurologically impaired children was indicative of the widespread interest in this field. Contradictory findings and the inadequacy of the known testing devices provided adequate justification for further research.

The differential diagnosis of emotionally disturbed children with and without neurological impairment has been described by Beck (1961) as a major problem in child psychology. Both medical and psychological methods of determining positive etiologies are limited at present. Therefore, any attempt to develop more adequate differentiation on the basis of psychological tests had significance.

Investigators who have incorporated various subtests of the Goldstein-Scheerer Test into test batteries designed for a variety of adult and child populations have attempted to overcome the major shortcomings of these tests cited by both Kogan and Strother in Buros (1949), namely, the lack of standardization data and the lack of a systematic scoring method. This study has attempted to provide normative data for a rather narrow age group of children. It will also bring together a number of scoring systems pragmatically adapted from the literature on the basis of apparent ease of scoring and utility for the purposes of this study. Of some significance has been the utilization of these scoring systems in a single battery. The derivation of the scoring systems are
described in more detail in Chapter III.

While Goldstein and Scheerer were interested primarily in the sampling of "concrete" and "abstract" attitudes, inspection of the various subtests revealed that they incorporated characteristics of a number of widely used tests or subtests which presented opportunities for eliciting information about a number of potential problem areas. The Object Sorting Test and the Color Form Sorting Test can be described as tests of concept formation, while the Stick and Cube Tests emphasize perceptual-motor functioning. By including the former, more dimensions of potential abnormality can be tapped than is possible when using only the latter or such related clinical tests as the Bender Visual-Motor Gestalt Test (Bender, 1938) or the Benton Visual Retention Test (Benton, 1945). The evaluation of a number of conceptual and perceptual dimensions corresponds with the expressed purpose of the Illinois Test of Psycholinguistic Abilities (ITPA) (McCarthy and Kirk, 1961). This latter test taps more specific areas of perceptual-motor and cognitive functioning, but the Goldstein-Scheerer Tests have the significant advantage of potential use with most school age children while the ITPA is not yet applicable beyond the primary grades.

A number of studies have indicated the potential usefulness of the Goldstein-Scheerer Tests. Rapaport et al. (1945), for instance, regarded the Sorting Test as a more sensitive concept formation test than the Wechsler Similarities Subtest. The continued concretization of cues used with the Cube Test provided additional information to that given in the Wechsler Block Design Subtest. Similar cues, when used with the
Bender Visual-Motor Gestalt Test, have shown promise of differentiating between neurologically impaired and normal children on the basis of rotation errors (Martin, 1964). The Stick Test incorporated the procedure of both the Bender and Benton Tests by requiring reproduction of designs both with and without visual stimulus while adding the aspect of the three-dimensional stimulus. Potential differences of response to any of these variations provided further significance for this study.

In summation, the significant purposes of this study were these:

1. To refine a known test battery by developing and/or adapting a scoring system for each subtest.

2. To provide normative data for children of a limited age and intelligence range on this test battery.

3. To investigate the usefulness of the individual items of this test battery in the differential diagnosis of neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children.

Hypotheses

The purposes of this study will be fulfilled by testing the following null hypotheses:

MAJOR HYPOTHESIS I: There are no significant differences in the number of cues needed by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete the Goldstein-Scheerer Cube Test.

Minor Hypothesis I: There are no significant differences in the number of cues needed by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete any of the individual designs of the Goldstein-Scheerer Cube Test.
MAJOR HYPOTHESIS II:

There are no significant differences in the number of errors made by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Goldstein-Scheerer Stick Test.

Minor Hypothesis 2:

There are no significant differences in the types of errors made by neurologically impaired, psychogenic emotionally disturbed and normal, well-adjusted children on the Goldstein-Scheerer Stick Test.

MAJOR HYPOTHESIS III:

There are no significant differences in the types of sortings made by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part A.

Minor Hypothesis 3:

There are no significant differences in the number of objects selected by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete the sortings on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part A.

MAJOR HYPOTHESIS IV:

There are no significant differences in the performance of neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part B.

MAJOR HYPOTHESIS V:

There are no significant differences in the performance of neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Weigl-Goldstein-Scheerer Color Form Sorting Test.

Analysis of the data

Those data which fulfilled the criteria set forth for the use of parametric statistics (Edwards, 1962), were compared by means of simple
analysis of variance. Data so tested included that gathered to test Major Hypotheses I and II and Minor Hypothesis 3.

Data which were more appropriately treated by non-parametric analysis (Siegel, 1956) were compared by two non-parametric tests. The chi square test of significance was used to test Major Hypotheses III and V and Minor Hypotheses 1 and 2. The Kruskal-Wallis one-way analysis of variance was used to test Major Hypothesis IV.

Assumptions

In undertaking this study, the following assumptions were made:

1. It was assumed that the differential diagnosis of neurologically impaired, psychogenic emotionally disturbed, and normal children was a worthwhile research goal.

2. It was assumed that the differential diagnosis of neurologically impaired, psychogenic emotionally disturbed, and normal children was an attainable goal.

3. It was assumed that the neurologically impaired, psychogenic emotionally disturbed, and normal children selected for inclusion in this study were diagnosed correctly.

Definition of terms

These frequently used terms were used in the following manner in this study:

Neurological impairment. This term was used synonymously with "brain damage" and "organicity" and referred to insults to the brain of various origins. In all subjects in this study, a medical diagnosis of neurological impairment was necessary for their inclusion in the experimental group.
Psychogenic emotional disturbance. In this study, these children were characterized by "adjustment reactions to childhood" of such a degree that they were receiving counseling or special educational programming as a result of their disturbance. Neurological impairment had been ruled out by the consensus of opinion of the professional staff of the referring facility on the basis of the available medical, developmental, and psychological data. "Psychogenic" referred specifically to the absence of a physiological basis for the emotional disturbance. (The abbreviation "ED" was used in certain instances in this study to denote this group.)

Clinical groups. This term was used to refer to the neurologically impaired group and the emotionally disturbed group as "abnormal" groups when they were contrasted or compared to the normal group.

Pre-natal; peri-natal; post-natal. These terms were used in the discussion of neurological impairment to denote the time at which the impairment occurred. Pre-natal denotes the in utero period; peri-natal denotes at birth; and post-natal denotes any time beyond the delivery period.

Psycho-educational problems. This term referred to those problems which manifested themselves in the school situation either by notable behavior or learning difficulties.

Perceptual-motor integration. This term referred to the ability to receive sensory impressions from the external world, to recognize and integrate them in the brain, and to motorically react to them (that is, to reproduce them with the use of similar objects). The visual-perceptual sense is the only one with which this study was concerned.

Concept formation. This term referred to the process by which specific characteristics of perceived objects are abstracted, then generalized as belonging to several objects (i.e., a red ball, a red plate, and a red poker chip may be conceptually grouped because of their "redness" or "roundness.")
"Open-closed; "public-private." These terms were used in this study to denote types of conceptual groupings employed in the Object Sorting Test, Part A. The "open-closed" dichotomy refers to the numbers of objects that can be included in a sort because of the number of attributes utilized. ("metal objects" is an open sort while "black buttons" is a closed sort.) The "public-private" dichotomy refers to the ease with which others can understand the sort and anticipate other objects that can be included.

Summary

This chapter has reviewed the origin of the research problem, the significance of the problem, and the major purposes of the study. Chapter II will review the literature pertaining to perceptual and conceptual development in normal, neurologically impaired, and psychogenic emotionally disturbed children and will cite research concerning the use of psychological tests in the differential diagnosis of these three groups.
CHAPTER II

REVIEW OF THE LITERATURE

This review of the literature was concerned with a number of topics pertinent to the differential diagnosis of neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children through an evaluation of perceptual and conceptual development. While an exhaustive review of each of the areas discussed would constitute a sizeable study in itself, it is hoped that the research trends can be clarified by this discussion.

The major areas of discussion will be as follows:

1. Normal perceptual and conceptual development in children
2. Abnormal characteristics of neurologically impaired and emotionally disturbed children
3. The use of psychological tests in determining perceptual and conceptual impairment.

Normal Perceptual and Conceptual Development in Childhood

Perceptual development

While perception constitutes a sizeable area of psychological research, an inclusive definition of the process is difficult. English and English (1958) describe perception as "an event in the person or organism primarily controlled by the excitation of sensory receptors, yet also influenced by other factors of a kind that can be shown to have originated in the life history of the organism. The event is primarily cognitive rather than affective or conative, though it usually
(or always) manifests all three aspects. It is an organized complex, though its several components can sometimes be recognized separately. It is usually very difficult to distinguish the integrated whole which constitutes the perception event from the associations, memories, and feelings that ensue."

Whether the developmental stages of perception primarily require analysis or synthesis is debatable. Suchman and Aschner (1961), in a review of perceptual and cognitive development, cite contradictory viewpoints some of which emphasize associative learning and perceptual integration; others, dissociative learning and perceptual differentiation and, still others, emphasize neurological maturation and preformed perceptual patterning. Bartley (1958) cites no less than thirteen theories on the nature of perception.

Bruner (1957) has viewed all perceptual experience as "necessarily the end product of a categorization process." This process involves the utilization of discriminatory cues to code stimulus inputs into appropriate categories (sets of specifications). He concludes that, "Under less than optimal conditions, perception will be veridical in the degree to which the accessibility of categorizing systems reflects the likelihood of occurrence of the events that the person will encounter."

This theory has particular relevance to the present study. Assuming that both neurologically impaired and emotionally disturbed children function under "less than optimal conditions," the major problem of this thesis, couched in Brunerian terminology, has questioned
whether the accessibility of categorizing systems differs in these groups, and, if so, can this be used for the differential diagnosis of children within these groups.

**Conceptual development**

Concepts (according to English and English, 1958) have the following qualities:

1. any object of awareness with its significance or meaning; anything one can think about that can be distinguished from other "things;"
2. a general meaning, an idea, or a property, that can be predicated for two or more individual items;
3. knowledge that is not directly perceived through the senses but is the result of the manipulation of sensory impression.

A concept requires both abstraction and generalization—the first to isolate the property, the second to recognize that it may be ascribed to several objects.

Harvey, Hunt, and Schroder (1961) view the developed concept as "an experiential filter through which impinging events are screened, gauged, and evaluated, a process that determines in large part what responses can and will occur." They view the simplest concept as the placement of two points in a relationship and making the judgment of "equality," "difference," or "similarity" between the two. Concepts therefore develop by the bipolar process of differentiation and integration.

Similarly, Piaget's dual process consists of "assimilation and accommodation" as means for cognitive adaptation (Flavell, 1963). Briefly stated, Piaget believes that cognitive growth (adaptation requires the structuring of an environmental object in accord with the
organism's existing intellectual organization (assimilation) while simultaneously requiring adjustment of the organism to the demands of the environment (accommodation). Through this environmental-organismic "give-and-take," intellectual (conceptual) growth occurs.

Development of form and color concepts

The development of specific concepts has been an object of concern to many researchers. Thompson (1962) has reviewed these studies in some detail. Of specific relevance to the present study was the development of color and form concepts. He revealed that form discriminations are among the first made by the growing child and remain the predominant sorting mode in adults. For a brief period between three and six years, color becomes preferable. Brian and Goodenough (cited by Thompson, 1962) speculated that the young child first develops genus rather than species concepts (all men are "daddies"), then undergo a period of species classification (a red cow is different than a black cow) followed by a return to a more mature use of form (genus) because of its greater appropriateness. The development of these concepts illustrates the gradual, orderly progression of concept development based upon increased abilities of discrimination, generalization, and memory.

Abnormal Characteristics of Neurologically Impaired and Psychogenic Emotionally Disturbed Children

Neurologically impaired children

A discussion of the characteristics of "the" neurologically impaired children

The development of specific concepts has been an object of concern to many researchers. Thompson (1962) has reviewed these studies in some detail. Of specific relevance to the present study was the development of color and form concepts. He revealed that form discriminations are among the first made by the growing child and remain the predominant sorting mode in adults. For a brief period between three and six years, color becomes preferable. Brian and Goodenough (cited by Thompson, 1962) speculated that the young child first develops genus rather than species concepts (all men are "daddies"), then undergo a period of species classification (a red cow is different than a black cow) followed by a return to a more mature use of form (genus) because of its greater appropriateness. The development of these concepts illustrates the gradual, orderly progression of concept development based upon increased abilities of discrimination, generalization, and memory.
impaired child is immediately open to criticism. Unlike conditions with a single etiology, neurological impairment can result from innumerable causes and can conclude in a variety of impairments. An underlying supposition of this study, namely, that there are common factors in all neurologically impaired children that can be isolated by psychological tests cannot be fully substantiated at this time. This, as was suggested by Haynes and Sells (1960), may account for the failure of many of the studies reviewed later in this chapter. Wortis (1956) criticized the concept of the brain-injured child and called for refined analysis instead of generalization.

With the above criticisms in mind, it should be noted that a number of characteristics are present in sufficient numbers of neurologically impaired children to have diagnostic usefulness. Beck (1961) found that the following symptoms were agreed upon by Strauss and Lehtinen, Doll, Carmichael, Tredgold, Goldstein, Bender, Gesell, and Amatruda, and Yacorzynski:

1. Perseveration
2. Distractibility
3. Disorganization or lack of integration
4. Perceptual difficulties
5. Conceptual difficulties
6. Language disorders
7. Motor inco-ordination
8. Disparity in development
9. Emotional instability
10. Insecurity
11. Irritability
12. Convulsions
13. Mental deficiency
14. Poor retention

Gross impairment resulting in expression of a majority of the above symptoms presents little difficulty for the diagnostician, but
those without defects of the neuromotor system present difficulty because of the overt behavior which overlaps with emotional disturbance.

In a discussion of prediction of learning disabilities following interference with the integrity of the central nervous system (CNS) in children of normal intellect, Thelander, Phelps, and Kirk (1958) described the "subtle" defects encountered in (1) expressive speech, (2) understanding oral commands, (3) writing, (4) subtle or perceptual disturbances in hearing, (5) memory, (6) control of hyperactivity, and (7) emotional control.

Myklebust (1964) in a discussion of psychoneurological disturbances in childhood (a term preferred by him in place of neurologically impaired or brain-damaged) described the alteration of learning in these four primary ways:

1. Perceptual disturbance—Inability to identify, discriminate, and interpret sensation resulting in poor recognition of everyday experience.

2. Disturbance of imagery—Inability to call to mind common experiences which have been perceived.

3. Disorders of symbolic processes—Inability to acquire facility to represent experience symbolically resulting in language disorders.

4. Conceptualizing disturbances—Inability to generalize and categorize experience resulting in abnormal concreteness and deficiency in grouping ability.

The above descriptions would support the hypothesis that neurologically impaired children would tend to have more difficulty in completing the perceptual and conceptual tasks of the Goldstein-Scheerer Tests than would normal children.
Psychogenic emotionally disturbed children

Psychogenic emotional disturbance presents as many labeling difficulties as does neurological impairment. Paté (in Dunn, 1963) described the following general categories of childhood disturbances:

1. **Psychoses** which are characterized by loss of contact with reality, by imaginary sights or sounds or by extreme withdrawal. Childhood schizophrenia and infantile autism are the most notable of these psychoses.

2. **Psychophysiologic disorders** which are characterized by physical malfunctioning such as asthma, eczema, migraine, etc., instead of by apparent anxiety.

3. **Psychoneuroses** are characterized by inordinate fears (phobias) or desires (manias) in specific areas but by the ability to function fairly well in other areas. Panic reactions to these specific areas differentiate these children from those with "normal" childhood fears.

4. **Personality disorders** include those children whose chronic behavior patterns present problems. Extreme shyness or aggressiveness and rigidity in behavior characterize these children.

5. **Transient situational personality disorders** are precipitated by traumatic experiences such as death or divorce in children without apparent chronic underlying personality disorder.

The case histories of the psychogenic emotionally disturbed children included in this study pointed to various disruptions in the
integrity of family interrelationships as the primary etiology and psychoneuroses and personality disorders as the primary results of these difficulties. Children considered psychotic were excluded entirely since childhood schizophrenia is considered by some to have an organic basis (Bender, 1947). A number of studies described below in more detail have indicated that perceptual and conceptual impairment can often be considered indicative of emotional disturbance. The overlapping symptomatology between the two clinical groups with which this study was concerned is so apparent that further discussion appears redundant.

The Use of Psychological Tests in Determining Perceptual and Conceptual Impairment

The Goldstein-Scheerer Tests

The use of the Goldstein-Scheerer Tests as research instruments has been comparatively rare. The lack of normative data and scoring standards may account for this as may the expressed purpose of these tests, i.e., to determine whether or not a subject is functioning in the "concrete" or "abstract" attitude. Although related to the perceptual-conceptual framework within which we have viewed these tests, the abstract-concrete dichotomy cannot be considered synonymous. Goldstein and Scheerer viewed the latter as two generically different modes of behavior which were separated by a pronounced line of demarcation. The "concrete attitude" characterized the abnormal individual who apprehended by sense or percept without conscious activity in the sense of reasoning, awareness or a self-account of one's doing. While Goldstein's work with brain-injured war veterans has caused his work to
be most identified with this type of abnormality, his own concept of "abnormality" was much broader, including all those who were not "normal." This normality was determined by an ability to respond in the "abstract attitude," a condition characterized by the following volitional or conscious modes of behavior (Goldstein and Scheerer, 1941):

1. To detach our ego from the outer world or from inner experiences.
2. To assume a mental set.
3. To account for acts to oneself; to verbalize the account.
4. To shift reflectively from one aspect of the situation to another.
5. To hold in mind simultaneously various aspects.
6. To grasp the essential of a given whole; to break up a given whole into parts, to isolate and to synthesize them.
7. To abstract common properties reflectively; to form hierarchic concepts.
8. To plan ahead ideationally; to assume an attitude towards the "mere possible" and to think or perform symbolically.

Subsequent studies have shown minimal interest in these attitudes which were of prime interest to Goldstein and Scheerer, but have attempted to concentrate on those areas which interested them least, i.e., the development of normative data. The following discussion will refer to those studies which have been concerned with both the Goldstein-Scheerer Tests and related tests which supply information about an area of equal concern, that of perceptual and conceptual development.

**Sorting tests**

The use of sorting tests in the study of concept formation has been explored by a number of authors. The need for developmental norms has been an obvious goal in the use of these tests with children.
Reichard, Schneider, and Rapaport (1944) administered both the Color-Form and Object Sorting Tests to 23 subjects, CA four to fourteen, to develop normative data. They found that three stages of sorting were evident: (1) the concretistic (apples and bananas both have peels) which was common in the youngest children; (2) the functional (you eat both bananas and apples); most common in the eight and nine year olds; and (3) the abstract (both apples and bananas are fruit) which becomes common at age eleven. In all children, sorting for themselves was easier than identifying the examiner's groupings.

Zaslow (1950), in another normative study, utilized fourteen geometric designs gradated from circularity to triangularity to "define operationally Goldstein's abstract and concrete dichotomy" and to compare the abstract and concrete modes found in normal children, mentally deficient children, and brain-damaged adults. Both qualitative and quantitative norms were supplied.

An early study by Bolles (1937) found that a qualitative analysis of the responses to the Color-Form, Object Sorting, and Cube Tests provided little help in differentiating between adult "dements" (hebephrenic dementia praecox), adult "aments," IQ range 47-64, and normal boys of a mental age similar to the "aments."

Clawson (1962), on the other hand, presented a battery of tests to three groups of children matched by age (8-0 to 13-0) and IQ (WISC 91-123) and judged brain-damaged, emotionally disturbed, or normal by medical and developmental means and found that an adapted Sorting Test differentiated between the brain-damaged and the other two groups at the
McGaughran and Moran (1957) rejected the abstract-concrete dichotomy of Goldstein and Scheerer and judged responses to the Object Sorting Test on two bases. The first, open vs. closed, referred to the number of attributes involved in the sorting decision, while the second, public vs. private, referred to the ability to communicate the sort to others. This system, which was adapted for the present study and is described in more detail in Chapter III, differentiated between paranoid schizophrenics and non-psychiatric adult patients and, in a later study (McGaughran, 1957), between schizophrenic and brain-damaged adults. The schizophrenics tended to make more private or unusual choices while the brain-damaged tended to make more closed and concrete choices.

Payne and Hewlett (cited by Eysenck, 1961) noted the tendency toward "overinclusion" on the part of adult schizophrenics on both the Color-Form and Object Sorting Tests and interpreted this as "an inability to preserve conceptual boundaries."

Perceptual-motor tests

Stick Test. Heald and Marzolf (1953) discovered that a majority of one hundred thirty-eight normal children, CA range 6-4 to 11-3, were capable of completing both the Color-Form and the Stick Test. In regard to the latter, they found that the mean correct reproductions for the youngest group (72 to 77 months) nearly approximated the group mean (27.2 vs. 28.7 correct reproductions) so that little increase by age was possible. They observed that reproductions from memory afforded little additional information since children who succeeded with the
designs with the stimuli present could also reproduce them from memory.

Halpin and Patterson (1954) compared two groups of familial and brain-injured retarded children of thirty subjects each, CA range 7-4 to 13-5, on the Color-Form, Cube and Stick Tests and found the latter to differentiate at the .01 level in deviations from the pattern when using their own scoring system. This system has been adapted for the present study and is described in detail in Chapter III.

Cube Test. Armitage (1946) discussed the Cube Test as an evaluator of brain injury and concludes that "the abstract-concrete (attitude) resolves ultimately to the ability to analyze, synthesize, anticipate, plan and shift," but presents no norms or other bases for comparison between normal and neurologically impaired subjects. Boyd (1949), on the other hand, presents a basis for quantitative scoring but little theoretical discussion of the results.

Neither Bolles (1937) nor Halpin and Patterson (1954) who included the Cube Test in a battery of tests found that it differentiated between the clinical groups as cited above.

Benton Visual Retention Test. This brief, seven card test of immediate visual recall which was devised to augment the digit span test of immediate auditory recall is similar to the Stick Test in that the reproduction of the figure is required with the stimulus card absent. It has been found useful in differentiating between adults with and without neurological impairment (L'Abate et al., 1962), but somewhat limited in differentiating brain-damaged adults from schizophrenics (L'Abate et al., 1963). Wahler (1956) also found that the mean number of
errors was significantly higher for brain-damaged adults than for normals, but that the types of errors were not significant.

Rowley and Baer (1961) explored the results of this test with matched groups of neurologically impaired and emotionally disturbed children and found that both groups made a sizeable percentage of borderline scores (-2), but that 28 per cent of the brain-damaged group made grossly defective scores (-3 or more) compared to 4 per cent of the disturbed, thereby appearing to have some usefulness at this level.

**Bender Visual-Motor Gestalt Test (Bender-Gestalt Test).** This widely used diagnostic tool has been the object of so much research that to attempt to review it briefly is impossible. The reader is referred to an excellent series of articles compiled by Murstein (1965) which deals with the use of this test in differential diagnosis, in the detection of organic brain damage, juvenile delinquency, emotional disturbance, and learning disturbance. In one of these articles and of particular relevance to this study, Billingslcar stated that the Bender-Gestalt can be used to detect the psychotic from the nonpsychotic and nonpsychiatric subjects above age thirteen but does not detect effectively the nonpsychotic emotionally disturbed child. Similarly, it can be used as a "clue" in the detection of possible organic brain damage. He concluded that more complete standardization is needed before the Bender-Gestalt Test can be used as a norm against which to judge other variables.

**Related Tests.** A number of studies using isolated techniques have related various perceptual abilities to anxiety or neurosis. Combs
and Taylor (1952) found that a group of normals given the task of "coding" neutral and threat sentences made significantly more errors and took significantly longer to code the threat sentences.

Granick (1955) found that neurotic children scored less well than normal children in tests involving visual discrimination while Brengelmann (1958) found that neurotics required significantly longer exposure time to recognize pictures or objects presented tachistoscopically than did normals, and psychotics required significantly more time than did neurotics.

Both Moldawsky and Moldawsky (1952) and Kaye et al. (1953) found that normals have a decreased digit span when tested under anxiety producing situations.

This series of studies coincides with the hypothetical basis for this study that declares that both neurologically impaired and emotionally disturbed children will perform less well on the perceptual and conceptual tasks of the Goldstein-Scheerer Tests while they offer equivocal information as to the feasibility of differentiating between the two clinical groups.

Summary

This chapter has presented a review of the literature concerning perceptual and conceptual development in children, abnormal characteristics of neurologically impaired and psychogenic emotionally disturbed children, and the use of psychological tests in determining perceptual and conceptual impairment. Chapter III will discuss the procedures used in determining whether or not the Goldstein-Scheerer Tests can be used
in the differential diagnosis of normal, neurologically impaired, and psychogenic emotionally disturbed children.
CHAPTER III

PROCEDURES

The preceding chapter reviewed the literature concerned with perceptive and conceptual development in children, characteristics of neurologically impaired and emotionally disturbed children, and previous studies concerned with the development of tests for use in the differential diagnosis of neurologically impaired and emotionally disturbed children. This chapter was concerned with the procedures used in obtaining and analyzing the data gathered for this study.

The problem

This study was concerned with the differential diagnosis of neurologically impaired, psychogenic emotionally disturbed, and normal children. A need for such differentiation has arisen in our schools where children with psycho-educational problems often are programmed in a regular class and taught by ordinary methods because of inadequate means of diagnosis.

The Goldstein-Scheerer Tests were chosen as the research instruments. Adaptations of these tests have been the basis for a number of studies but minimal interest has been shown in the original tests because of inadequate standardization and scoring procedures. This study has attempted to provide normative data for a group of children limited by age and intelligence and has provided scoring procedures adapted from a number of research studies.
The specific problem

The specific purpose of this study was to determine the usefulness of the Goldstein-Scheerer Cube Test, the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, the Weigl-Goldstein-Scheerer-Color Form Sorting Test, and the Goldstein-Scheerer Stick Test as instruments for the differential diagnosis of neurologically impaired, emotionally disturbed, and normal, well-adjusted children.

Hypotheses

The specific purpose of this study, stated above, will be fulfilled by testing the following null hypotheses:

MAJOR HYPOTHESIS I:
There are no significant differences in the number of cues needed by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete the Goldstein-Scheerer Cube Test.

Minor Hypothesis 1:
There are no significant differences in the number of cues needed by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete any of the individual designs of the Goldstein-Scheerer Cube Test.

MAJOR HYPOTHESIS II:
There are no significant differences in the number of errors made by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Goldstein-Scheerer Stick Test.

Minor Hypothesis 2:
There are no significant differences in the types of errors made by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Goldstein-Scheerer Stick Test.
<table>
<thead>
<tr>
<th>MAJOR HYPOTHESIS III:</th>
<th>There are no significant differences in the types of sortings made by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor Hypothesis 3:</td>
<td>There are no significant differences in the number of objects selected by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete the sortings on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part A.</td>
</tr>
<tr>
<td>MAJOR HYPOTHESIS IV:</td>
<td>There are no significant differences in the performance of neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part B.</td>
</tr>
<tr>
<td>MAJOR HYPOTHESIS V:</td>
<td>There are no significant differences in the performance of neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Weigl-Goldstein-Scheerer Color Form Sorting Test.</td>
</tr>
</tbody>
</table>

**Population**

Three experimental groups of children were selected for this study on the basis of their availability for testing and their fulfillment of the following criteria:

**Group I. Neurologically impaired**

1. The child was a client of a local mental health or medical facility.
2. The child had a medically confirmed diagnosis of neurological impairment.
3. The child had a Stanford-Binet or WISC IQ between 85 and 115.
4. The child had a chronological age between 8-0 and
11-0 at the time of the administration of the Goldstein-Scheerer Tests.

Group II. Psychogenic emotionally disturbed

1. The child was the client of a local mental health facility or was placed in a special educational program for emotionally disturbed children.
2. The child had a Stanford-Binet or WISC IQ between 85 and 115.
3. The child had a chronological age between 8-0 and 11-0 at the time of the administration of the Goldstein-Scheerer Tests.

Group III. Normal children with no neurological impairment and no significant emotional problems.

1. The child had made normal progress in school. (He had not been retained and had made average or above average grades.)
2. The child had exhibited normal social and behavioral adjustment (as reported by teacher questionnaire).
3. The child had a Stanford-Binet or WISC IQ between 85 and 115.
4. The child had a chronological age between 8-0 and 11-0 at the time of the administration of the Goldstein-Scheerer Tests.
5. The child had normal perceptual-motor development as measured by the Bender Visual-Motor Gestalt Test. (He fell within one standard deviation of his chronological age group as reported by Koppitz [1962].)
6. The child had no history of prenatal, perinatal, or postnatal trauma or conditions commonly associated with neurological impairment (as reported by parent questionnaire).

Each group contained fifteen children. The chronological age and intelligence quotient of each child are presented in Table 1. The neurologically impaired group had been evaluated at Children's Hospital or the Diocesan Child Guidance Center, both located in Columbus, Ohio. Medical, psychological and developmental data had been available to those staff members who had diagnosed each child as "neurologically impaired." This group consisted of thirteen boys and two girls, mean CA of 9-1 (range of 8-0 to 10-7), and mean IQ of 91.33 (range of 90 to 115).
<table>
<thead>
<tr>
<th>Neurologically Impaired</th>
<th>Emotionally Disturbed</th>
<th>Normal</th>
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<tr>
<td>NM 1</td>
<td>8-0</td>
<td>115W</td>
</tr>
<tr>
<td>NM 2</td>
<td>8-1</td>
<td>99S</td>
</tr>
<tr>
<td>NM 3</td>
<td>8-5</td>
<td>107S</td>
</tr>
<tr>
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<td>94S</td>
</tr>
<tr>
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<tr>
<td>NF15</td>
<td>10-7</td>
<td>92W</td>
</tr>
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**Mean:**

<table>
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<th>M:13</th>
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<th>Mean</th>
<th>M:8</th>
<th>Mean</th>
<th>Mean</th>
<th>M:9</th>
<th>Mean</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>F: 2</td>
<td>9-1</td>
<td>91.33</td>
<td>F:7</td>
<td>9-5</td>
<td>97.86</td>
<td>F:6</td>
<td>9-6</td>
<td>100.93</td>
</tr>
</tbody>
</table>

*M denotes Male; F denotes Female

*C.A. denotes Wechsler Intelligence Scale for Children; S denotes Stanford-Binet Intelligence Scale

*C.A. denotes code number of the administration of the Goldstein-Scheerer Tests.
The psychogenic emotionally disturbed group was obtained from the Diocesan Child Guidance Center, Columbus Children's Psychiatric Hospital, a residential facility for emotionally disturbed children, and from special programs for emotionally disturbed children in the Southwestern City and Franklin County Public Schools. Psychological and developmental and, in most cases, medical data were available to those staff members who had diagnosed each child as emotionally disturbed. None of these children was considered psychotic or neurologically impaired. This group consisted of eight boys and seven girls, mean CA of 9-5 (range of 8-6 to 10-10) and mean IQ of 97.86 (range of 90 to 113).

The normal group was obtained from the Hamilton South Elementary School located in southern Franklin County, Ohio. It was selected because it represented a cross-section of socio-economic groups comparable to the other two experimental groups. The "normality" of the group was determined by this writer on the basis of the psychological, developmental and school data outlined above. The original selection of normal subjects was done by third, fourth, and fifth grade teachers at this school. In a group meeting, these teachers were instructed by this writer to nominate three students from their classrooms who were performing at an average or above average academic level, who appeared to be well-adjusted, and who met the age criteria set forth for this study. They were then asked to evaluate these nominated children on the "Checklist for Well-Adjusted Children" suggested by Byrd (1956) and described later in this chapter. Parental permission was obtained to test these children as was developmental data in the form of the parent questionnaire.
shown in Appendix A, page 90. Children without a negative developmental history were tested by this writer on the Stanford-Binet, LM, Intelligence Scale until fifteen subjects who fulfilled the intelligence criteria were identified. These children became the normal group. There were nine boys and six girls, mean CA of 9-6 (range of 8-6 to 10-5), and mean IQ of 100.93 (range of 90 to 112) in this group.

Obtaining permission to gather data

Permission to obtain clients as subjects and to contact parents for their co-operation and permission for testing was obtained through personal contact with Dr. Roger Gove and Sister Mary Denis, Directors, Diocesan Child Guidance Center; Dr. David Sabatino, Psychologist, Children's Hospital; Dr. Ellen Culbertson, Psychologist, Columbus Children's Psychiatric Hospital; Mr. James Rudder, Director of Pupil Personnel Services, Southwestern City Schools; and Mr. Edwin Nordin, Principal, Hamilton South Elementary School. Full access to available records and the use of the individual facilities for testing purposes was granted at the same interview.

Obtaining parental permission

An explanatory letter was sent to the parents of the normal group requesting a release form and basic developmental data. A similar letter requesting permission to test was sent to the parents of the Diocesan Child Guidance Center group. The Children's Hospital group was tested as part of their total evaluation. Verbal permission was obtained by the staff psychologist before scheduling the test for these children.
The residential group was tested at the hospital with the permission of the resident clinical psychologist.

Selection and development of the evaluation devices

Intelligence tests. So that the variable of intelligence could be controlled as rigidly as possible, only children with recent evaluations by either the Wechsler Intelligence Scale for Children (WISC) or the Stanford-Binet, Form L-M, Intelligence Scale were included in this study. These two tests were chosen because of the extensive amount of research available indicating their value as individual intelligence tests for children (Buros, 1965).

Bender Visual-Motor Gestalt Test. The rationale for using this test of perceptual-motor maturity was based on the findings of Koppitz (1962) whose scoring system was also used. Since Koppitz had found that immaturity or malfunctioning of visual-motor perception was frequently found in children with neurological impairment, learning problems, and emotional problems, to include children in the normal group who did not exhibit such malfunctioning afforded another opportunity of insuring their normalcy. The nine Bender designs were presented to the normal subjects at the time of the administration of the individual intelligence test. Administration of the test followed the procedures suggested by both Bender (1938) and Koppitz (1962).

The Identification Checklist for Well-Adjusted Children. The original selection of normal subjects was made by teachers in the Hamilton South Elementary School. So that some guidelines could be
provided in this selection, these teachers were asked to evaluate the nominated children on the above checklist. It consisted of eleven criteria of good adjustment. Byrd (1956) suggested that a well-adjusted child should meet nine of the eleven criteria and have no gross deviation from any which was not met. This checklist (see Appendix B, page 91) was used by Byrd in a selection of two hundred well-adjusted subjects, ages 8 to 16, for a validation study of the Bender-Gestalt Test. The judges used were teachers, principals, or youth-center leaders whose contacts with these children were similar to those in the present study.

**Developmental history questionnaire.** To help rule out the possibility of neurological impairment in the normal and emotionally disturbed groups, a developmental history questionnaire was prepared by this writer and sent to the parents of these children along with the parental permission form. (This writer obtained the same information from the case histories of the residential emotionally disturbed children.) The questionnaire consisted of ten items which could be answered by circling "Yes" or No," covering common traumatic conditions of the pre-, peri-, and post-natal periods (see Appendix A, page 90).

**The Goldstein-Scheerer Tests**

The research instruments selected for this study included four of the five tests described in the Goldstein and Scheerer (1941) monograph, Abstract and Concrete Behavior: An experimental study with special tests. The fifth test, the Gelb-Goldstein Color Sorting Test, was omitted to conserve time and because a review of the literature indicated minimal interest in it.
Goldstein-Scheerer Cube Test. This test consisted of twelve designs adapted from Kohs which were to be reproduced by using colored cubes. If the subject was unable to reproduce the design by referring to the original card, a series of five cues of increasing concreteness were presented. A maximum of seventy-five seconds presentation was allowed for each card. The cues included an enlarged unlined card model, a lined standard size card model, an enlarged lined card model, a block model made by the examiner, and a multiple choice of three designs made by the examiner.

Scoring of the Cube Test. For each child, a record was made of the number of cues needed for completing each individual design and the total number of cues needed for completing the twelve designs.

Goldstein-Scheerer Stick Test. This test was presented in two parts. In Part A, the subject was requested to copy each of the thirty-six designs of the test after they were individually exposed by the examiner who had constructed them behind a screen. Plastic sticks of varying lengths (0.75, 2, 3, and 4 inches) were used by both the examiner and the subject. In Part B, the identical thirty-six designs were presented, but the subject was required to reproduce them from memory after an exposure of from five to ten seconds. (The five to thirty seconds suggested by Goldstein were found to be unnecessarily lengthy.)

Scoring of the Stick Test. For each subject, a record was made of the total number of errors made, separately for Part A and Part B. In addition, the types of errors were categorized according to a system devised by Halpin and Patterson (1954). The categories included reversals, rotations, distortions, breakdown of Gestalt, and proportion
changed (incorrect length of stick used). This writer found it helpful to add the categories of additions and omissions for a more explicit description of certain errors. (See Appendix C, page 92, for examples of these categories.)

**Gelb-Goldstein-Weigl-Scheerer Object Sorting Test.** This test consisted of thirty-three common objects (listed in Appendix D, page 93) which were presented at one time to the subject. He was asked to choose an object and "all the other things that belong with it." After this was done, he was asked to explain his choice of objects. In Part A of this test, this procedure was repeated nine times, except that the examiner supplied the reference object after the first time. In Part B of this test, six groupings of objects were presented to the subject who was requested to "tell me anyway in which these things all go together."

**Scoring of the Object Sorting Test.** The scoring for Part A of the Object Sorting Test was adapted from a study by McGaughran and Moran (1957) who rejected the abstract-concrete continuum of Goldstein and Scheerer in favor of four conceptual areas. These areas were defined by two sets of contrasting characteristics—open versus closed and public versus private. The former referred to the number of perceptible attributes on which a grouping was based. For example, grouping "metal" objects was considered to be an "open" grouping based on one attribute, while grouping two identical objects such as sugar cubes was considered "closed" since only other identical objects could be included. "Public" groupings were those which were easily conveyed to others, while
"private" groupings were those not easily anticipated by others. From these groupings, scores (frequencies) of open, closed, public, private, open-public, open-private, closed-public, and closed-private were obtained for each subject. The total number of objects used in each sort was also noted.

Part B of the Object Sorting Test was scored by indicating the number of groupings accepted and correctly identified by underlying concept by each subject.

Weigl-Goldstein-Scheerer Color Form Sorting Test. This test consisted of twelve ceramic figures including four equilateral triangles, four squares, and four circles. In each set of figures, one was red, one green, one yellow, and one blue. The subject was requested to sort the figures, then to "sort them in a different way."

Scoring the Color Form Sorting Test. For each subject, a record was made of the ability to sort the figures by color or form and his ability to shift to the alternate sorting mode. A "Yes" or "No" description provided this data.

Collection of the data

To test the hypotheses, the scores obtained by the methods described above were related to the individual hypotheses in the manner described below:

MAJOR HYPOTHESIS I. There are no significant differences in the number of cues needed by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete the Goldstein-Scheerer Cube Test.
The data needed to test the first major hypothesis were obtained by administering the Goldstein-Scheerer Cube Test to the forty-five children involved in the study. To test this hypothesis, the total number of cues needed by each individual in the reproduction of the twelve designs of this test was noted. The responses of the three experimental groups were then compiled and compared by statistical analysis.

Minor Hypothesis 1. There are no significant differences in the number of cues needed by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete any of the individual designs of the Goldstein-Scheerer Cube Test.

To test the first minor hypothesis, the data obtained to test the first major hypothesis were again evaluated but by individual design. The responses of the three experimental groups were compiled for each design and were compared by statistical analysis or by inspection if the latter revealed non-significance.

MAJOR HYPOTHESIS II. There are no significant differences in the number of errors made by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Goldstein-Scheerer Stick Test.

The data needed to test the second major hypothesis were obtained by administering the Goldstein-Scheerer Stick Test to the forty-five children involved in the study. To test this hypothesis, the number of errors made by each individual on Part A, in which reproduction of the designs was done with the stimulus present, and on Part B, which was done from memory, was noted. The responses of the three experimental groups were then compiled and compared by statistical analysis.
Minor Hypothesis 2. There are no significant differences in the types of errors made by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Goldstein-Scheerer Stick Test.

To test the second minor hypothesis, the data obtained to test the second major hypothesis again were evaluated to determine the types of errors made (Halpin and Patterson categories). The errors made by the three experimental groups were compiled and were compared by statistical analysis or by inspection if the latter revealed non-significance.

MAJOR HYPOTHESIS III. There are no significant differences in the types of sortings made by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part A.

The data needed to test the third major hypothesis were obtained by administering the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part A, to the forty-five children involved in this study. To test this hypothesis, the types of groupings (McGaughran and Moran categories) made by each individual were noted. The responses of the three experimental groups were then compiled and compared by statistical analysis.

Minor Hypothesis 3. There are no significant differences in the number of objects selected by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete the sortings on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part A.

To test the third minor hypothesis, the data obtained to test the third major hypothesis again were evaluated by noting total number of
objects selected by each individual in completing the ten sorts. The responses of the three experimental groups were compiled and were compared by statistical analysis.

**MAJOR HYPOTHESIS IV.** There are no significant differences in the performance of neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part B.

The data needed to test the fourth major hypothesis were obtained by administering the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part B, to the forty-five children involved in the study. To test this hypothesis, the number of examiner-made groupings which were accepted and correctly identified by underlying concept by each individual was noted. The responses of the three experimental groups were then compiled and compared by statistical analysis.

**MAJOR HYPOTHESIS V.** There are no significant differences in the performance of neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Weigl-Goldstein-Scheerer Color Form Sorting Test.

The data needed to test the fifth major hypothesis were obtained by administering the Weigl-Goldstein-Scheerer Color Form Sorting Test to the forty-five children involved in the study. To test this hypothesis, it was noted whether or not each individual could sort by form and/or by color. The responses of the three experimental groups were compiled and compared. Since inspection revealed non-significant differences in the three groups, no statistical analysis was undertaken.
Analysis of the data

To determine the significance of the data obtained to test the major and minor hypotheses, three major types of statistical analysis were performed. When the data fulfilled the criteria set forth for the use of parametric statistics (Edwards, 1962), an analysis of variance to test the significance of the difference of the means of the three experimental groups was used. The F test of significance was performed to test whether the three groups differed significantly in their ability to complete the task required to obtain the data. Hypotheses so tested included Major Hypotheses I and II and Minor Hypothesis 3.

Since some data did not lend itself to parametric analysis, two non-parametric tests were used to test the remainder of the hypotheses. The chi square test of significance (Edwards, 1962) was performed to test the significance of Major Hypothesis III and Minor Hypothesis 1. Major Hypothesis V and Minor Hypothesis 2 would have been tested by the chi square method had inspection not revealed non-significance. Since certain other raw data revealed close similarity in the scores of the three groups, the chi square test was performed on the most disparate data and the non-significance of the other differences was determined by inspection.

Major Hypothesis IV was tested by applying the non-parametric Kruskal-Wallis one-way analysis of variance test (Siegel, 1956). This test was chosen since the small range of possible scores (0 to 6) was too limited for application of parametric analysis of variance.
Further non-parametric analyses were applied in an attempt to explain the outcomes of the analyses performed to test the major and minor hypotheses. The Mann-Whitney U test (Siegel, 1962) was used to determine whether significant intra-group variations occurred between neurologically impaired children whose basis for impairment differed (encephalitis versus pre- or peri-natal trauma) and between in-patient and out-patient emotionally disturbed children. This intra-group variation was analyzed in the discussion of Major Hypotheses I and II. The Pearson product moment coefficient of correlation (Guilford, 1965) was used to compare performance on the Stick and Cube tests.

Summary

This chapter presented the procedures used in conducting this study, the selection of the population, the description of the research instruments, and the methods by which the data were gathered and analyzed. Chapter IV presents an analysis of the data and a discussion of the results of that analysis.
CHAPTER IV

ANALYSIS OF THE DATA

The primary purpose of this study was to determine the usefulness of the Goldstein-Scheerer Tests (consisting of a Cube Test, a Stick Test, a Color Form Sorting Test, and an Object Sorting Test) as instruments for the differential diagnosis of neurologically impaired, psychogenic emotionally disturbed and normal, well-adjusted children. Forty-five children (fifteen in each of the three experimental groups), chronological age range 8-0 to 10-10, IQ range 90 to 115, were administered the Goldstein-Scheerer Tests. This chapter presents the statistical analysis and interpretation of the results as they relate to the five major and three minor hypotheses. Secondary findings which appeared pertinent are also presented.

Discussion of the Results

Hypotheses

MAJOR HYPOTHESES I. There are no significant differences in the number of cues needed by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete the Goldstein-Scheerer Cube Test.

To test this hypothesis, the total number of cues needed by each subject in the reproduction of all twelve designs of the Cube Test was noted and the mean scores of the three experimental groups were treated...
by simple analysis of variance as described by Edwards (1962). The F test for significance was applied. The analysis of the data concerning the significance of the difference of the mean scores and the raw scores of the three experimental groups are presented in Tables 2 and 3.

**TABLE 2**

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>d.f.</th>
<th>Mean Square</th>
<th>F*</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>151.6</td>
<td>2</td>
<td>75.8</td>
<td>1.47</td>
</tr>
<tr>
<td>Within Groups</td>
<td>2168.4</td>
<td>42</td>
<td>51.6</td>
<td></td>
</tr>
</tbody>
</table>

*F = 3.22 for significance at the .05 level.

In Table 2, the F of 1.47 indicated that the first major hypothesis was tenable. No significant differences did exist in the mean scores of the three experimental groups on the Goldstein-Scheerer Cube Test. It should be noted that means, while not significant, differed in the order which would be expected from previous research. The normal group needed the fewest cues and the neurologically impaired group needed the most cues.

**Discussion**

The lack of significant findings on the performance on the Cube Test appeared to contradict the previous research findings which regard perceptual-motor weakness as a major diagnostic sign in the detection
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NM 1</td>
<td>14</td>
<td>EM 1</td>
<td>20</td>
<td>OM 1</td>
<td>4</td>
</tr>
<tr>
<td>NM 2</td>
<td>14</td>
<td>EF 2</td>
<td>13</td>
<td>OM 2</td>
<td>11</td>
</tr>
<tr>
<td>NM 3</td>
<td>2</td>
<td>EF 3</td>
<td>18</td>
<td>OM 3</td>
<td>4</td>
</tr>
<tr>
<td>NF 4</td>
<td>18</td>
<td>EF 4</td>
<td>25</td>
<td>OM 4</td>
<td>4</td>
</tr>
<tr>
<td>NM 5</td>
<td>10</td>
<td>EM 5</td>
<td>0</td>
<td>OF 5</td>
<td>17</td>
</tr>
<tr>
<td>NM 6</td>
<td>25</td>
<td>EM 6</td>
<td>9</td>
<td>OF 6</td>
<td>17</td>
</tr>
<tr>
<td>NM 7</td>
<td>4</td>
<td>EM 7</td>
<td>8</td>
<td>OM 7</td>
<td>4</td>
</tr>
<tr>
<td>NM 8</td>
<td>19</td>
<td>EM 8</td>
<td>7</td>
<td>OM 8</td>
<td>21</td>
</tr>
<tr>
<td>NM 9</td>
<td>4</td>
<td>EM 9</td>
<td>11</td>
<td>OF 9</td>
<td>6</td>
</tr>
<tr>
<td>NM10</td>
<td>3</td>
<td>EF10</td>
<td>12</td>
<td>OF10</td>
<td>2</td>
</tr>
<tr>
<td>NM11</td>
<td>10</td>
<td>EM11</td>
<td>2</td>
<td>OF11</td>
<td>1</td>
</tr>
<tr>
<td>NM12</td>
<td>10</td>
<td>EF12</td>
<td>11</td>
<td>OF12</td>
<td>4</td>
</tr>
<tr>
<td>NM13</td>
<td>22</td>
<td>EF13</td>
<td>3</td>
<td>OM13</td>
<td>0</td>
</tr>
<tr>
<td>NM14</td>
<td>4</td>
<td>EF14</td>
<td>1</td>
<td>OM14</td>
<td>4</td>
</tr>
<tr>
<td>NF15</td>
<td>8</td>
<td>EM15</td>
<td>0</td>
<td>OM15</td>
<td>1</td>
</tr>
</tbody>
</table>

Mean 11.13
Range 2 to 25

Mean 9.33
Range 0 to 25

Mean 6.67
Range 0 to 21
of neurological impairment. The range of scores in the three groups (NI, 2 to 25; ED, 0 to 25; and Normal, 0 to 21) indicated that on this test individual subjects in both the normal and emotionally disturbed groups were as error prone as were the neurologically impaired subjects. Likewise, the raw data revealed that five of the neurological group required fewer than five cues to complete the twelve designs compared to ten in the normal group and five in the disturbed group. To determine the implications of these findings, further exploration was undertaken to answer the following two possible explanations:

1. The Goldstein-Scheerer Cube Test was not sensitive to perceptual-motor impairment

2. Intra-group or inter-group differences were so great as to render the group data meaningless.

The sensitivity of the Cube Test to perceptual-motor impairment can be discussed only tentatively. Obviously, since the normal group demonstrated no impairment on the Bender-Gestalt Test as part of the criteria for their inclusion in this study, the four normal subjects who required more than the mean number of cues needed by the normal group (6.33 for the group versus 16.55 for the four) were exhibiting a difficulty not apparent in their performance on the Bender-Gestalt Test.

Of interest to this examiner at the time of testing and noted on the test protocols was the difference in the method of attack of the designs demonstrated by those in the normal group who performed well and those who performed poorly. The former tended to perform the task in a methodical, analytical manner. Usually, each portion of the design (represented by an individual block) was placed correctly before
proceeding to the next block. The normal children who found this sub-test difficult tended to place all four blocks rather quickly. If an error was made, the total design was destroyed rather than analyzing the source of the error and correcting only that portion. Similar differences in approaching this task were noted in the two clinical groups who were tested at a later date than was the normal group.

The similarity between the above description and that of the "concrete" and "abstract" attitudes of Goldstein and Scheerer (1941) is striking. However, since certain "normal" children also displayed the characteristics of the "concrete" attitude, these findings must be interpreted in another manner than the normality-abnormality dichotomy presumed by Goldstein and Scheerer.

Although not within the scope of this study to explore in depth, the writer has noted the great similarity between the test behavior noted above and the "impulsivity-reflectivity" dichotomy proposed by Kagan (1961). Through a series of studies with elementary school children, he has found that children tend to differ in "conceptual tempo." The impulsive group tends to value speed over accuracy therefore making many errors in the completion of such tasks as matching familiar figures, completion of Bender-Gestalt designs, and typical school work. The reflective group, on the other hand, tends to work more slowly but with fewer errors. If, as Kagan contends, some of the present diagnoses of visual-motor weaknesses must be re-evaluated in the light of his findings, the interpretation of such tests as the Cube and Stick Tests may need similar re-evaluation.
The second possible explanation of the lack of significance of the findings was then examined. Since age and intelligence variations within the criteria used for selection of the subjects were assumed to be non-significant variables, no attempt was made to match individuals within the three experimental groups. It can be noted that the normal group tended to be somewhat older (normal mean 9.6, NI mean 9.1, and ED mean 9.5) and more intelligent (normal mean 100.93, NI mean 91.33, and ED mean 97.86) than the other two groups. Had the results been significant, this would have tended to cloud the results. The reverse, however, is not true. Since these variables tend to favor the normal group which has the lowest mean cue scores, they should have tended to increase, not diminish, the significance of the results. Inter-group variations in age and intelligence cannot be considered significant in explaining the lack of significance of the data.

Another possible variable discussed at some length in Chapter II was the difference in performance of neurologically impaired subjects whose impairment was traceable to different etiologies. Of the fifteen subjects included in the neurologically impaired group in this study, five were considered to have pre-natal or peri-natally caused impairment, four were encephalitic, and six were not specifically determined. The Mann-Whitney U test, a non-parametric test designed to test whether or not two individual groups have been drawn from the same population, was performed on the scores of the two groups with known etiologies (Siegel, 1956). The raw scores and the results of the Mann-Whitney U test are presented in Table 4. The probability that the two groups were drawn
from the same population was .19 for a two-tailed test for a U of 4. Since this was larger than the .05 level used for significance throughout this study, it must be concluded that these two etiological groups were not significantly different. Although the encephalitic group tended to need fewer cues to complete the Cube Test, it can not be concluded that their inclusion in this study tended to cloud the results of the analysis of variance.

**TABLE 4**

A COMPARISON OF THE SCORES OF ENCEPHALITIC AND PRE- AND PERI-NATAL NEUROLOGICALLY IMPAIRED CHILDREN ON THE GOLDSTEIN-SCHERER CUBE TEST

<table>
<thead>
<tr>
<th>Encephalitic Group Raw Scores</th>
<th>Pre- and Peri-natal Group Raw Scores</th>
<th>Mann-Whitney U</th>
<th>Significance Levela</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>8</td>
<td>4</td>
<td>.19</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. .05 would have been considered significant for a two-tailed test for groups of 5 and 4 subjects

A similar breakdown by etiology was not possible in the emotionally disturbed group since disruption of the integrity of the family or poor family interrelationships appeared to be the precipitating factor in all subjects. However, since six of the children were patients in a residential psychiatric hospital, these were considered to be somewhat
more disturbed than those who were functioning as out-patients and attending special or regular classes in the public schools. The Mann-Whitney U test was applied to these two sub-groups. The raw scores and the results of the Mann-Whitney U test are presented in Table 5. The U of 30 was non-significant at the .05 level for a one-tailed test (used because it was predicted that the in-patient group would perform more poorly on the Cube Test).

### Table 5

**A Comparison of the Scores of In-Patient and Out-Patient Emotionally Disturbed Children on the Goldstein-Scheerer Cube Test**

<table>
<thead>
<tr>
<th>In-Patient Group Raw Scores</th>
<th>Out-Patient Group Raw Scores</th>
<th>Mann-Whitney U</th>
<th>Significance Level^a</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>30</td>
<td>Not Significant</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

^aU = 12, needed for .05 level of significance for a one-tailed test for groups of 9 and 6 subjects.
One must conclude that the Goldstein-Scheerer Cube Test was not a sensitive diagnostic instrument in the differential diagnosis of the three experimental groups used in this study.

Minor Hypothesis 1. There are no significant differences in the number of cues needed by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete any of the individual designs of the Goldstein-Scheerer Cube Test.

To test this hypothesis, the number of cues needed by each individual was noted and the total cues needed for the three experimental groups was compiled and compared by the chi square test of significance. The total cues needed by each group for each design is presented in Table 6.

**TABLE 6**

A COMPARISON OF THE CUES NEEDED ON THE INDIVIDUAL DESIGNS OF THE GOLDBSTEIN-SCHERER CUBE TEST BY THE THREE EXPERIMENTAL GROUPS

<table>
<thead>
<tr>
<th>Design</th>
<th>0-1 Cues</th>
<th>2-5 Cues</th>
<th>Chi Squarea</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NI</td>
<td>ED</td>
<td>Normal</td>
<td>NI</td>
</tr>
<tr>
<td>I</td>
<td>14 15</td>
<td>15</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>II</td>
<td>15 15</td>
<td>15</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>III</td>
<td>15 15</td>
<td>15</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IV</td>
<td>14 15</td>
<td>15</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>V</td>
<td>12 12</td>
<td>14</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>VI</td>
<td>14 13</td>
<td>12</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>VII</td>
<td>6 9</td>
<td>11</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>VIII</td>
<td>7 10</td>
<td>13</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>IX</td>
<td>6 10</td>
<td>9</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>X</td>
<td>3 4</td>
<td>7</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>XI</td>
<td>9 12</td>
<td>14</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>XII</td>
<td>8 11</td>
<td>12</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>

aChi square of 5.99, needed for .05 level of significance for 2 d.f.
bIns. = Inspection
Since inspection revealed great similarity in the performance of the three groups, statistical analysis was undertaken on only the most disparate data and the non-significance of the other data was determined by inspection. Table 6 reveals no significant differences. Minor Hypothesis 1 is tenable. No significant differences exist in the performance of the three experimental groups on any of the individual designs of the Goldstein-Scheerer Cube Test.

To determine whether or not any of the individual cues were more helpful to any of the experimental groups, the data were arranged in the manner presented in Table 7.

**TABLE 7**

**A COMPARISON OF THE TOTAL DESIGNS COMPLETED FOR EACH CUE PRESENTED ON THE GOLDSTEIN-SCHEERER CUBE TEST**

<table>
<thead>
<tr>
<th>Group</th>
<th>Cues</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>Level</td>
</tr>
<tr>
<td>NI</td>
<td>128</td>
<td>24</td>
<td>15</td>
<td>6</td>
<td>7</td>
<td>0</td>
<td>6.83&lt;sup&gt;a&lt;/sup&gt; Not sig.</td>
</tr>
<tr>
<td>ED</td>
<td>117</td>
<td>9</td>
<td>28</td>
<td>11</td>
<td>13</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>120</td>
<td>21</td>
<td>18</td>
<td>11</td>
<td>2</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>365</td>
<td>54</td>
<td>61</td>
<td>28</td>
<td>22</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Chi square of 18.31 needed for .05 level of significance for 10 d.f.

Once again, the similarity in the responses of the three groups was obvious from inspection. The neurologically impaired group appeared to be less able to utilize the first cue (enlarged block) than did the other two groups, but the overall differences did not reach statistical
significance when the chi square test was applied (chi square = 6.83, 10 d.f.). Of some interest was the fourth cue (the three-dimensional model) which was utilized effectively by all of the normal group who had not completed the designs on previous cues. It also enabled the neurologically impaired group to complete thirteen of the fifteen incompletely designs, but only two of the emotionally disturbed group were aided by this cue. The significance of this inability is unclear, but further research might explore the comparative value of concrete, three dimensional material in teaching the two clinical groups.

**MAJOR HYPOTHESES II.**

There are no significant differences in the number of errors made by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Goldstein-Scheerer Stick Test.

To test this hypothesis, the number of errors made by each subject in the reproduction of the thirty-six designs included in the Stick Test were noted and the scores (number of errors) were treated by simple analysis of variance. The F test of significance was applied. Part A, in which the reproduction was done with the stimulus present and Part B, which was done from memory, were treated separately.

The results of the analysis of the data concerning the significance of the difference of the mean scores of the three experimental groups and the raw scores are presented in Tables 8 and 9.

In Table 8, the F scores of 2.59 and 1.45 indicate that the second major hypothesis is tenable. No significant differences existed in the mean scores of the three experimental groups on the Goldstein-Scheerer Stick Test, Part A or Part B. As inspection of the raw data reveal,
more errors were made on Part B when the designs were reproduced from memory than when the stimulus designs were present. This logical increase was present in all groups.

**TABLE 8**

SIGNIFICANCE OF THE DIFFERENCE AMONG THE MEAN SCORES OF THE THREE EXPERIMENTAL GROUPS ON THE GOLDSTEIN—SCHEERER STICK TEST

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>d.f.</th>
<th>Mean Square</th>
<th>F</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part A—Between Groups</strong></td>
<td>84.90</td>
<td>2</td>
<td>42.45</td>
<td>2.59*</td>
<td>Not sig.</td>
</tr>
<tr>
<td><strong>Within Groups</strong></td>
<td>770.30</td>
<td>42</td>
<td>18.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Part B—Between Groups</strong></td>
<td>49.63</td>
<td>2</td>
<td>24.87</td>
<td>1.45*</td>
<td>Not sig.</td>
</tr>
<tr>
<td><strong>Within Groups</strong></td>
<td>720.67</td>
<td>42</td>
<td>17.16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*F = 3.22 needed for significance at the .05 level.*

While differences in the mean scores were not statistically different, an inspection of the range of scores indicated some trends. On Part A, the ranges were most disparate at the extreme end of the continuum (normal, 0-8; NI, 0-20; ED, 0-18). No subject in the normal group and only one in the emotionally disturbed group made more than seven errors on Part A, while five of the neurologically impaired group made nine or more errors. On Part B (where the ranges were normal, 1-14; NI, 3-22; and ED, 2-14), six subjects (including the five cited above) made fifteen or more errors while no subjects in the other two groups made more than fourteen errors. If a similar pattern were apparent in a study involving a large number of subjects, a cut-off score
### TABLE 9

Means, Ranges, and Raw Scores of the Three Experimental Groups on the Goldstein-Scheerer Stick Test, Parts A and B

<table>
<thead>
<tr>
<th>NI Group</th>
<th>ED Group</th>
<th>Normal Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM 1</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>NM 2</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>NM 3</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>NF 4</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>NM 5</td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>NM 6</td>
<td>19</td>
<td>16</td>
</tr>
<tr>
<td>NM 7</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>NM 8</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td>NM 9</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>NM10</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>NM11</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>NM12</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>NM13</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>NM14</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>NF15</td>
<td>0</td>
<td>8</td>
</tr>
</tbody>
</table>

Means: 5.8 10.8 4.2 8.9 2.4 8.3
Ranges: 0 to 20 3 to 22 0 to 18 2 to 14 0 to 8 4 to 14
which would separate neurologically impaired children from the normal and emotionally disturbed groups at the error extreme might be feasible. This is not within the scope of the present study nor would it be helpful with the majority of neurologically impaired children who exhibited no more difficulty with this test than did the other two experimental groups.

When the neurologically impaired group was broken down by etiology, the encephalitic group had an error range of 0 to 20 on Part A and 4 to 22 on Part B, while the pre- and peri-natally damaged group had a range of 0 to 9 on Part A and 8 to 17 on Part B. When the Mann-Whitney test was applied to these raw data, U's of 9 \((p=.452)\) on Part A and 7 \((p=.278)\) on Part B far exceeded the .05 level of significance adapted for this study so that, once again, etiology was not helpful in explaining intra-group variation or lack of significance of the differences between the three experimental groups. These data are presented in Table 10.

### Table 10

A COMPARISON OF THE SCORES OF ENCEPHALITIC AND PRE- AND PERI-NATAL NEUROLOGICALLY IMPAIRED CHILDREN ON THE GOLDSTEIN-SCHEERER STICK TEST, PARTS A AND B

<table>
<thead>
<tr>
<th>Encephalitic Group</th>
<th>Pre- and Peri-Natal Group</th>
<th>U</th>
<th>Significance Level $^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part A</td>
<td>Part B</td>
<td>Part A</td>
<td>Part B</td>
</tr>
<tr>
<td>0</td>
<td>4</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>15</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>20</td>
<td>22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$^aU = 1$ needed for .05 level of significance for a two-tailed test.
When the out-patient and in-patient emotionally disturbed groups were compared, the ranges for the in-patients were one to seven on Part A and seven to fourteen on Part B compared to zero to eighteen on Part A and two to fourteen on Part B for the out-patients. Mann-Whitney U's of 20 on Part A and 22 on Part B are non-significant (U of 10 is needed for significance at the .05 level with groups of 9 and 6). These data are presented in Table 11.

TABLE 11
A COMPARISON OF THE SCORES OF IN-PATIENT AND OUT-PATIENT EMOTIONALLY DISTURBED CHILDREN ON THE GOLDSTEIN-SCHEERER STICK TEST, PARTS A AND B

<table>
<thead>
<tr>
<th>In-patient Group Part A</th>
<th>Part B</th>
<th>Out-patient Group Part A</th>
<th>Part B</th>
<th>U</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>0</td>
<td>2</td>
<td>Part A = 20</td>
<td>Not sig.</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>Part B = 22</td>
<td>Not sig.</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>2</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>4</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>5</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>14</td>
<td>5</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>18</td>
<td>14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*U of 10 needed for .05 level of significance.

One must conclude that the Goldstein-Scheerer Stick Test was not a sensitive diagnostic instrument in the differential diagnosis of the
three experimental groups involved in this study.

Minor Hypothesis 2. There are no significant differences in the types of errors made by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Goldstein-Scheerer Stick Test.

To test this hypothesis, the types of errors made on the individual designs of the Stick Test were tabulated for comparison. While the chi square test of significance would have been appropriate for the analysis of these data, inspection revealed non-significant differences and no formal analysis was undertaken. Table 12 reveals the incidence of each type of error within the three experimental groups.

<table>
<thead>
<tr>
<th>Type of Error</th>
<th>Part A</th>
<th>Part B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NI 0-1 2-5</td>
<td>ED 0-1 2-5</td>
</tr>
<tr>
<td>Revolution</td>
<td>12 3 12 3</td>
<td>12 3 11 4</td>
</tr>
<tr>
<td>Rotation</td>
<td>10 5 12 3</td>
<td>14 1 6 9</td>
</tr>
<tr>
<td>Distortion</td>
<td>15 0 15 0</td>
<td>15 0 14 1</td>
</tr>
<tr>
<td>Gestalt</td>
<td>15 0 15 0</td>
<td>15 0 13 2</td>
</tr>
<tr>
<td>Proportion</td>
<td>9 6 8 7</td>
<td>10 5 1 14 0 15</td>
</tr>
<tr>
<td>Omission</td>
<td>15 0 15 0</td>
<td>15 0 9 6 12 3</td>
</tr>
<tr>
<td>Addition</td>
<td>15 0 15 0</td>
<td>15 0 12 3 15 0</td>
</tr>
</tbody>
</table>

TABLE 12
A COMPARISON OF THE TYPES OF ERRORS MADE BY THE THREE EXPERIMENTAL GROUPS ON THE GOLDSTEIN-SCHEERER STICK TESTS, PARTS A AND B
As can be noted from Table 12, the most prevalent errors were those of proportion and rotation. In the former, the integrity of the basic design was maintained but the wrong size stick was used. Since this was common in all subjects, there was no diagnostic significance in its appearance. It may be a normal, developmental weakness of this age group which cannot be verified until norms for other age groups become available. While the neurologically impaired group tended to rotate more than did the other two groups, this error did not assume diagnostic significance on this test.

It must be concluded that the type of error made on the Stick Test was not a diagnostically useful tool in differentiating among the three experimental groups involved in this study.

MAJOR HYPOTHESIS III. There are no significant differences in the types of sortings made by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Gelb-Goldstein-Maigl-Scheerer Object Sorting Test, Part A.

To test this hypothesis, the responses to the Object Sorting Test, Part A, were categorized according to the "open-closed," "public-private" dichotomies presented by McLaughran and Moran (1957). The former referred to the number of attributes involved in the sorting (the more attributes involved in the sort, the more "closed" it became). The latter referred to the ability of others to anticipate the objects to be included in the sorts. (They found that "private" sorts which represented a deviation from reality tended to be chosen by schizophrenic
adults.) Three chi square tests of significance were performed on these data. The results of these analyses are presented in Table 13.

**TABLE 13**

A COMPARISON OF THE RESPONSES OF THE THREE EXPERIMENTAL GROUPS TO THE GELB-GOLDSMITH-WEIGL-SCHERER OBJECT SORTING TEST, PART A

<table>
<thead>
<tr>
<th>Category</th>
<th>Group</th>
<th>Open</th>
<th>Closed</th>
<th>Public</th>
<th>Private</th>
<th>Open</th>
<th>Public</th>
<th>Closed</th>
<th>Closed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NI</td>
<td>49</td>
<td>91</td>
<td>63</td>
<td>77</td>
<td>39</td>
<td>10</td>
<td>24</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>ED</td>
<td>73</td>
<td>67</td>
<td>51</td>
<td>89</td>
<td>38</td>
<td>35</td>
<td>13</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>51</td>
<td>86</td>
<td>56</td>
<td>84</td>
<td>37</td>
<td>17</td>
<td>20</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td></td>
<td>176</td>
<td>244</td>
<td>170</td>
<td>150</td>
<td>114</td>
<td>62</td>
<td>57</td>
<td>137</td>
</tr>
<tr>
<td>Chi square</td>
<td></td>
<td>2.79</td>
<td>&gt;</td>
<td>0.05 level of significance, 2df.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.34</td>
<td>not sig.</td>
<td>0.05 level of significance, 6df.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chi squares of 0.34 when the "open-closed" responses were compared, and 0.34 when the "public-private" responses were compared indicated that the three experimental groups were nearly identical in their choices within these two dichotomies. McGaughran and Moran (1957) had found these dichotomies to be highly differentiating when used to compare schizophrenic, brain-damaged, and non-psychiatric adults. They had reported that the schizophrenics tended to make more private choices while the brain-damaged adults made more closed, concrete choices. It can be seen from Table 13 that the neurologically impaired group made
forty-nine open choices compared to ninety-one closed, while the emotionally disturbed group made seventy-three open choices compared to sixty-seven closed. When the public-private responses were compared, the emotionally disturbed group made more private choices than the neurologically impaired, but only slightly more than the normal group (normal, 84; NI, 77; and Ed, 89).

Similarly, when the "open-public," "open-private," "closed-public," and "closed-private" categories were compared, a non-significant chi square of 2.79 was obtained. It can be noted that the frequency of responses coincided with the trends reported by McCaughran and Moran (1957). That is, the psychogenic emotionally disturbed group made thirty-five "open-private" choices compared to seventeen made by the normal group and ten made by the neurologically impaired.

It must be concluded that the children in this study exhibited similar tendencies to the McCaughran-Moran population in types of sortings chosen, but did not exhibit them to a significant degree. This may reflect a difference in the "adult" versus the "child" mind or it may reflect a difference in the severity of emotional disturbance (schizophrenia versus non-psychotic emotional disturbance) and type of neurological impairment (brain injury versus minimal neurological impairment).

Of some interest in the comparison of the severity of the two groups of emotionally disturbed (i.e., the adult schizophrenics versus the non-psychotic children) was the performance of one child diagnosed as pre-psychotic. He followed the schizophrenic adult pattern making
six "open-private" and four "closed-private" groupings. He included 216 objects in these ten groupings, using all objects in five instances. To explain his groupings, elaborate, loosely-structured stories evolved. Since his pre-psychotic state can be considered to represent the most severe disturbance among the emotionally disturbed, it is possible that the severity of the disturbance of the group as a whole was not sufficient to elicit the types of responses reported by McGaughran and Moran (1956).

The similarity of the raw scores of the normal and neurologically impaired groups was so great that this test appeared to have no contribution to make in differentiating between these two groups. The evidence reported in the above case study presented some evidence that further research might find it useful in differentiating between psychotic and non-psychotic emotionally disturbed children.

Within the framework of this study, it must be concluded that the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part A, was not a diagnostically useful tool in differentiating among the three experimental groups involved in this study.

Minor Hypothesis 3. There are no significant differences in the number of objects selected by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete the sortings on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part A.

This hypothesis was based on the tendency toward "overinclusion" or "an inability to preserve conceptual boundaries" reported to
characterize adult schizophrenics by Payne and Hewlett (cited by Eysenck, 1961). To test this hypothesis, an analysis of variance was performed to determine whether or not the mean number of objects chosen in the Object Sorting Test, Part A, differed significantly among the three experimental groups. The results of the statistical analysis and the raw data are presented in Tables 14 and 15.

<table>
<thead>
<tr>
<th>TABLE 14</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGNIFICANCE OF THE DIFFERENCE AMONG THE MEAN NUMBER OF OBJECTS CHOSEN BY THE THREE EXPERIMENTAL GROUPS ON THE GELB-GOLDSTEIN-WIEGL-SHEERER OBJECT SORTING TEST, PART A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>d.f.</th>
<th>Mean Square</th>
<th>F</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>2401.1</td>
<td>2</td>
<td>1202.05</td>
<td>1.29a</td>
<td>Not sig.</td>
</tr>
<tr>
<td>Within Groups</td>
<td>38901.9</td>
<td>42</td>
<td>926.24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*F = 3.22 needed for significance at the .05 level.*

When the F test of significance was applied to the data, a non-significant F of 1.29 was found. Minor Hypothesis 3 is tenable. The three experimental groups could not be differentiated on the basis of number of objects included in the Object Sorting Test, Part A. It can be noted, however, from the data presented in Table 15 that no neurologically impaired subject chose more than thirty-six objects and no normal subjects chose over forty-three objects, while three psychogenic emotionally disturbed children chose fifty-four, sixty-seven, and two hundred sixteen objects respectively. In an attempt to relate this finding to the research on "overinclusion," the disturbed group
TABLE 15
A COMPARISON OF THE NUMBER OF OBJECTS CHOSEN BY THE THREE EXPERIMENTAL GROUPS TO COMPLETE THE GELB-GOLSTEIN-WEIGL-SCHERER OBJECT SORTING TEST, PART A

<table>
<thead>
<tr>
<th>NI Group</th>
<th>ED Group</th>
<th>Normal Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ss Code</td>
<td>No. of Objects</td>
<td>Ss Code</td>
</tr>
<tr>
<td>NM 1</td>
<td>19</td>
<td>EM 1</td>
</tr>
<tr>
<td>NM 2</td>
<td>24</td>
<td>EF 2</td>
</tr>
<tr>
<td>NM 3</td>
<td>27</td>
<td>EF 3</td>
</tr>
<tr>
<td>NF 4</td>
<td>11</td>
<td>EF 4</td>
</tr>
<tr>
<td>NM 5</td>
<td>22</td>
<td>EM 5</td>
</tr>
<tr>
<td>NM 6</td>
<td>15</td>
<td>EM 6</td>
</tr>
<tr>
<td>NM 7</td>
<td>17</td>
<td>EM 7</td>
</tr>
<tr>
<td>NM 8</td>
<td>15</td>
<td>EM 8</td>
</tr>
<tr>
<td>NM 9</td>
<td>23</td>
<td>EM 9</td>
</tr>
<tr>
<td>NM10</td>
<td>36</td>
<td>EF10</td>
</tr>
<tr>
<td>NM11</td>
<td>22</td>
<td>EM11</td>
</tr>
<tr>
<td>NM12</td>
<td>23</td>
<td>EF12</td>
</tr>
<tr>
<td>NM13</td>
<td>20</td>
<td>EF13</td>
</tr>
<tr>
<td>NM14</td>
<td>27</td>
<td>EF14</td>
</tr>
<tr>
<td>NF15</td>
<td>18</td>
<td>EM15</td>
</tr>
</tbody>
</table>

Mean = 21.18
Range = 11 to 36

Mean = 38.4
Range = 9 to 216

Mean = 25.3
Range = 12 to 43
was again divided into in-patient and out-patient sub-groups and the scores of the two were treated by the Mann-Whitney U test. The in-patient group was presumed to be more disturbed and, therefore, more likely to "overinclude" objects. This, in fact, did occur. The obtained U of 5 was found to be significant at the .01 level for a one-tailed test. The raw scores and statistical data are summarized in Table 16.

**TABLE 16**

A COMPARISON OF THE SCORES OF IN-PATIENT AND OUT-PATIENT EMOTIONALLY DISTURBED CHILDREN ON THE GELB-GOLDSTEIN-WEIGL-SCHERER OBJECT SORTING TEST, PART A

<table>
<thead>
<tr>
<th>In-patient Raw Scores</th>
<th>Out-patient Raw Scores</th>
<th>Mann-Whitney U</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>9</td>
<td>5</td>
<td>.01a</td>
</tr>
<tr>
<td>27</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>216</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>29</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*aU of 7 or less significant at the .01 level for a one-tailed test for groups of 9 and 6 subjects.*

The above evidence indicated that the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part A, may have significant use in determining
the severity of disturbance of emotionally disturbed children when the characteristic of "overinclusion" is used as the criterion.

MAJOR HYPOTHESIS IV. There are no significant differences in the performance of neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part B.

To test this hypothesis, the number of groups of objects presented by the examiner which could be accepted and the underlying concept identified were tabulated for each individual. Since the total number of groupings presented was six, the possible range (0 to 6) was somewhat narrow for treatment by parametric statistics. The non-parametric Kruskal-Wallis one-way analysis of variance by ranks was performed and corrected for ties. The results of the statistical analysis and the raw data are presented in Tables 17 and 18.

The H of 9.97 (which resulted from the statistical analysis) revealed that Major Hypothesis IV is not tenable. Significant differences did exist among the three experimental groups in their ability to accept and identify the underlying concept of given conceptual groupings. Inspection of the raw data revealed that only two of the neurologically impaired group and three of the psychogenic emotionally disturbed group were able to identify any of the underlying concepts, while twelve of the normal group identified one or more of these concepts. This test, therefore, was successful in differentiating the normal group from the two clinical groups, but did not differentiate the two clinical groups from one another.
TABLE 17

RAW SCORES, RANKS, AND SIGNIFICANCE OF THE DIFFERENCE AMONG THE SCORES
OF THE THREE EXPERIMENTAL GROUPS ON THE GELB-GOLDSTEIN
WEIGL-SCHREER OBJECT SORTING TEST, PART B

<table>
<thead>
<tr>
<th>Ss Code</th>
<th>NI Group</th>
<th>Raw Score</th>
<th>Rank</th>
<th>ED Group</th>
<th>Raw Score</th>
<th>Rank</th>
<th>Normal Group</th>
<th>Raw Score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>NM 1</td>
<td>0</td>
<td>13.5</td>
<td>2</td>
<td>EM 1</td>
<td>33.5</td>
<td>2</td>
<td>OM 1</td>
<td>33.5</td>
<td>2</td>
</tr>
<tr>
<td>NM 2</td>
<td>0</td>
<td>13.5</td>
<td>0</td>
<td>EF 2</td>
<td>13.5</td>
<td>0</td>
<td>OM 2</td>
<td>13.5</td>
<td>0</td>
</tr>
<tr>
<td>NM 3</td>
<td>0</td>
<td>13.5</td>
<td>0</td>
<td>EF 3</td>
<td>13.5</td>
<td>3</td>
<td>OF 3</td>
<td>38.0</td>
<td>3</td>
</tr>
<tr>
<td>NF 4</td>
<td>2</td>
<td>33.5</td>
<td>0</td>
<td>EF 4</td>
<td>13.5</td>
<td>1</td>
<td>OF 4</td>
<td>29.0</td>
<td>1</td>
</tr>
<tr>
<td>NM 5</td>
<td>0</td>
<td>13.5</td>
<td>0</td>
<td>EM 5</td>
<td>13.5</td>
<td>1</td>
<td>OF 5</td>
<td>29.0</td>
<td>1</td>
</tr>
<tr>
<td>NM 6</td>
<td>0</td>
<td>13.5</td>
<td>2</td>
<td>EM 6</td>
<td>33.5</td>
<td>0</td>
<td>OF 6</td>
<td>13.5</td>
<td>0</td>
</tr>
<tr>
<td>NM 7</td>
<td>0</td>
<td>13.5</td>
<td>3</td>
<td>EM 7</td>
<td>38.0</td>
<td>2</td>
<td>OM 7</td>
<td>33.5</td>
<td>2</td>
</tr>
<tr>
<td>NM 8</td>
<td>0</td>
<td>13.5</td>
<td>0</td>
<td>EM 8</td>
<td>13.5</td>
<td>4</td>
<td>OF 8</td>
<td>41.5</td>
<td>4</td>
</tr>
<tr>
<td>NM 9</td>
<td>3</td>
<td>38.0</td>
<td>0</td>
<td>EM 9</td>
<td>13.5</td>
<td>4</td>
<td>OF 9</td>
<td>41.5</td>
<td>4</td>
</tr>
<tr>
<td>NM10</td>
<td>0</td>
<td>13.5</td>
<td>5</td>
<td>EF10</td>
<td>44.5</td>
<td>2</td>
<td>OF10</td>
<td>33.5</td>
<td>2</td>
</tr>
<tr>
<td>NM11</td>
<td>0</td>
<td>13.5</td>
<td>0</td>
<td>EM11</td>
<td>13.5</td>
<td>1</td>
<td>OF11</td>
<td>29.0</td>
<td>1</td>
</tr>
<tr>
<td>NM12</td>
<td>0</td>
<td>13.5</td>
<td>0</td>
<td>EF12</td>
<td>13.5</td>
<td>5</td>
<td>OF12</td>
<td>44.5</td>
<td>5</td>
</tr>
<tr>
<td>NM13</td>
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<td>0</td>
<td>EF13</td>
<td>13.5</td>
<td>0</td>
<td>OM13</td>
<td>13.5</td>
<td>0</td>
</tr>
<tr>
<td>NM14</td>
<td>0</td>
<td>13.5</td>
<td>0</td>
<td>EF14</td>
<td>13.5</td>
<td>4</td>
<td>OM14</td>
<td>41.5</td>
<td>4</td>
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<tr>
<td>NF15</td>
<td>0</td>
<td>13.5</td>
<td>0</td>
<td>EM15</td>
<td>13.5</td>
<td>4</td>
<td>OM15</td>
<td>41.5</td>
<td>4</td>
</tr>
</tbody>
</table>

\[ \sum Ranks = 247.0 \]
\[ \sum Ranks = 298.0 \]
\[ \sum Ranks = 476.5 \]

\[ H = 9.97^a \] (corrected for ties), .01 level of significance

\[ ^aH = 9.21 \] needed for significance at the .01 level.
The implications of these findings in regard to educational programming of the two clinical groups is discussed in detail somewhat later in this chapter.

**TABLE 18**

**A COMPARISON OF THE RESPONSES OF THE THREE EXPERIMENTAL GROUPS TO THE WEIGL-GOLDSTEIN-SCHEERER COLOR FORM SORTING TEST**

<table>
<thead>
<tr>
<th>Group</th>
<th>Sorted by Color</th>
<th>Sorted by Form</th>
<th>Both Color and Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>NI</td>
<td>5</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>ED</td>
<td>7</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Normal</td>
<td>7</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>27</td>
<td>16</td>
</tr>
</tbody>
</table>

The above evidence indicated that the Gelb-Goldstein-Weigl Scheerer Object Sorting Test, Part B, did significantly differentiate the normal group from the two clinical groups, but did not differentiate the two clinical groups from one another.

**MAJOR HYPOTHESIS V.** There are no significant differences in the performance of neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Weigl-Goldstein Scheerer Color Form Sorting Test.

To test this hypothesis, the Color Form Sorting Test was administered and it was noted whether the subjects could sort by color, by form, and/or by both color and form. The chi square test of significance would have been appropriate to determine the significance of differences among the three groups, but inspection of data revealed non-significant
differences so no formal analysis was undertaken. These raw data are presented in Table 19.

These data revealed that Major Hypothesis V is tenable. The Color Form Sorting Test did not significantly differentiate among the three experimental groups. It can be noted from the data that twenty seven of the forty-five subjects were able to sort the objects of this test by form while nineteen sorted by color and sixteen performed both sorts. The preponderance of form sorts coincides with the findings discussed in Chapter II that children of this age range tend to prefer form over color as a mode of sorting (Thompson, 1962).

Although statistical significance was not achieved, twelve of the normal group compared to eight of the neurologically impaired and seven of the emotionally disturbed group were able to sort by form. This trend is consonant with the superiority of the normal group in identifying the conceptual sorts discussed in relation to Major Hypothesis IV. The greater ease with which the Color Form Sort was completed as compared to the Object Sorting Test, Part B, coincides with the findings of Reichard, Schneider, and Rapaport (1944) whose subjects found it easier to sort for themselves than to identify examiner's groupings.

Those children who did not successfully perform on this task characteristically used the objects to make designs. Popular choices included "houses" (a square with a triangular roof adjacent to a round "garage") and rockets (a triangle, a square, and a circle in vertical sequence). Such figures obviously represent a "concrete" type of performance on this test but once again did not prove to be diagnostically
### TABLE 19

**CORRELATION OF RESPONSES OF THE THREE EXPERIMENTAL GROUPS TO THE CUBE AND STICK TESTS**

<table>
<thead>
<tr>
<th>Ss Code</th>
<th>Cube Errors</th>
<th>Stick Errors</th>
<th>Cube Code</th>
<th>Cube Errors</th>
<th>Stick Errors</th>
<th>Cube Code</th>
<th>Cube Errors</th>
<th>Stick Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>NI Group</td>
<td>Total</td>
<td>Total</td>
<td>ED Group</td>
<td>Total</td>
<td>Total</td>
<td>Normal Group</td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>NM 1</td>
<td>14</td>
<td>26</td>
<td>EM 1</td>
<td>20</td>
<td>21</td>
<td>CM 1</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>NM 2</td>
<td>14</td>
<td>16</td>
<td>EF 2</td>
<td>13</td>
<td>15</td>
<td>CM 2</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>NM 3</td>
<td>2</td>
<td>10</td>
<td>EF 3</td>
<td>18</td>
<td>11</td>
<td>CM 3</td>
<td>4</td>
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<td>NF 4</td>
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<td>CM 4</td>
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<td>12</td>
</tr>
<tr>
<td>NM 5</td>
<td>10</td>
<td>30</td>
<td>EM 5</td>
<td>0</td>
<td>9</td>
<td>OF 5</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>NM 6</td>
<td>25</td>
<td>25</td>
<td>EM 6</td>
<td>9</td>
<td>8</td>
<td>OF 6</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>NM 7</td>
<td>4</td>
<td>8</td>
<td>EM 7</td>
<td>8</td>
<td>18</td>
<td>CM 7</td>
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<td>9</td>
</tr>
<tr>
<td>NM 8</td>
<td>19</td>
<td>26</td>
<td>EM 8</td>
<td>7</td>
<td>21</td>
<td>CM 8</td>
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<td>22</td>
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<tr>
<td>NM 9</td>
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<td>6</td>
<td>EM 9</td>
<td>11</td>
<td>5</td>
<td>OF 9</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>NM10</td>
<td>3</td>
<td>9</td>
<td>EF10</td>
<td>12</td>
<td>12</td>
<td>OF10</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>NM11</td>
<td>10</td>
<td>35</td>
<td>EM11</td>
<td>2</td>
<td>11</td>
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<td>15</td>
<td>OF12</td>
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<td>7</td>
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<td>NM13</td>
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<td>24</td>
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<td>NM14</td>
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<td>OM14</td>
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<td>EM15</td>
<td>0</td>
<td>14</td>
<td>OM15</td>
<td>1</td>
<td>14</td>
</tr>
</tbody>
</table>

Total Group Mean Errors on the Cube Test = 9.04
Total Group Mean Errors on the Stick Test = 6.76

Pearson $r = .61$, .01 level of significance

---

*Significance determined by Fisher t ratio, $t = \frac{t_1 - t_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$*
significant in differentiating between the three experimental groups.

The Weigl-Goldstein-Scheerer Color Form Sorting Test does not appear to be a useful test in differentiating among neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children in the eight to eleven year and 90 to 115 IQ range. All three groups tended to sort more easily by form than by color as would be expected from the normative data available on color versus form sorting.

Implications of this study

The implications of the results of this study will be discussed within the framework of the three significant purposes of the study expressed in Chapter I.

1. Development of a scoring system. This purpose of the study was fulfilled with little difficulty except in the instance of the Object Sorting Test. The counting of cues in the Cube Test and reproductive errors in the Stick Test appeared to be a straightforward, descriptive means by which to gather the data and compile it for statistical analysis. Similarly, while not obtaining the desired results, the analysis of the individual block designs errors and the types of errors made on the Stick Test followed common procedures utilized in other studies with significant results. It may be that, as Goldstein and Scheerer (1941) contended, qualitative scoring methods are inadequate in determining the "nature or the degree of impairment" of the subject. It would seem that the determination of both number and types of errors employed in this study would overcome this criticism. If the latter is so, it must be concluded that with the population used in this study,
the Goldstein-Scheerer Stick and Cube Tests were not sensitive to any perceptual-motor differences that existed among the three experimental groups. It may be that the component parts of "perceptual-motor dysfunction" were not adequately tapped by these tests. That is to say, those subjects who performed well on these tests may have specific perceptual-motor weaknesses which were not discovered.

It was difficult to devise any scoring system for the Color Form Test other than a simple "yes" or "no" description of each subject's ability to sort. As was previously discussed, those who were unable to perform the expected sorts tended to make and name concrete objects such as houses or rockets but once again this occurred in all three groups and appeared to have limited relationship to the criteria set up to differentiate the three experimental groups.

A number of possible scoring systems were considered with the Object Sorting Test. They ranged from simple "logical-illogical" sorts to categorizing such as Goldstein and Scheerer (1941) suggested by use, situation, color, form, double occurrence, or material to the "open closed," "public-private" dichotomies of McGaughran and Moran (1957) which were chosen. The latter was chosen because no decision of "rightness" and "wrongness" of response had to be made. All sorts could be categorized regardless of the inclusion of what might be considered "wrong" items by the examiner's criteria. In addition, this scoring method had the advantage of differentiating significantly among three adult populations who roughly corresponded to the three experimental groups involved in this study. While the results of this study
were limited in significance, this writer believes that the possible differences in the emotionally disturbed group which were detected by this method are of sufficient importance to warrant further research.

The task required to complete Part B of the Object Sorting Test differed enough so that the McCaughran-Moran dichotomies (1957) were not applicable. While most children were able to pick out some items which were related to other items (for example, all the silverware when the desired grouping was "metal objects"), the test required that all items could be related to a single, underlying concept such as "whiteness," "roundness," or "made of metal." Admittedly, much information was lost but an "acceptance-rejection" scoring system was adapted. This proved to be a significantly differentiating test. It was this writer's observation that further information of clinical significance could be gathered by noting whether or not the child made subgroupings in the absence of rejecting the complete grouping. This, in effect, would represent a combined use of quantitative and qualitative data which, while not within the expressed purposes of this study, may represent the best use of the data obtained from the Goldstein-Scheerer Tests. This dual analysis would provide an extensive description of the individual and would provide a basis for comparison with normative data.

2. Development of normative data. The subjects involved in this study (forty-five) do not represent a sufficient number to assume that adequate normative data has been gathered. It can be stated unequivocally that all of the Goldstein-Scheerer Tests can be completed successfully by children in the eight to eleven year old range so that they
can be considered appropriate tests in this regard. Certain other
trends which were prevalent in all three groups and, therefore, may be
characteristic of the age group were:

1. Most of the Cube Test designs were completed with the aid
   of two or fewer cues. (Eighty-nine per cent as opposed to
   eleven per cent needing three or more cues.)

2. More errors were made on the Stick Test, Part B, than on
   the Stick Test, Part A. (Only two children made fewer on
   Part B, while two made the same number on each part.)

3. More errors made on the Stick Test, Parts A and B, were
   errors of proportion (wrong size stick used) than of any
   other type. (Fifty-nine per cent of all errors were
   errors of proportion.)

4. Children who did well or poorly on the Cube Test tended
to perform in a similar manner on the Stick Test. (A
   Pearson r correlation of the number of cues needed by
   each subject to complete the Cube Test and the total
   number of errors made on the Stick Test (Parts A and B
   combined) was performed (see Table 19, page 70). An
   r of .61 (significant at the .01 level, Fisher t ratio
   Guilford, 1965 was found to support this observation.)

5. On the Object Sorting Test, Part A, more "closed" than
   "open" sortings were made. (Fifty-eight per cent versus
   forty-two per cent.)

6. On the Object Sorting Test, Part A, more "private" than
   "public" sortings were made. (Sixty per cent versus forty-
   two per cent.)

7. On the Object Sorting Test, Part B, more "form" than
   "color" sorts were made. (Sixty per cent of all subjects
   were able to complete the form sort compared to forty-
   two per cent who were able to complete the color sort.)

With the exception of the final trend cited, this writer is aware
of no other studies which present these data. It is cited at this time
as a basis of comparison for those whose research may follow.
3. **Differential diagnosis of the three experimental groups.** The primary purpose of this study, to determine the usefulness of the Goldstein-Scheerer Tests as instruments of differential diagnosis, has been discussed at length in relation to each hypothesis. As has been previously noted, the Cube and Stick Tests demonstrated no usefulness in differentiating between the three groups of subjects involved in this study. That these tests are highly correlated has been demonstrated ($r = .61$) and that these tests demonstrate a portion of the subject's level of perceptual-motor functioning appears probable because of their great similarity to other tests (such as the Bender-Gestalt and Benton Visual Retention) designed for that purpose. The wide range of scores found within each of the three experimental groups and the great overlapping of the scores of the three groups is such that no method was apparent by which subjects of any of the groups could be differentiated from subjects in the other two groups on the basis of scores on either the Cube or Stick Tests.

The diagnostic ability of the Object Sorting Test appeared to be more promising than did the Stick and Cube Tests. The task of conceptual sorting employed in these tests is a more symbolic form of cognitive functioning than was employed in the previous two tests. As was previously noted, the types of sorts chosen by the three groups on Part A of this test were not significantly different among the three groups nor was the number of objects selected for the groups considered as a whole. The highly significant difference between the out-patient and in-patient emotionally disturbed population can only be considered
as a basis for further research at this time, but if the significance were maintained throughout further study, this test (or the characteristic of "overinclusion" on which it is based) might prove to be a useful addition to the battery of tests employed in the diagnosis of emotionally disturbed children.

The implications of the significant findings on the Object Sorting Test, Part B, are more clear. The present impetus in educational programming, especially for the neurologically impaired child, is upon the development of perceptual-motor training exercises. Yet, in this study, the tests most related to perceptual-motor functioning did not reveal significant differences among the three experimental groups, while the test involving conceptual relationships did. The obvious implication is that further research may be needed in developing conceptual training skills or, more basically, to determine whether or not such training is feasible. A second implication is that neurologically impaired and psychogenic emotionally disturbed children who do not exhibit pronounced perceptual-motor dysfunction may still be unable to compete with their normal peers in the conceptual area and may need special programming in this regard.

Summary

This chapter presented the raw data gathered for this study, its statistical analysis, and a discussion of the results as they related to the five major and three minor hypotheses.

It was found that the two tests of perceptual-motor functioning, the Stick and Cube Tests, revealed no significant differences among the
three experimental groups. Similarly, the types of groupings used in the Object Sorting Test, Part A, and the groupings made on the Color Form Test were very similar for the three groups.

Two areas of significance were found. When the out-patient and in-patient emotionally disturbed groups were compared in regard to number of objects selected on the Object Sorting Test, Part A, it was found that significantly more objects were chosen by the in-patient group. It was suggested that this tendency toward "overinclusion" might differentiate between less and more severely disturbed children.

The Object Sorting Test, Part B, was found to differentiate between the normal group and the two clinical groups. The clinical groups were very limited in their ability to identify the concept that prompted each grouping. The implications of this apparent conceptual weakness was discussed in relation to educational programming for the two clinical groups.

Chapter V presents a summary of this study, will discuss the conclusions that can be drawn from the data which was gathered and analyzed for its completion, and suggests problems for further study.
CHAPTER V

SUMMARY AND CONCLUSIONS

Chapter V presents an overview of the research design and basic purposes of this study, reviews the procedures used, and discusses major findings and the implications of these findings for further research.

The problem

This study was concerned with the differential diagnosis of neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children. Early diagnosis and treatment is of paramount importance in the case of the two clinical groups so that proper educational, medical, and psychological treatment can be initiated. At present, methods of diagnosing these children and differentiating them from one another are limited because of the inadequacies of the psychological and medical tools that are available.

This study was specifically concerned with the evaluation of the Goldstein-Scheerer Tests as tests for the differential diagnosis of the three experimental groups. These tests have been available for a number of years as qualitative measures of "abstract" and "concrete" functioning. This study attempted to evaluate them as instruments of diagnosis of perceptual-motor and conceptual impairment. Secondary purposes were to select or devise scoring systems for these tests so that quantitative analysis was possible and to provide tentative norms
Hypotheses

The expressed purposes of this study were fulfilled by testing the following null hypotheses:

MAJOR HYPOTHESES I:

There are no significant differences in the number of cues needed by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete the Goldstein-Scheerer Cube Test.

Minor Hypothesis 1:

There are no significant differences in the number of cues needed by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete any of the individual designs of the Goldstein-Scheerer Cube Test.

MAJOR HYPOTHESES II:

There are no significant differences in the number of errors made by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Goldstein-Scheerer Stick Test.

Minor Hypothesis 2:

There are no significant differences in the types of errors made by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Goldstein-Scheerer Stick Test.

MAJOR HYPOTHESES III:

There are no significant differences in the types of sortings made by neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part A.

Minor Hypothesis 3:

There are no significant differences in the number of objects selected by
neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children to complete the sortings on the Gelb-Goldstein-Weigl-Scheerer Sorting Test, Part A.

MAJOR HYPOTHESIS IV: There are no significant differences in the performance of neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part B.

MAJOR HYPOTHESIS V: There are no significant differences in the performance of neurologically impaired, psychogenic emotionally disturbed, and normal, well-adjusted children on the Weigl-Goldstein-Scheerer Color Form Sorting Test.

Population

Three groups of children, fifteen in each group, were involved in this study. All children were similar in that they were available for testing, that they were between eight and eleven years old at the time of the administration of the Goldstein-Scheerer Tests, and that they were within the range of normal intelligence (IQ between 85 and 115) on an individual intelligence test.

The children differed in that one group had medical diagnoses of neurological impairment, one was considered emotionally disturbed but without neurological impairment, and one was considered to be normal and well-adjusted. The former two groups were obtained from medical or mental health clinics, a residential psychiatric hospital, and/or from special educational programs for emotionally disturbed children. The normal group was obtained from a local elementary school and was
adjudged normal from available developmental data, individual intelligence test data, and teacher observation.

**Procedures**

This writer obtained permission to undertake study of the individual children by contacting the administrators or psychologists in charge of the various programs or agencies which participated. Full access to available records and facilities for testing were obtained at the same conference. Letters of explanation of the purposes of the study were sent to the parents of the children residing in their own homes. A short developmental history questionnaire was included with this letter and returned with the parental consent form.

Each child in the study was seen individually by this examiner between January and September, 1966. In the case of the normal group, each child was seen twice since it was necessary to administer individual intelligence tests. For all children, one individual session was used for the administration of the Goldstein-Scheerer Tests. The raw data obtained from this administration were then compiled and analyzed by the methods described below.

**The research instruments**

Four of the five tests described by Goldstein and Scheerer (1941) in the monograph, *Abstract and Concrete Behavior*, *An experimental study with special tests*, were used as the research instruments in this study. These included two tests which stressed perceptual-motor functioning, the Stick and Cube Tests, and two which stressed conceptual functioning,
the Object Sorting and Color Form Sorting Tests. Since Goldstein and Scheerer had intended these tests to be entirely qualitative, scoring systems were devised or adapted from other studies so that the results could be analyzed statistically.

Analysis of data

Both parametric and non-parametric statistics were utilized in the analysis of the data. When the data fulfilled the criteria set forth for parametric statistics, the simple analysis of variance was used to test the significance of the difference of the means of the three experimental groups. Hypotheses so tested included Major Hypotheses I and II and Minor Hypothesis 3.

The remainder of the data did not lend itself to parametric analysis. Two non-parametric tests were used to test these data. The chi square test of significance was performed on Major Hypothesis III and Minor Hypothesis 1. Major Hypothesis V and Minor Hypothesis 2 would have been tested by the chi square test had inspection not revealed non-significance. Major Hypothesis IV was tested by the non-parametric Kruskal-Wallis one-way analysis of variance test.

Certain other data not specifically covered by the major and minor hypotheses were tested by the Mann-Whitney U test and the Pearson product moment coefficient of correlation for more precise description of the secondary findings.

Major findings

The results of the analyses of the raw data resulted in the
following major findings as they relate to the major and minor null hypo­theses:

1. The number of cues needed to complete the Goldstein-Scheerer Cube Test did not differentiate among the three experimental groups. A non-significant F of 1.47 was obtained when an analysis of variance was performed on these data.

2. When the individual designs of the Goldstein-Scheerer Cube Test were examined, great similarities were apparent in the performance of the three experimental groups. Chi squares were performed on the most disparate data. No significant differences existed.

3. The number of errors made on the Goldstein-Scheerer Stick Tests, Parts A and B, did not differentiate among the three experimental groups. Non-significant F's of 2.59 and 1.45 were obtained when an analysis of variance was performed on these scores.

4. When the types of errors made on the Goldstein-Scheerer Stick Test were inspected, great similarities in the performance of the three experimental groups were apparent. No formal statistical analysis was undertaken since this inspection revealed that no significant differences existed.

5. The types of sortings made on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part A, did not differentiate among the three experimental groups. Non-significant chi squares of .84 for the "open-closed" responses, .34 for the "public-private" responses, and 2.79 for the "open-public," "open-private," "closed-public," and "closed private" categories were obtained.
6. The number of objects selected on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part A, did not differentiate among the three experimental groups. A non-significant F of 1.29 was obtained when an analysis of variance was performed on these data.

7. The acceptance and identification of concepts underlying the grouping of objects on the Gelb-Goldstein-Weigl-Scheerer Object Sorting Test, Part B, differed significantly among the three experimental groups. A Kruskal-Wallis H of 9.97 (significant at the .01 level of confidence) was obtained. Inspection of the data revealed that the performance of the normal group was significantly superior to the two clinical groups.

8. Inspection of the Weigl-Goldstein-Scheerer Color Form Sorting Test results revealed great similarities among the three experimental groups in their ability to sort by color and/or by form the twelve objects which comprised the test. Since inspection revealed non-significant differences, no formal analysis was undertaken.

Secondary findings

1. When the number of cues needed to complete the Cube Test by the neurologically impaired children impaired by encephalitis and those impaired by pre- or peri-natal trauma were compared, a non-significant Mann-Whitney U of 7 was obtained.

2. When the errors made on the Stick Test, Parts A and B, by neurologically impaired children impaired by encephalitis and those impaired by pre- or peri-natal trauma were compared, non-significant Mann-Whitney U's of 9 and 7 were obtained.
3. When the number of cues needed to complete the Cube Test by psychogenic emotionally disturbed children who were in-patients and those who were out-patients were compared, a non-significant Mann-Whitney U of 23 was obtained.

4. When the number of objects selected on the Object Sorting Test, Part A, by psychogenic emotionally disturbed children who were in-patients and those who were out-patients were compared, the obtained Mann-Whitney U of 5 was found to be significant at the .01 level. In-patients chose significantly more objects than did out-patients. Since in-patients were presumed to be more disturbed than out-patients, this test was considered to have possibilities as a measure of severity of emotional disturbance when the "overinclusion" of objects was used as the criterion.

5. A Pearson r of .61 was obtained when the performances of each child on the Cube Tests and Stick Test were correlated. These tests apparently tapped similar functions, presumed to be perceptual-motor in nature.

6. Eighty-nine per cent of the Cube Test designs were completed with the aid of two or fewer cues.

7. More errors were made on the Stick Test, Part B, than on the Stick Test, Part A.

8. Fifty-nine per cent of all errors made on the Stick Test were errors of proportion.

9. On the Object Sorting Test, Part A, the children tended to make more "closed" than "open" and more "private" than "public" sorts.
10. On the Color Form Sorting Test, the children tended to make more form than color sorts.

Implications

The implications of this study are somewhat limited by the non-significant differences found in the analysis of the majority of the data. Obviously, the Goldstein-Scheerer Tests did not prove to be perceptive instruments for the differential diagnosis of the three experimental groups. Both the lack of sensitivity of the tests and the heterogeneity of response within the three experimental groups appeared to have accounted for this non-significance. The overlapping scores of the three experimental groups emphasized the need for recognition of a variety of strengths and weaknesses within the broad categories of "neurologically impaired" and "emotionally disturbed."

It is hoped that the lack of sensitivity of these tests can be overcome by continued research and refinement of these and other psychological tests. The heterogeneous nature of the three experimental groups has broader implications. As has been previously discussed in this paper, certain writers have long recognized the variety of patterns of dysfunction presented by neurologically impaired and emotionally disturbed children. For instance, this study made no attempt to test for impairment of auditory perception. It is entirely possible that children who exhibited slight perceptual-motor impairment on the Goldstein-Scheerer Tests might have shown obvious impairment on a test of auditory discrimination. This presents a strong argument for the use of a battery of tests instead of the heavy reliance on the perceptual-motor
tests that are now in widespread use. It also suggests that further research should stress a variety of profiles that may be indicative of neurological impairment or emotional disturbance, although they might be quite different from one another.

The tendency for the two clinical groups to have less success in identifying conceptual groupings than did the normal group opens a whole area of research that has been largely overlooked in the face of the current "perceptual bandwagon." Devising programs strong in perceptual training but neglectful in this sphere is perhaps delusive.

Finally, one must delve further into the functioning of normal children such as those who exhibited difficulty in completing the Stick and Cube Tests. These children were exhibiting good social and academic adjustment, yet performed quite inadequately on these tasks. What factors differentiated them from the neurologically impaired and emotionally disturbed children who performed well on these tasks, but were encountering behavioral and/or academic difficulties? The present study did not answer this complex question.

Suggestions for further research

It is suggested that further research should explore:

1. The similarities and differences of etiological sub-groups on the Goldstein-Scheerer and other available psychological tests.

2. The relationship of visual and auditory perceptual dysfunction in these etiological subgroups.

3. The relationship between the "impulsivity-reflectivity" dichotomy and the performance of normal children on the Goldstein
Scheerer Cube and Stick Tests.

4. The value of the concept of "overinclusion" in the detection of severity of emotional disturbance.

5. The relative value of three-dimensional, concrete objects in teaching neurologically impaired and psychogenic emotionally disturbed children.

6. The development of further tests of conceptual impairment.

7. The relationship of conceptual impairment and academic success.


Summary

Chapter V has reviewed the purposes of this study and the procedures used in its completion. The major and secondary findings were reported and the implications of these findings were discussed. Suggestions for further research were made.
APPENDIX A: Parental Questionnaire and Permission Form

BACKGROUND INFORMATION

Please circle the correct response below:

1. Did the child ever have encephalitis or meningitis? Yes No

2. Did he ever have any permanent change of behavior following a high fever? Yes No

3. Has the child had any severe illness or accident? If so, what? Yes No

4. Has he ever been given any drugs for nervousness or restlessness? Yes No

5. Did he ever have a convulsion? Yes No

6. Did the mother and child have incompatible Rh blood factors? Yes No

7. Was there anything unusual about the pregnancy? If so, what? Yes No

8. Did the mother hemorrhage or have toxemia (blood poisoning) during pregnancy? Yes No

9. Was the mother nauseous throughout most of the pregnancy? Yes No

10. Was the child premature? Yes No

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PARENTAL PERMISSION FORM

I give my permission for _________ to participate in the test development study.

Request a conference ________ Parent

No conference ________
APPENDIX B: Identification Checklist for Well-Adjusted Children

I. Identification Checklist for Well-Adjusted Children

To be considered well-adjusted, a child must be judged to meet at least nine of the eleven criteria and must have no gross deviation from criteria which he failed to meet.

1. He (or she) is able to play well with other children.
2. He has reasonable control over his emotions.
3. He is able to think for himself.
4. He is achieving somewhere near his capacity.
5. He can be depended upon.
6. He is relatively free from fears, tensions, and anxiety.
7. He is able to learn from experience.
8. He is kind and helpful to teachers and classmates.
9. He is liked and respected by peers.
10. He is able to show satisfaction on his own ability without being dependent on adult approval.
11. He is able to share.

APPENDIX C: Types of Errors Made on the Goldstein-Scheerer Stick Test

<table>
<thead>
<tr>
<th>Type of Error</th>
<th>Stimulus Design</th>
<th>Errors Made</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reversal</td>
<td>5</td>
<td>▼, ▼</td>
</tr>
<tr>
<td>Rotation</td>
<td>5</td>
<td>▼, ▼</td>
</tr>
<tr>
<td>Distortion</td>
<td>5</td>
<td>▼</td>
</tr>
<tr>
<td>Breakdown of Gestalt</td>
<td>5</td>
<td>▼, ▼, ▼, □</td>
</tr>
<tr>
<td>Proportion changed</td>
<td>5</td>
<td>▼, ▼</td>
</tr>
<tr>
<td>Addition</td>
<td>□□□</td>
<td>□□□</td>
</tr>
<tr>
<td>Omission</td>
<td>□□□</td>
<td>□□□</td>
</tr>
</tbody>
</table>

APPENDIX D: Objects Included in the Object Sorting Test.

Cigar
Candy cigar
Two soda crackers
Two sugar cubes
One yellow, one red poker chip
Red ball
Red wax apple
Two keys
Lock
Bicycle bell
Two nails
One small red candle
One large white candle

Pipe
Two matches
Box of matches
Small red plate
Toy hammer
Woodblock with nail
Pliers
Noisemaker
Screwdriver
White toy dog
Large knife, fork, spoon
Toy knife, fork, spoon
BIBLIOGRAPHY

Books


Koppitz, Elizabeth M. The Bender Gestalt Test with The Human Figure Drawing Test for Young School Children. Columbus: Ohio Department of Education, 1962.


Periodicals


Unpublished Material