

**AN ECOLOGICAL ASSESSMENT OF A MENTALLY  
RETARDED ADOLESCENT**

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AN ECOLOGICAL ASSESSMENT OF A MENTALLY  
RETARDED ADOLESCENT

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AN ABSTRACT

Presented To  
The Graduate Council of  
Austin Peay State University

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Arts  
in Psychology

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Patrecia Margaret Starbird

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## ABSTRACT

The widespread use of IQ scores to classify, label, and formulate an educational approach for mentally retarded children has been questioned by a number of psychologists in the last decade. This concern has given rise to the development of new research strategies.

This twelve month long study attempted to determine (1) whether the assessment produced by an ecologically designed study of a mentally retarded adolescent male would be similar or different from the assessment that had been produced by repeated IQ testing and (2) whether the ecological assessment could be used to produce an habilitative program that would maximize the adaptive potential of the subject.

Results indicate wide discrepancies between the assessment produced by the ecological method and the assessments previously found by repeated IQ testing. The assessment produced by the ecological method proved to be far more valid, detailed, and useful for the designing of a habilitative program. The habilitative interventions based on the findings of the ecological study, when put into effect, clearly produced marked improvement in the adaptive potential of the subject.

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Patrecia Margaret Starbird

June, 1979



To the Graduate Council:

I am submitting herewith a thesis written by Patrecia Margaret Starbird entitled, "An Ecological Assessment of a Mentally Retarded Adolescent." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Masters of Arts, with a major in psychology.

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Major Professor

We have read this thesis and  
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## CHAPTER I

### Introduction

The method most frequently used to identify the mentally retarded child in the public school system is the quantitative evaluation of intelligence based on an intelligence quotient (IQ) obtained from IQ test results (Adams, 1973; Baumeister & Muma, 1975; Burton, 1974; Filler, et. al., 1975; Hobbs, 1975). The psychologist's evaluation, in some instances, may be based on several standardized tests including an IQ test. In other instances, the psychologist's diagnosis is discussed by an interdisciplinary team, where the child is evaluated from each team member's perspective, and factors other than an IQ score may go into the final evaluation which catagorizes the child as mentally retarded. However, in most situations, the datum that has the greatest influence in the determination of "mental retardation" is the IQ score (Mercer, 1975; Hobbs, 1975).

Once identified as retarded by the use of the intelligence quotient (IQ), the child is assigned to a category of mental retardation based on the AAMD guidelines (Kirk, 1972): educable (IQ 68-52), trainable (IQ 51-36), custodial (IQ 35 and below). Essentially, the mentally retarded child is assigned to a category based on the quantitative average of the child's scores which measure an assumed underlying, unitary factor called "intelligence" (Brooks & Baumeister,

1977). The now identified and labeled child is placed in a special classroom or given access to resource classes deemed suitable to his ability level as measured by the IQ test.

Identification, labeling, and educational placement of the mentally retarded child based on the IQ score has come under increasing criticism in recent years. IQ tests have been found to be culturally unfair which results in disproportionately large numbers of ethnic minority children being assigned to special classes where they receive inferior education (Braginsky & Braginsky, 1974; Cole & Bruner, 1972; Goodnow, 1976; Hobbs, 1975; Mercer, 1975). What IQ tests may measure for many children are cultural differences, rather than ability differences (Cole & Bruner, 1972).

The IQ score as a valid measure of adaptive ("intelligence") behavior has been questioned by a large number of articles in the psychological research literature (Baumeister & Muma, 1975; Charlesworth, 1976; McClelland, 1973; Mercer, 1975; Sigel, 1963). Baumeister and Muma (1975) state:

The IQ test cannot, or at least should not be used to "diagnose" anything. Moreover, the predictive power implicitly attributed to completely arbitrary cutoff points simply does not exist at the individual level primarily because of numerous sources of error, both in terms of reliability and validity (p. 297).

Classifying children according to their IQ test scores results in the assumption that children with comparable test results are at the same mental level and require

identical educational treatment. Contrary to this assumption, the evidence has shown that the children so categorized are a very heterogeneous group with widely different areas of strengths and weaknesses (Baumeister & Muma, 1975; Berkson, 1966; Trembley, 1969). Berkson (1966) has stressed the great behavioral variability that characterizes retarded children grouped solely on the basis of identical IQ's. Hobbs (1975) states, ". . .the categories of mild, moderate, severe, and profound retardation are often interpreted (erroneously) to mean that individuals within a particular category will behave in similar ways and that instructional programs and procedures can be applied in blanket fashion to groups of children so identified" p.53).

The child's IQ score, a composite of several scores, and the retardation category label are relatively useless for designing a special class curriculum (Trembley, 1969). When planning individual improvement programs, the IQ is of no practical help because it tells nothing about the source of the individual's problem or what course to take in remediation of the problem (Brooks & Baumeister, 1977; Iano, 1971; Hallahan & Kauffman, 1977). Hobbs (1975) comments, ". . .categorization and labeling often proceed on a negative basis by determining a child's deficits only, rather than considering both his deficiencies and his strengths (Haywood, 1969). This practice defeats the goal of building individualized educational programs, which



require assessment of assets as well as liabilities" (p.54). The stated purpose of the classification system based on the IQ test is to aid the development of the retarded child, but IQ assessment does not provide any information for developing and categorizing programs of individual development. Burton (1974) states, "It appears that the least useful tool in the assessment of trainable retardates would be the standardized intelligence test" (p.424).

The result of IQ score identification, categorization, and placement of mentally retarded children often is to reduce rather than enhance their capacities for more adaptive behavior in the real life environment in which they could be functioning. In some cases, it may result in individuals remaining dependent on families or public institutions when they may have the potential to become partly or completely independent in our society (Dunn, 1973). The structure and educational goals of most EMR and TMR classrooms tend to limit rather than increase adaptive potential.

The educable mentally retarded (EMR) classroom curriculum is geared to the theoretical learning deficiency of the EMR child (IQ 68-52) as measured by his IQ score, which implies a rate of mental development one-half to three-fourths that of an average child. The goals of an EMR program according to Kirk (1972) include training in social competence, occupational competence, emotional security, independence, good health habits, practical homemaking

skills, and ". . .the minimum essentials of the tool subjects, even though their academic limits are third to fifth grade" (p.198).

These goals create EMR classrooms in which limited academic material of a very concrete nature is taught at an extremely slow pace, with frequent repetition and with a great deal of structure and guidance (Iano, 1971). The total effect is a slowed and restricted curriculum which may actually do more harm than good in that there is too great an emphasis on disability which may remove many opportunities for the child to learn and to achieve.

The curriculum typical of a trainable mentally retarded (TMR) classroom emphasizes self-care skills, communication development, work habit improvement, direction following exercises, rudimentary social skills, and rote recognition of words such as "stop," "women," "men," etc. (Robinson & Robinson, 1976). The goals of such programs are self-care, social adjustment, and economic usefulness. A program developed around these goals is based on the belief that the TMR child (IQ 51-36) will always be semi-dependent, is capable of only simple rote learning and training, will develop at a rate of one-fourth to one-half that of the normal child, and is incapable of profiting from the type of program provided for the educable mentally retarded (Burton, 1974).

Special programs, such as those described, have not been especially successful as measured by standardized tests of academic achievement. More importantly, such programs limit rather than increase the individual child's potential for adaptive behavior, assume across-the-board deficits in the children so categorized, and do not allow for identifying areas of potential competence in each individual child.

There is little evidence that the typical informal, total group instruction in self-care and socialization has been effective in accomplishing even its limited goals (Dunn, 1973). Hobbs (1975) states:

The academic achievement of children in special classes has been shown to be either equal to, or inferior to that of children of comparable IQ who remained in the regular classes. Studies comparing personal or social adjustment of students in special and regular classes have reached inconsistent conclusions, making special placement on this basis questionable (p.147).

Narrowing educational goals, and fixing a child on the restricted educational tracks existing in many EMR and TMR classrooms, is compounded when the pressure is put on for an "early identification" drive. Diagnosis and classification as well as prognosis is relatively uncertain due to the questionable validity and predictive power of the standardized tests now in use. Categorizing a child incorrectly and placing him in a restricted special classroom



may ill equip him to make a transition to a less restricted classroom (Iano, 1971). Categorization that leads to a restricted curriculum may do more harm than good.

Thus, criticism of the use of the IQ score based on the cultural bias of IQ tests, the resulting erroneous assumption of homogeneity of children with like IQ's, the impracticality of using IQ test results to plan individual habilitative instructional programs, and the often restrictive educational programs based on the assumption of a limited intellectual potential has been reported in a large number of studies and discussions in the research literature.

Research efforts involving the mentally retarded have grown substantially since the early 1950's. Criticism of research involving mentally retarded children centers around the pervasive use of the IQ as a criterion measure to validate other theories and the frequent use of either the laboratory or the institution setting, both far removed from real-life situations.

Research has often been dependent upon IQ test results to dichotomize subjects into groups for comparative study. In addition, the IQ is often used as the criterion for validating the results of research. In both instances, data from the general psychometric theory of intelligence, whose validity has been questioned, is used to validate research results and ultimately theories related and unrelated to mental retardation. Brooks and Baumeister (1977) state,

"The IQ does not possess sufficient validity on its own merit to justify this elevated position as the ultimate criterion for establishing the validity of other theories" (p.140).

Much of the research using mentally retarded children has been done in institutional settings rather than in real-life surroundings. Marked differences have been found between individuals of comparable intelligence living in institutions and those living at home (Hobbs, 1964). Results of research conducted in one institution cannot be generalized to other institutions because of the marked differences between institutions (Hobbs, 1975). The results of studies in institutions tell us less about the nature of mental retardation than they do about the effects of institutionalization (Zigler, 1966).

Laboratory research using the mentally retarded as subjects, in an attempt to learn more about mental retardation, in many instances appears artificial, contrived, and far removed from the real-life environment of the mentally retarded. Reported findings in such research are often used to make generalizations about mental retardation in and out of the laboratory. Such generalizations are often unwarranted, as the experimental tasks employed have no meaning in a real-life situation (Brooks & Baumeister, 1977).

A growing number of researchers in special education and in the psychology of the exceptional child are proposing alternative avenues for research which will result in an educational approach that will increase the child's individual potential for cognitive and social adaptation to the real world environment. Researchers are now demanding that if research findings from the study of mentally retarded children are to have any generalizability and are to be useful for developing habilitative programs designed to maximize the child's potential for learning and adaptation, they must have "ecological validity."

Ecological validity, as defined by Bronfenbrenner (1977), "refers to the extent to which the environment experienced by the subjects in a scientific investigation has the properties it is supposed or assumed to have by the investigator" (p.516). The current psychometric procedures used to identify and categorize mentally retarded children for educational purposes do not have ecological validity, using Bronfenbrenner's definition.

The psychometric testing situation is one from which, even if the tests were valid measures of intelligence, no valid conclusions as to the child's capabilities and potentials can be drawn. Riegel (1978) contends that:

Under 'objective' testing conditions, the tester is prevented from interacting with the subject in any reasonable manner. The most he or she is permitted



to do is to smile encouragingly and to say 'Hm, hm' or 'It's just fine the way you are doing it.' . . . It not only alienates the subject, but provides questionable results even to a test administrator with the best of intentions.

These deficiencies arise from the artificial character of the testing condition. In real-life situations, all performances (whether on the assembly line or in the executive board meeting) are determined interactively by participating members. . . (pp.149-150).

The nature of IQ tests and the conditions under which they must be administered do not qualify them for ecological validity, using Bronfenbrenner's definition.

If the objective of testing is not primarily to affix a label to the child but to ascertain the child's capacities and potentials in order to devise an individual habilitative program, it is important to explore alternative ways of performing the assessment of the child's capacities, which may be more productive than IQ testing. One possible alternative method is the ecological approach described by Bronfenbrenner (1977).

Bronfenbrenner's definition of the ecological approach to studying child development, paraphrased to apply to mentally retarded children, would read: An ecological approach to the study of children with disabilities and handicaps is the scientific study of the progressive, mutual accommodation, during the child's life span to date, between the child as a growing organism and the changing environ-

ments in which the child lives, as this process is affected by relationships existing within and between these immediate settings, as well as the larger social contexts, both informal and formal, in which the settings are embedded.

The purpose of an ecological experiment is not primarily hypothesis testing, but discovery (Bronfenbrenner, 1977), i.e., not just the assessment of the individual's present status, but using the assessment to propose interventions which will "radically restructure the environment, producing a new configuration that activates previously unrealized potentials of the subject" p.526).

Bronfenbrenner (1977) has proposed that the most efficient method of arriving at an understanding of the existing relationship between the person and his surrounding milieu is to purposely intervene and attempt to change the relationships that exist. The result of a planned intervention is a clearer understanding of the individual in his environment. The knowledge gained by observing the person's reaction to the intervention can be used to plan future interventions, producing more changes which may lead to the development of potentials previously unrealized.

In recent years there has been a reaction against the exclusive reliance on laboratory experimentation in the applied research area, and against an exclusive reliance on statistical analysis (Chapanis, 1970; Levine, 1974). The question has been raised: is it ecologically valid to

generalize from laboratory research, which attempts to control most variables, to the natural environment where the control of all variables is impossible (Willems, 1969)?

Ecological research requires the experimentation occur within the natural environment of the mentally retarded child or children under study for the resulting data to be ecologically valid, and around which an habilitative program can be constructed which will increase the individual's adaptive potential in his total environment. Single subject studies and studies using subjects who are "experiments of nature" often utilize the ecological approach.

In the recent literature, the need for ideographic, single-subject, studies has been recognized by researchers in the area of exceptional children (Ginsburg & Koslowski, 1976; Elkins, 1976; Bronfenbrenner, 1977). Single-subject studies have an honorable and important place in the history of psychology (Ackerly, 1962; Ayres, 1972; Baruch, 1952; Clarke, 1973; Feuerstein, 1977; Koluchova, 1973; Langmier & Matejcek, 1975; Luria, 1966; Luria, 1968, Morsink, 1971). In discussing sample size in studies of psychological deprivation, Langmeir and Matejcek (1975) state:

Detailed studies of individual cases, particularly if continued over a long period of time, are probably the best way of identifying both those mechanisms underlying the development of deprivational disorder and the close relationship between deprivational symptoms and various internal and external factors. . .



In this context, one should also note the sociologically oriented studies of individual families. These throw light on the relationship between the child's behavior and responses from his family environment under normal everyday conditions (p.27).

An "experiment of nature" is a term used to designate an individual who has a serious abnormality or deviation, usually neurological, which could never be produced in laboratory studies for ethical reasons. While experiments of nature and single-case studies are not synonymous, many experiments of nature have given rise to single case studies. Results from research utilizing single subject experiments of nature can be as valid as results stemming from multi-subject laboratory experiments.

The actual execution of research, whether in a laboratory or a naturalistic setting, is always a product of the purposes and questions of the investigator and his choice of methods to achieve his purposes and answers (Taylor et. al., 1959). Specific methods and techniques of experimentation and research should serve the investigator rather than limit the scope of his possible research, and therefore the number of questions he can answer. Willems (1969) states, ". . .good methodological practice is usually an empirical matter and is largely determined by what works. . ." (p.44).

The specific questions this research attempts to answer are (1) whether the assessment produced by an ecologically designed study of a mentally retarded adolescent



male will be similar or different from the assessment that had been produced by repeated IQ testing, and (2) whether the ecological assessment could be used to produce an habilitative program that would maximize the adaptive potential of the subject.

## CHAPTER II

### METHOD

#### Subject

Davey, the subject of this study, is a sixteen year old male enrolled in a class for the trainable mentally retarded. His public school education has consisted of four years in classes for the educable mentally retarded followed by four years in classes for the trainable mentally retarded.

Davey is the product of a reported full term, normal pregnancy, followed by a reported prolonged, difficult, forcep delivery resulting in a permanent deformation of his skull. His family consists of his natural father, mother, and one sister, six years older than Davey, who is married and does not reside in the family residence. Davey and his parents live in a middle class home situated in a neighborhood of middle to high socioeconomic residences. Davey's father, retired from a blue-collar job, continues to operate a farm some 15 miles away from the residence despite two severe heart attacks in the last five years. Davey's mother has not worked outside of the family home since her marriage.

Evaluations of Davey by official agencies and/or professionals show considerable variability in diagnoses and evaluations of strengths and weaknesses. The most recent psychometric evaluation produced an IQ of 43.

PROCEDURE

The term "ecological research" as used in this study is defined as:

research in which the subject is studied in the totality of his environmental interactions: at home, in school, in the neighborhood, in the community, and in other settings. The child's behaviors during the interactions are conceptualized in terms of cognitive structure, motivational structure, and in patterns of interpersonal interactions, which are intimately related to emotional structure. All relevant methods of data collection are used: naturalistic observation, the clinical method, cognitive and neurological tests, mini- or quasi-experiments, and planned interventions.

Considerable variability in the application of the ecological method by different experimenters, and even from one experiment to the next conducted by the same experimenter, is to be expected. Each study progresses in a unique pattern determined by the individual subject's behaviors discovered in the process of the study. Interventions, quasi- or mini-experiments, tests, etc., are planned as the study progresses and more information about the subject's unique ecological pattern is discovered.

This ecological research, which was conducted over a period of twelve months, consisted of two stages. The first stage was designed to collect baseline data derived from naturalistic observation, clinical records, and interviews. The second stage executed planned interventions and mini-



experiments suggested by the data produced by the first stage.

Naturalistic observation was conducted first in order not to bias EO's perception of Davey. Clinical evaluations reached by various hospitals, a mental health clinic and school psychometrists, as well as interviews of family members and teachers were obtained.

During the second stage of the study, data was collected by continued naturalistic observation, the administration of tests, and the observation of the subject's reactions to planned interventions and mini-experiments. During the second stage a taxonomy was formulated which was developed to classify the observations of Davey's behavior.

Tests administered during Stage 2 included: Wide Range Achievement Test (Jastak, et. al., 1976), Durrell Analysis of Reading Difficulty (Durrell, 1955), Kraner Pre-school Math Inventory (Kraner, 1976), Doren Diagnostic Reading Test of Word Recognition Skills (Doren, 1973) and the Similarities scale of the Wechsler Intelligence Scale for Children-Revised (Wechsler, 1974).

Interventions in Stage 2 were planned and conducted in four major areas: cognitive functioning, social or interpersonal functioning, emotional control, and gross and fine motor coordination. Interventions in one area often affected one or more of the other areas and led to a chain of further interventions.

Interventions and mini-experiments were initially developed on the basis of the data collected in Stage 1. As the study proceeded, the data produced by interventions in progress contributed to the development of additional interventions producing more data. The nature of an ecological study, such as this one, does not allow for the detailed planning of interventions or mini-experiments before the baseline data and clinical information are gathered. Interventions are planned as the need to clarify, to understand, or to question data accumulated is encountered.

Specific interventions in the area of cognitive functioning included the establishment of a reading program, arithmetic concept lessons, instruction in the use and value of money, the teaching of spatial and temporal prepositional concepts such as before and after, quantitative concepts such as more than and less than, sequential concepts such as first and last, and directional concepts such as right and left.

Interventions in the area of social or interpersonal functioning concentrated on reducing the frequency of two behaviors considered socially maladaptive: covert public masturbation, and the making of loud and hostile depreciatory comments, often directed at strangers.

Control of emotional expression via the use of self-commands was the main goal of all interventions in the area of emotional behavior. Interventions were designed to

increase the subject's awareness of his own emotions, the emotions of others, and the appropriate manner in which emotions are to be expressed.

Attempts to instruct the subject in such areas as shoe lacing, shoe tying, hair washing, and the operation of a calculator are examples of interventions attempted in the gross and fine motor coordination areas. Interventions planned to improve the subject's posture and normalize his gait were also conducted.

Following approximately eight months of research a taxonomy was developed to break down observations of the subject's behavior into meaningful categories. The taxonomy was modified several times during the study as more behaviors were observed. The final taxonomy categories behavior in three major areas: cognitive, motivational, and emotional. The behaviors observed and recorded before the formation of the taxonomy, and after, were broken down into their appropriate components and placed under the appropriate headings in the taxonomy. Meanwhile continued interventions and observations added to the data available.

Observations were made in the form of detailed notes on as many aspects of the subject's behavior as possible in the context of continuous interaction between the experimenter-observer (E-O) and the subject. Recurrent patterns of behavior once clearly established in documented observations were no longer recorded unless they reflected some



type of change. A number of instructional and testing sessions were tape recorded to increase the limited data on the subject's spontaneous speech patterns as well as other cognitive processes.

The taxonomy is presented in Appendix A, and is followed by an explanation of the design of the taxonomy and its use. Appendix B is an example of several observations of the subject's behavior placed under the appropriate categories of the taxonomy.

## CHAPTER III

### RESULTS

This study, which was conducted over a period of twelve months, consisted of two stages. During the two stages, the experimenter observer (E-O) observed or interacted with Davey four hours per week on the average--in his school classroom, in his home, and in the community. Each set of observations and interactions varied in length from fifty minutes to ten hours. There were over 200 hours of contact between Davey and E-O during the twelve month period. Results are reported separately for each of the two stages.

#### Stage I Results

##### Data Derived From Formal Assessment Procedures

Tables 1-6 in Appendix C summarize information obtained from agencies and/or professional evaluations and from school records contained in Davey's school file. Evaluations (Appendix C, Table 1) of Davey by official agencies and/or professionals (university hospitals, mental health center, mental hospital, school psychometrist) show considerable variability in conclusions.

These conclusions can best be summarized by highlighting their contradictions:

1. University Hospital "B" assessed Davey, at 3 years, as "normal and healthy." The same hospital at age 6 years, 11

months assessed Davey as having a "psychoneurological learning disorder." Their second evaluation also produced two widely discrepant IQ scores: a score of IQ 75, derived from the Columbia Mental Maturity Scale (Burgemeister, et al., 1959), places Davey in the borderline retardation range; the Stanford Binet Intelligence Scale (Terman & Merrill, 1960) score of IQ 52 places Davey at the top edge of the "moderately" retarded range. Both of these evaluations differ from that of the Mental Health Center psychologist who, in the same year, obtained an IQ score of 67 for Davey on the Peabody Picture Vocabulary Test, (Dunn, 1965) putting Davey in the "mildly" retarded range.

2. The record of professional evaluations shows that Davey's IQ scores show a steady progression downward, from IQ 67 to IQ 75/52 to IQ 55, to IQ 50, to IQ 43 between the ages of 6 years and 17 years. This record contrasts, curiously, with the unanimous reports of teachers and parents that Davey had shown marked improvements in both adaptive social behavior and in academic learning during the same period. The decline of IQ score from 50 to 43, from age 14 to 17, overlapped the time when the present year-long study was conducted and during which dramatic improvements in academic ability and socially adaptive behavior occurred, as recorded in subsequent sections of this report.

3. Professional diagnoses of the nature of Davey's behavior and academic problems vary widely, and include such dispar-



ate classifications as: moderately retarded, psychoneurological learning disorder, brain damage with retardation, organic brain damage, uneven development, and deficit in perceptual-motor areas. (The school psychometrist's evaluation of Davey's cognitive strengths and weaknesses (Appendix C, Table 3) will be detailed and evaluated in the section which reports Stage II findings of this study).

4. Educational recommendations (Appendix C, Table 1) and placement (Appendix C, Table 5), based on professional psychological evaluation, varied from "special learning problem class," "special education class," "educable mentally retarded class," to "trainable mentally retarded class." These recommendations closely followed current practice which uses IQ scores as the primary criterion for educational placement. One result of this was that Davey's progress from a formal educational viewpoint has been "progress in reverse," i.e., from educable mentally retarded classes to trainable mentally retarded classes (Appendix C, Table 5).

#### Data Provided by Informal Evaluations of Davey by Professionals, Parents, and Teachers

The data on informal evaluations (Appendix C) are also best summarized by showing their contradictory nature. There are areas of both agreement and disagreement on Davey's cognitive (Appendix C, Table 3), emotional, motivational, and social interactional adaptive characteristics (Appendix

C, Table 4) by agencies, professionals, teachers, and parents.

1. Areas of Agreement: Davey seems to have a higher intelligence than test scores consistently indicate; his verbal behavior seems to indicate a higher level of comprehension than test scores indicate; his verbalizations are filled with jokes and puns (indicating a higher mental age than test scores would indicate); he is very alert to surroundings and people (no disorientation); he is likeable, sensitive, not physically hostile; he is verbally hostile to mother and strangers; he is highly anxious and becomes very emotional when others or self are disciplined; he has poor motor coordination; he is described as hyperactive and frequently displays repetitive movements.

2. Areas of disagreement: peer rejection vs. peer acceptance; no friends vs. few friends; unable to play well with other children vs. good interaction with other children; prefers to remain alone vs. enjoying interaction with others; cooperates well at times vs. refusing to help with simplest tasks; uncooperative during group instruction vs. complete cooperation during group instruction; adapts well to school environment vs. does not adapt; reacts well to new surroundings; vs. threatened by new surroundings; unmanageable vs. controllable by hard look or verbal reminder; often moody and dependent vs. playing the comedian constantly; seldom emotional vs. often highly emotional; slow development vs. development within normal limits.

One must conclude that these often contradictory informal evaluations by professionals, parents, teachers, and friends must be: (1) highly subjective, and (2) based on limited and situationally specific experiences with Davey, rather than on a comprehensive view of Davey in his interactions throughout his total egosystem.

E-O's factual interpretations of the data produced by Stage I of the study, after reviewing the psychometric and other formal evaluations of Davey, are as follows:

1. All formal testing shows that between 6 years, 3 months and 17 years of age, Davey has continuously deteriorated in "intelligence."
2. The conclusions reached by psychometric evaluation are at variance with the "gut feelings" of parents, teachers, friends, and some of the professionals themselves, i.e., a feeling that Davey's "real" potential is much higher than that which is revealed by psychometric testing. Yet, no individualized educational strategy based on Davey's areas of weakness and strengths has ever been formulated and, after psychometric evaluation, no followup of Davey's apparent "greater potential" has ever been done.
3. Davey's educational placement, following the conventional IQ based distinction between "educable" and "trainable" retardates, severely restricted his access to the very type of academic instruction which would make possible a development of his "real" potential, if that potential is in



fact greater than would be indicated by psychometric evaluation.

Data Produced by Naturalistic Observation of Davey in His School Classroom

Data collected from naturalistic observation by E-O which agree with those noted by parents and teachers are:

1. Davey is alert, observant, and in general, adaptively responds to his environment (Appendix C, Table 1).
2. Davey is very verbal, as reported by teachers and other evaluators. His verbalizations in school frequently involve jokes and references to television programs and characters. His ability to express himself verbally exceeds that of his classmates and appears to be above what would be expected from a child with a recently measured IQ of 43. Davey's verbal behavior in the classroom, however, often is not directly related to questions asked by the teacher, or to on-going discussion or activities in progress in the class. They are based principally on images recalled from recently viewed TV programs.
3. Davey's comprehension of TMR classroom activities, discussion, and instruction seems to be superior to the comprehension of most of his classmates. His academic knowledge in areas such as science and history greatly exceeds that of his classmates according to his teacher. This was confirmed during observation of his behavior in the classroom.

4. Davey appears to be fully accepted by his present classmates, who vary in age from eleven to sixteen years. He interacts verbally with them and prefers to take part in class activities rather than be left out. This contradicts information given by one teacher (Appendix C, Table 4) that Davey is rejected by peers.
5. Davey does become extremely apprehensive when strangers enter his environment as reported by his present teacher, mother, and others. His initial reaction is to direct a barrage of hostile remarks in the stranger's direction and to avoid, if possible, close proximity. After approximately three experiences, his initial reaction to the stranger subsides. This was his behavior pattern toward E-O when E-O first appeared in the classroom to make covert observations of Davey while working with another child. When the stranger's presence habituates, Davey then begins to make friendly overtures towards the stranger.
6. Davey at times does exhibit continuous repetitive behavior, as reported by parents and teachers (Appendix C, Table 2). E-O's observations showed that this behavior occurs only when Davey is not involved in a task, and is anxious or bored. Some proportion of this repetitive behavior appears to be part of a behavior pattern observed by E-O, and not reported by any previous observer. He masturbates by rubbing his penis through his clothing when seated at his desk and also by lying on the floor rubbing

his pelvic area against it. During these episodes his facial expression becomes blank, his eyes glaze, and he does not react readily to his surroundings.

7. His reported poor gross motor coordination (Appendix C, Table 2) is apparent in his clumsy, awkward gait, either when walking or running. His fine motor coordination appears to be less impaired, as he is able to print letters and words neatly and to write numbers with appropriate spacing. The strength of his grip in general is adequate, but strength in fine motor movements, i.e., pulling the strings tight when tying his shoes, is weak. He has great difficulty in turning knobs and some difficulty picking up small items, such as beans.

8. Although generally cooperative, Davey frequently injects comments which are irrelevant into class discussion. He also refuses to cooperate when assigned some individual seat work unless he has the undivided attention of the teacher in a one-to-one interaction.

9. E-O's observations confirmed that Davey becomes moody and despondent, as reported by teachers and parents (Appendix C, Table 4). When moodiness was expressed in the classroom, it was accompanied by an increase in repetitive movement, penis manipulation, negativism, and lack of cooperation.

10. Both Davey's mother and teacher acknowledge that, upon advice of professionals, they have never punished or disci-



plined him.

Data Collected by E-O From Naturalistic Observation Which Disagree With Those Noted by Parents and Teachers are:

1. Davey was not observed to become highly emotionally upset when others are reprimanded in his presence, which was reported by his mother and teacher (Appendix C, Table 4). The observed effect of reprimands to classmates was momentary distraction followed by an increase in Davey's cooperation in class. Davey's reported sensitivity to loud noises and voices (Appendix C, Table 4) was observed to be momentary distraction.
2. Davey, at age 6 (Appendix C, Table 4), is described as hyperactive. There is no indication, from E-O's observations, of his lack of ability to sit quietly for periods of time or to sustain attention to a learning task. Davey remains seated more often than not, and normally attends to the instruction in progress. His ability to focus his attention and his attention span are not age appropriate, i.e., he is easily and often distracted by activity in the classroom. However, in one to one tutoring sessions Davey is able to concentrate on the task at hand for twenty to thirty minutes at a time.
3. Davey's present teacher reported (Appendix C, Table 4) that she controls instances of Davey's deviant behavior with a hard stare or a verbal reminder. Observations of Davey in the classroom reveal that the teacher is often unable to control Davey using these methods. For example, Davey

frequently refuses to do assigned seat work. He will even leave his seat to avoid a task, although infrequently. When he displays overt negativism, he is not reprimanded by the teacher. After asking Davey to return to his seat without results, the teacher was observed to attempt to regain control of Davey by ignoring him, by cajoling or kidding him, or by changing the immediate task to one which Davey would do. One or a combination of these methods always works.

4. E-O, in the first weeks of the study, observed Davey's frequent covert masturbation in school, a behavior not reported by either teachers or parents. This behavior was observed to increase at times of tension and emotional reactivity. It also diverted his attention from academic or other tasks being carried on at the time.

E-O concluded, after reviewing and evaluating all data produced by Stage I of the study, that much more specific data was needed on Davey's cognitive level, motivation, emotional behavior, and social interactional behavior in order to reach firm conclusions as to the exact nature of Davey's academic and social behavior problems and in order to make recommendations for Davey's further academic and adaptive growth.

E-O hypothesized that interventions in the areas of reading, arithmetic, exposure to normal community experience, self-control of public masturbation and of aggressive

behavior, and learning self-help skills involving motor coordination would yield much needed information on Davey's potential for academic achievement and for learning more adaptive social interactional behaviors, information not provided by any professional assessment to date.

### Interventions From Which State 2 Results Derived

Stage 2 results flowed from the interventions developed during Stage 2. To fully understand these results, it is necessary first to briefly describe Davey's baseline behavior in each of the intervention areas and the types of operations performed in these interventions.

### Reading Interventions

The intervention on which the most time was spent was teaching Davey to read. An initial analysis of Davey's reading ability, measured by the Durrell Analysis of Reading Difficulty (Durrell, 1955), placed his reading level between grade 1.0 and 1.5. This general assessment was confirmed by other observations of E-O. Davey had great difficulty reading a simple consecutive text. For example, he could not read a short five word sentence without stopping to inject a comment irrelevant to the task. He reversed letters in words and frequently skipped words which he knew. He frequently guessed at a word, substituting for it a word that began with the same first letter. He often reversed the order of words, or the letters in words. He did not



know, understand, or follow the left to right rule for reading. He had no conception of what a sentence was. He could not repeat or explain even a short simple sentence which he had just read. He could not repeat words which were broken down into syllables and sounded out for him. He could not phonetically sound out any word presented to him visually. The formal and observational data on Davey's actual reading level was widely discrepant from his teacher's subjective estimates of his reading level (Appendix C, Table 3).

Despite all of the foregoing weaknesses in Davey's reading ability, there were also some positive indications that his potential might be far greater than his performance would indicate. (Davey had a limited exposure to reading instruction four years earlier in an educable class for the retarded.) His mother reported that Davey frequently read the weather report and headlines in the paper to her. E-O had observed that Davey had a much larger speaking and listening vocabulary than would have been expected from the stereotype of the "trainable" retardate. When E-O took him into community settings, he read store signs, grocery labels, aisle marker signs, etc. Much of this material was from several words to short sentences in length. Davey could reliably discriminate most letters of the alphabet. E-O also discovered that Davey could use a simple written list

of steps (an algorithm) in order to learn to perform a new operation involving several steps, e.g., adding with a hand calculator, tying his shoe laces, etc.

Techniques used to improve reading and comprehension skills included repeated explanation of what a sentence is, reinforcement of the reading of uninterrupted sentences, development of a serial algorithm (set of rules) by which reading instruction was conducted by E-O and Davey's mother, instruction in finding smaller words in larger words, instruction in breaking words into syllables, sounding out the syllables and blending them into words, construction of flashcards to aid in learning of unknown words, and instruction in differentiating right from left in order to eliminate reversals and improve a left to right reading pattern.

#### Arithmetical and Money Concepts Intervention

A second intervention attempted to teach Davey elementary arithmetical concepts and procedures, to recognize all of the coins in U.S. currency, to know their value, to combine them, and to count by coin values, i.e., 5's, 10's, etc. At the outset of this intervention Davey did not recognize or know the value of any coin, nor was he able to understand such simple addition concepts as  $1+1=2$ ,  $5+1=6$ , etc.

As part of the arithmetic intervention Davey was tested in spatial and temporal concepts necessary for conceptually

understanding simple addition and subtraction. These are measured by the Kraner Preschool Math Inventory (Kraner, 1976). This diagnostic test showed that Davey did not understand some of the spatial concepts necessary for an understanding of simple addition. This information led to another cognitive intervention, the attempt to teach Davey concepts of quantity, sequence, position, and direction. (A by-product of the administration of the Kraner was that it revealed Davey's ability to verbally identify spatial and temporal concepts which were at the six to seven year old levels. This provided additional evidence that Davey should be able to profit from reading instruction.)

#### Reducing Maladaptive Social Behaviors Intervention

Data collected in Stage I showed that Davey had serious problems in establishing personal relationships and that this appeared to be related to strong fear and anxiety responses toward strangers resulting in hostile, aggressive behavior. Observations showed that he had serious difficulty in understanding or controlling his own emotional reactions, or understanding those of others. Interview data established that Davey had had extremely limited experiences in personal interactions with either peers or adults in his 17 years of life. Until age 12, Davey had lived with his family on an isolated farm where afterschool playmates were unavailable. His family had also provided him with his own TV for use in his own room. He spent (and still does) hours every day



watching TV secluded in his room, drastically reducing personal contact with other humans, including his mother and father. In addition, Davey was deprived of the experience of being among and interacting with other people in the community because his mother refused to be seen with him in community settings due to his maladaptive social behaviors, and because his father's work schedule precluded such opportunities.

E-O hypothesized that normal exposure to such community settings as grocery supermarkets, department stores, eating places, etc., would help overcome his fear of proximity to people and provide practical opportunities to employ skills learned in the reading and math interventions.

It was clear to E-O that public masturbation (though partially covert) and hostile verbal behavior were non-adaptive for either academic or socially adaptive growth. It appeared that Davey's verbal system was sufficiently developed cognitively to make it possible for Davey to control these behaviors by verbal self-commands. Instruction on this was coupled with E-O's verbal explanations which showed Davey how these behaviors would affect peoples' reactions to him. This became another intervention and it easily integrated with and complemented the other interventions decided on.

### Learning Physical Skills Intervention

The intervention on learning physical skills resulted from observations in Stage I that Davey's difficulties with motor coordination were not the sole cause of his inability to perform simple self-help skills, as was assumed by his parents and teachers. The motor problems appeared to be partially due to an inability to remember the sequence of steps required to perform motor acts such as tying shoe laces. Utilizing Davey's limited capacity for reading, E-O developed an approach to learning the steps necessary to perform a given physical skill by helping him to overcome the memory problem. E-O hypothesized that working out a written algorithm for a sequential task would provide a guide for Davey to use to learn the task; and then with practice, the skill would become automatized.

In all the interventions which E-O contemplated, in addition to their significance for Davey's cognitive growth, their successful learning, E-O hypothesized, would strengthen Davey's confidence and feelings of satisfaction with himself, and thus his motivation for further learning in both academic and social areas.

E-O decided that, in order to successfully carry through the interventions, it would be necessary to establish a different type of relationship with Davey than the one which existed between him and his parents and teacher, which was completely permissive. E-O adopted the role of the "author-

itative parent" (as contrasted to the 'permissive' or 'authoritarian' parent), as described by Baumrind (1965). In this relationship it would be difficult for Davey to manipulate the situation to escape demands placed upon him. This meant the establishment of Davey's responsibility for the effects of his own behavior within the confines of the relationship with E-O. E-O repeatedly explained the anti-social nature of Davey's verbal hostility, and displayed appropriate reactions to verbal hostility toward E-O, accompanied by explanations of E-O's behavior. E-O also warmly praised him for accomplishments and efforts to behave adaptively. This pattern of personal relationship was carried through all of the interventions and resulted in the development of a close friendship between Davey and E-O.

### STAGE II RESULTS

The results of Stage II are reported in the following pages in an order which follows the taxonomy of Davey's behavior (Appendix A). The data from which the results are summarized was produced by the interventions described above, from mini-experiments conducted during the interventions, from tests administered during the interventions, and from naturalistic observation of all behavior occurring during the interventions. Results from the major intervention of teaching Davey to read consecutive text are reported under the appropriate sections of the taxonomy.



Cognitive Processes

Perception. Perceptual processes were assessed at the level of sensory analysis, of holistic recognition of complex stimuli, and of inter-sensory coordination. The interpretations are made on the basis of an analysis of everyday behavior: at home, in the community, and in school. The determinations are gross determinations, i.e., they do not rule out the possible presence of subtle perceptual deficits.

Davey's visual perception adequacy is shown clearly in his ability to recognize the letters of the alphabet and to distinguish one from another without confusion. The same ability exists at the whole word level where Davey showed that he could accurately match-to-sample a stimulus word from a group of four different words. The same visual perceptual ability is shown in his recognition and proper use of all the common objects in his environment, his ability to tell time, his ability (after the intervention) to distinguish the different coins in the U.S. money system, etc.

His visual acuity is adequate. An examination by an opthamologist, conducted at the suggestion of E-O, resulted in the discovery of a slight myopia which the specialist felt was not great enough to need correction. He appears to have difficulty in focusing on fine print and this has not been professionally evaluated.

The data shows that Davey perceives various non-verbal auditory stimuli in his environment accurately, shown by

his reactions to whistles, car honks, motor sounds of larger vehicles, voices of children on the playground while Davey is in the classroom, etc. His reading instruction shows that he can accurately discriminate between the sounds of different and similar sounding words, that he can imitate sounds produced by E-O, and that he articulates adequately in his use of spoken language. There also are no indications of auditory acuity problems.

The perceptual aspect of the motor system consists in the brain's ability to receive and interpret accurately feedback from muscles, joints, tendons, and skin. When the feedback is discrepant from the intended motor movement, the brain produces correction to conform to the intended movement.

There is obvious gross motor movement impairment, shown by Davey's clumsy, flat-footed, and irregular gait. His posture has an uppertorso forward angle of approximately 20-25 degrees, rounded shoulders with the right shoulder held above the left, and other deviations from normal posture. The problem here appears to be in the efferent part of the motor system, i.e., the ability of motor cortex to coordinate the musculature and other components of posture into a normal pattern.

The reason that E-O believes that the feedback component of the motor system is functioning properly is that Davey rides a 3-speed bike with ease, despite his difficul-

ties with motor pattern coordination. This skill involves a well-functioning feedback system which automatically compensates for all of the irregularities of terrain, wind resistance, etc., which the bicycle rider encounters. An analysis of Davey's difficulties in lacing shoes, tying shoe laces, etc., showed that at least part of the problem was caused by the same motor pattern coordination difficulties discussed before, plus a short-term memory problem of remembering the sequence of steps necessary to tie the laces. When the memory problem was alleviated by construction of a written algorithm, hitherto "impossible" motor tasks were learned, e.g., shoelacing, shoetying, calculator operation. The difficulty in motor pattern coordination does not appear to be as severe for fine motor movements as for gross motor movements. Davey is able to print both capital and small letters when copying written material or producing his own. He is able to operate a small hand held calculator which involves a number of coordinated fine motor movements. He is also able to use a screwdriver, screws, and nuts and bolts successfully.

Efforts by E-O to improve Davey's posture and gait were unsuccessful. Methods used were the following: putting him in front of a full-length mirror, physically modeling correct foot positions, forced correction of foot position, etc., by E-O. In all of these procedures Davey complained of pain and fear saying that he would fall and



"dent the floor." E-O hypothesizes that Davey's sense of balance is impaired, which may involve damage in the cerebellum or vestibular areas of the brain, and that his present posture is compensatory for disequilibrium and is necessary for maintaining his balance when he is moving or standing.

Davey's holistic visual processing, i.e., remembering faces, letters of the alphabet, words as holistic stimuli, etc., appears to be normal. This is further confirmed by the following behaviors: Davey is able to accurately direct E-O to various stores in the community and from these stores back to his home. He is able to describe the correct spatial location of the rooms in his school. He drew a map of the room locations in his friend's new house. All of these abilities show that he has been able to build up mental images in his brain of spatial layouts from exposure to the corresponding stimuli in his environment. These layouts contain the proper spatial relationships of objects.

The foregoing data from this study directly contradict the diagnosis of two of the professionals and/or agencies which evaluated Davey. The mental health center psychologist who examined Davey at age 11 years, 9 months, said that his "most severe deficit was in the perceptual-motor areas." The school psychometrist who examined Davey at 14 years, 1 month, listed visual discrimination as one of his weaknesses. This study found no serious problems of perceptual-motor coordination or visual discrimination.

"Coordination" was also listed as a weakness by the school psychometrist. There was no explanation of what "coordination" referred to. If the reference was to gross muscle coordination and to fine muscle coordination to a lesser extent, that of course is obvious.

Memory. Memory can be dichotomized into short-term or working memory and long-term memory. It can also be dichotomized into visual or visuo-spatial memory and verbal memory. One can therefore talk about short-term and long-term visual memory and short- and long-term verbal memory. Each of these four types of memory is regarded by neuropsychologists as having different brain substrates, and impairment of any one can exist independently of the others.

E-O's observations showed numerous examples that both types of long-term memory (visual and verbal) function normally for Davey. He remembers and describes incidents which took place months and years back. These recollections contain both verbal and spatial components. There are also numerous observations that verbal material learned in the earlier part of this study is retained to the present time, indicating the normal functioning of long-term memory. Inasmuch as any material in either type of long-term memory had originally to be present in short-term memory, shows that material from short-term memory does routinely become transferred into long-term storage.

There is evidence, however, that the quantity of information which can be held in short-term memory at any given moment is severely limited. This is unquestionable when that material is verbal in nature. It is not certain as yet whether this is also true of visuo-spatial material.

The severe constraints on Davey's short-term memory span (the amount of information which it can hold and perform cognitive operations on in a time period of seconds) is shown by the following data: Davey cannot repeat more than a two-digit number forward; he is unable to reproduce a succession of more than two taps, or to reproduce a pattern of the taps; he is unable to memorize his telephone number (7 digits). The deficits relative to numbers are examples of verbal memory because numbers when presented aurally constitute words. Rhythmic patterns of taps are non-verbal but serial rather than holistic stimulus patterns. Thus, serial stimuli, both verbal and non-verbal, seem to be equally affected. If Davey is presented with sentences, the words of which have been overlearned, and which include not more than one semantic element (a single predication), Davey can remember as many as seven words. In novel sentences, where the words are relatively newly learned, his performance is fewer words. This indicates that his working memory capacity is increased somewhat when the material to be remembered is meaningful, i.e., consists of familiar and overlearned words.



Another aspect of Davey's working verbal memory is the constant intrusion of irrelevant associations when he attempts to read a sentence from beginning to end. When he reads a sentence which presents him with several unknown words, and he is helped with each word as he reads the sentence, he often interrupts the instruction by verbally blurting out completely irrelevant words, sentences, or phrases, most of which are descriptive of images from recent TV viewing. When he reaches the end of such a sentence, he can neither repeat it, or explain what it means. The irrelevant association apparently exercises a retroactive inhibitory effect (Luria, 1973) on the previous words read, making it impossible for the succession of words constituting the sentence to be retained in short-term memory. The whole sentence must be processed as a unit in order for an analysis of the syntactic relationships between the different words to be made. This processing is necessary for the brain to decode the meaning of a sentence. E-O noted however that when sentences containing well learned words are read, irrelevant collateral associations are reduced and Davey can repeat and explain the sentence.

Davey's inability to perform sequential motor tasks, E-O hypothesized, was possibly due more to impaired short-term memory than to impaired perceptual-motor coordination. When E-O provided a verbal algorithm, Davey was able to use this as a memory aid and learned to perform the purely

non-verbal sequential motor task. In testing Davey on spatial concepts, when he was unable to perform, the reason seemed to be more a question of an inability to remember the instructions for the task than a lack of understanding of the task per se. When E-O reformulated and simplified the instructions and gave examples, some concepts which had not been discriminated under standard testing conditions were correctly indicated.

All of the foregoing are examples of the effects of Davey's working memory defect on a variety of behaviors. It is not clear whether sequential visual stimuli present the same problems for working memory as sequential audioverbal stimuli.

It should be pointed out that none of the psychological evaluations of Davey mentioned memory at all, despite the fact that most IQ tests contain some items which test short-term memory span by presenting a digit repetition test, and sometimes a test requiring reproduction of a rhythmic tapping pattern.

Davey's short working memory span is probably his most severe cognitive deficit of all the elementary neuropsychological processes. This particular defect in turn limits his capacity to acquire many more complex cognitive skills which require the more extended working memory span. E-O's experiences with Davey, however, also show that various strategies can be used to partially compensate or circum-

vent this deficit. This question will be discussed more fully in the final section of this thesis.

Attentional Mechanisms. Attention in this study is conceptualized in terms of alertness and orientation to the environment; "captured" or "involuntary" attention; the ability to be aware of and to relate different aspects of a visual or auditory task to each other in a short time span; and the ability to voluntarily direct one's own attentional processes, "voluntary" attention. From a neuropsychological viewpoint (Luria, 1973), the above listed attentional processes are qualitatively different, and involve different neural substrates. Each first appears at different times in the child's ontogenetic development.

Davey is very alert to his environment, often displays curiosity and investigative behavior prompted by internal (covert) verbal processes (voluntary attention), pays attention to details of situations that capture his interest, and notices the new and novel when it is present.

He also displays "involuntary" or "caught" attention when a stimulus in the school room or from the outside captures his attention away from the task at hand. He has shown the capacity for sustained attention for two or more hours at academic learning tasks when the tasks are varied and the appropriate motivational set exists. These observations thus show a considerable capacity for voluntary attention, an ability which is first found in most children



between 6 and 7 years of age when favorable conditions exist.

Davey shows himself to be distractable and unable to concentrate on academic tasks in the presence of the normal noisiness of his classroom and distracting stimuli from outside the classroom, i.e., in conditions which are not optimal. He thus learns best in a one-to-one situation, isolated from the distractions of the ordinary classroom. These conditions have never existed as the milieu in which Davey's academic learning takes place, until this study was undertaken.

E-O has also observed that Davey's attention to instruction is also affected by situational factors. For example, if Davey has been upset previous to instruction by some occurrence in the classroom (a child being reprimanded, a child becoming ill or having a seizure, a trip to a novel environment, the visit of a stranger), his concentration on instruction is far less. His motivation to attend the tasks set by E-O in instruction is also affected by his desire to please her at a given time. E-O has also observed that Davey's ability to attend to instruction has improved markedly throughout the course of the study. He has become accustomed to the demands of the E-O and when he realizes that non-attentiveness will result in E-O stopping instruction, thus forcing him to return to the classroom, he cooperates.

Summarizing the results of observations on Davey's attention capacities, Davey shows an attention span of considerable length for academic learning, and his motivation to attend can be optimized by properly understanding situational factors which affect his attention, and by properly structuring the learning situation.

Conceptual Level and Processes. Concepts are based on groupings of objects, persons, or relationships present in the environment which possess some type of similarity. Concepts are also referred to as classes of things or categories. Concepts exist in pragmatic, de facto form, and also at the verbal level, i.e., the child is able to recognize examples of the class when provided with the verbal label for the class, or, when confronted with an example of the class, can assign it to a verbal category. Concepts themselves have been categorized in different ways by different psychologists.

Two types of concepts which have been named by many workers in the field are concepts which are constituted by groupings of physical objects. The similarity of members of the class may be in physical attributes, discernable to the senses, or in "hidden" characteristics, not immediately accessible to visual or other sensory analysis and synthesis. "Dog" would be a concept with immediately discernable physical criteria for the formation of the class. Hardness, as a characteristic of various categories of rocks and

minerals, is not immediately accessible to sight, taste, smell, hearing or feeling. Classification of objects (rocks) into hardness categories requires a mediated behavior (scratching) and each category is relative to the other, i.e., a rock at 7 on the hardness scale is able to scratch a rock categorized as 6 on the hardness scale, etc.

Conceptual groupings of objects are also formed on the basis of an intangible abstraction called "function." Thus, many disparate looking objects may be grouped together because they all perform the same function. Another type of concept is constituted on the basis of a given type of relationship. Kin relationships, "father," "brother," etc., are examples. Spatial and temporal concepts, such as "before," "after," "first," "middle," "last," "beginning," "end," "right," and "left," are also examples of relational concepts. The foregoing relational concepts have physical referents, but these may be of the most diverse kind. For example, first may refer to a line of people, a line of cars, or other objects. The concept itself, however, is the type of relationship involved regardless of which physical objects are involved.

There are no adequate tests of the various types of concepts possessed by the average child at a given age or stage of development, despite much research on concept attainment and concept learning in the psychological literature. For this study, the Kraner Preschool Math Inventory



(Kraner, 1976) doubled both as a diagnostic test of Davey's readiness for learning arithmetic and as a concept level test.

The Kraner provides both criterion referenced diagnostic information and normative information (Kraner test results are shown in Appendix D, Table 1). This test showed Davey to be at the 5 year level for all spatial concepts that 80% of all five-year-olds have, and to have some of the concepts possessed by children of six and seven years of age. Overall it showed a conceptual level possessed by the average 6 to 7 year old child.

The Kraner tests the child's conceptual repertoire by having the child visually identify layouts which correspond to a verbal label provided by the examiner. It does not distinguish between the pragmatic everyday use of a concept and the child's ability to verbally label that concept, the latter being more difficult than the former. A case in point is the concept "left" and "right." At the outset of the study, Davey could not respond to directions using the words left and right. He did, however, distinguish between left and right in everyday life. E-O discovered that his initial reading behavior fluctuated in various ways: reversing words, sometimes reading the letters from right to left, confusing letters whose only difference was a left-right distinction (b's and d's), etc. The reason Davey made these mistakes was found not to be perceptual, but to be the lack of a verbal concept of left and right

and the lack of understanding of the purely conventional left-right reading rule for written English.

Observations show that Davey understands the common kin concepts, "uncle," "brother" etc., although it is not clear whether he merely knows which relatives are "uncle," father's "brother," etc., or whether he could correctly apply these verbal labels when given adequate information in a novel situation.

E-O also observed that Davey was not able to pass some of the more advanced concepts of the Doren Diagnostic Reading Test (Doren, 1973) because he did not understand the concepts used in the instructions. This was also the case in his inability to correctly answer any of the concepts tested on the "Similarities" sub-test of the Wechsler Intelligence Scale for Children (Wechsler, 1974). In both cases, a major difficulty was posed by instructions which used the concepts "same," and/or "similar." A number of things which are the "same" or "similar" appear to be simple and obvious, but of course it depends on the criteria used which determines "sameness" or "similarity." What is obviously "similar" to the test constructor or test giver may not be so to a child, and what is the same to some children, depending on their having certain types of experiences, may not be obviously the "same" to other children. It is clear from E-O's observations that one of the impediments to Davey's learning concepts is his difficulty in understanding the breadth and

variability of the concepts "same" and "different."

E-O found that it was not difficult to teach Davey the verbal concepts "right" and "left." Other concepts that have been taught include: "more," "less," "middle," "first," "last," "farthest," and "nearest," all concepts with which Davey had difficulty when given the Kraner Preschool Math Inventory (Kraner, 1976).

As part of Davey's reading instruction, E-O frequently stopped and discussed with Davey the meaning of what he was reading from a conceptual point of view. Davey has proved himself capable of learning new concepts when taught them, but does not readily form them himself by a process of noting similarities among things in his experience and grouping them into conceptual classes.

Another impediment for Davey in learning concepts is his limited short-term memory span. Learning concepts from verbal instruction requires the ability to retain several ideas in working memory at the same time, in order to ascertain their similarities which is the basis for assigning them to the same class.

Data from this study shows that a key area of weakness in Davey's cognitive skills is the ability to learn and use concepts. Yet the school psychometrist, who examined him at 14 years of age, evaluated "concept formation" as one of Davey's strengths.



Davey is capable of much greater attainments in the area of concept learning if the actual difficulties which he confronts are understood and taken into consideration in the academic learning situation. There is no evidence of any attempts by parents or teachers to increase Davey's conceptual abilities.

Ability to Learn and Use Rules and Algorithms. A rule is a verbal statement that directs the performance of a certain behavior. If one knows the rule, under normal conditions, one can perform the behavior. An algorithm is a sequential list of rules needed to perform a behavior. The behavior that requires an algorithm is obviously a more complex behavior than one requiring only a rule. For many behaviors children devise their own rules and/or algorithms on the basis of their trial-and-error experience. Other rules are learned by observational learning, particularly starting around age 4. The learning of math, reading, science, and other academic subjects requires the learning of many verbal rules and algorithms.

Davey has shown himself capable of learning and using algorithms. He learned to lace his shoes and tie the laces by reference to written algorithms. He also learned the sequence of operations necessary to add and subtract with a hand calculator by use of an algorithm.

Linguistic Level and Verbal System Abilities. In ontogenetic development, children learn the basic syntax

of their native language between the ages of 1 year and 4 to 5 years (Hall & Ramig, 1978). Psycholinguistic research shows that by the fifth year, children have learned the basic grammatical structure of their native language in much of its complexity. This enables a child to form an almost infinite number of grammatical sentences, and to be able to decode sentences using most of the syntactic structures of the language. There is much experimental research on the progression of this learning. No test in the psychometric arsenal, including the Illinois Test of Psycholinguistic Abilities - Revised Edition (Kirk, et. al., 1968), taps these abilities and accomplishments.

The assessment of Davey's linguistic level must therefore, at this time, be qualitative. E-O's observations show the following: Davey verbalizes a lot with others in his environment which caused professionals, parents, and teachers, and others to characterize him as having "superior" verbal abilities. The quantity of Davey's verbal behavior is greater than most of his classmates. There are, however, indications that the developmental psycholinguistic level may not be very high.

Listening to tapes of reading lessons reveals that much of Davey's verbalizations in this situation are irrelevant to the task at hand, and consist of stereotyped expressions (e.g. "C'mon, baby," "I'm disgusted," "Hold it, baby," "You

little vampire," etc.). Many of these stereotyped expressions come from TV shows that Davey regularly watches. Davey also frequently uses them in inappropriate contexts, resulting in their being offensive to the person who is addressed. In many cases Davey is not aware of this. The syntax of most of Davey's language is very simple, and does not express causal and conceptual relations which many children of 6-7 years are using in their language. For children (and people in general) receptive language is usually at a higher level than expressive language, i.e., one can understand more than one is capable of expressing, from the point of view of linguistic complexity as well as vocabulary. For Davey it appears that this discrepancy is greater than usual, i.e., his receptive linguistic abilities are much greater than his expressive ones.

An important event which occurs in the child's linguistic development is the time when speech is internalized and becomes capable of being used for verbal thinking and verbal direction or control of behavior. No experiments were done in this study to determine whether or not language is used as an internal mental operation for thinking. There is evidence that Davey can use his verbal system to control some of his socially maladaptive behaviors and his emotional reactions to stimulus objects in his environment which he considers threatening. E-O taught Davey to give himself commands to inhibit certain socially undesirable behaviors.



These are discussed in the section of the taxonomy on emotional structures. This ability is one of the prerequisites for performing socially adaptive behaviors which involve prohibitions and stereotypic expectations.

Results of the Reading Intervention, Diagnostic and Normative

Initial testing utilizing the Wide Range Achievement Test (Jastak, et. al., 1976) resulted in the following grade level scores: Spelling, 1.9; Arithmetic, kg. 6; and Reading, 2.6 (Appendix D, Table 2). Initial efforts to use material graded at the 2.6 level during reading instruction completely failed. The inflated reading grade level of 2.6 obtained by Davey on the Wide Range Achievement Test is believed to be at least partially due to the "single" word method of testing employed by this test which did not assess the ability of Davey to read and comprehend actual reading passages.

In an attempt to find a more valid measure of Davey's reading ability when reading whole sentences and paragraphs, the Durrell Analysis of Reading Difficulty (Durrell, 1955) was administered in the fourth month of the study. Testing revealed an oral reading level of 1.0 to 1.5. Comprehension of the material read was poor in that Davey was unable to report what he had read without direct leading questions. Instruction was initiated at this time with reading material graded at the 1.0 to 1.5 level.

By the eight month of the study, Davey was beginning to sound out some of the words on flashcards which he had missed in previous reading sessions. Examples: supposed, braver, hearing, bright. By the twelfth month of the study, he was reading sentences in units. Some of these sentences he could repeat after having read them, and/or explain their meaning. He followed the left-to-right reading rule consistently, did not read words backwards, and only occasionally confused letters that differed in a left-right characteristic.

In the tenth month of the study, E-O began giving Davey the Doren Diagnostic Reading Test (Doren, 1973), a criterion related test, which purports to measure twelve basic components of the reading process. The test is geared to children who are at the end of the second or beginning of the third year of reading instruction in elementary school. It is postulated that once a child has mastered the twelve basic elements covered by the test, that child is ready for "independent" reading, and with practice can increase his/her rate of reading and comprehension.

The Doren test results show that of the twelve basic elements, Davey has a fairly adequate understanding of six (average of 83.3% correct responses). He has a partial understanding of three more sections (average of 56.9% correct answers) and little or no understanding of three sections of the test. The principles he understands are: letter recognition, beginning sounds, whole word recognition, words

within words, speech consonants, and ending sounds. The principles partially understood are: rhyming, discriminate guessing, and spelling. Principles not understood are: blending, vowels, and sight words (pronouncing a new word from a phonetic analysis of its spelling). Doren test results are given in Appendix D, Table 3.

Davey's reading vocabulary grew rapidly in the seven months of intermittent reading instruction. He had learned 188 new words by the end of the twelfth month of the study. This figure was arrived at by compiling the words from (1) various reading session flashcards made by E-O and (2) Milton-Bradley ABC Flashcards (Milton Bradley, 1963), for grades kg-2 which were used in instruction. These figures are not an adequate estimate of the increase in Davey's reading vocabulary, because new words learned in nightly reading lessons with his parents over the last three months of the study are not included. He was also reading "on his own," and the words learned in this context also are not reflected in the above figures. (Reading instruction is being continued by an undergraduate student doing an independent study, and this will include testing Davey on a standard "reading vocabulary" mastered by children in their first four years of reading. This instruction will also concentrate on attempting to teach Davey the remaining conceptual skills, not yet mastered, which are required for becoming an "independent" reader.)



## Motivational Factors

These factors have been touched on from time to time in discussing the results of Stage II in the previous section on cognitive factors. They also form an inevitable part of the subsequent discussion of emotional and interpersonal behaviors. Results reported under the present heading will be brief.

Carrying through the various interventions of this study would have been very difficult or impossible if Davey did not have four crucial motivators present: (1) the desire for praise and approval; (2) a close personal affectional relationship with E-O; (3) strong curiosity and investigative motivation; and (4) a strong desire for mastery of the environment and for achievement.

The first two motivations are particularly susceptible to external types of reinforcement. The latter two, often called intrinsic motivators, result from feelings of mastery and satisfaction resulting from varied encounters with the environment which are successful.

It is often said that retarded children are very low in motivation. The current fad is to stress extrinsic motivation, using the child's desire for praise and approval as the principle reinforcer to change the child's behavior. E-O's approach was to put primary emphasis on stimulating curiosity and investigation and the desire for mastery and achievement. External reinforcers were used toward this

end. Despite the many negative experiences in Davey's life, his potential for intrinsic motivation was very high.

E-O successfully stimulated intrinsic motivational factors by structuring her various encounters with Davey in a way to achieve "success" experiences. This required posing tasks for Davey that were challenging and capable of achievement, but required maximum effort. This, in turn, required a precise knowledge of Davey's strengths and weaknesses. On many occasions, E-O was not able to accomplish her objective, but in general, achievements have predominated. Davey is both aware and proud of his achievements, and parents and teachers agree that he is more cooperative and easier to live with -- in addition to having increased abilities in various cognitive areas.

### Emotional Structures and Interpersonal Interactions

Emotions expressed. Davey shows the range of emotions found in a normal child, and they are usually expressed in an appropriate context. Examples from observations: joy, satisfaction, elation, boredom, fear, anxiety, hostility, anger, and aggression.

In E-O's interviews with parents, friends of the family, and teachers at the outset of the study, Davey was described as generally alert, happy, and likeable. E-O's record of observations, however, shows many occasions where anxiety, fear, hostility, and aggressiveness predominate.

At the outset of the study, E-O witnessed a number of situations at school or in the community where Davey exhibited excessive verbal abuse and hostility toward his mother, other children, and particularly strangers.

The situations that produced nonadaptive anger and hostility were:

1. New and novel demands or expectations.
2. Encounters with or close proximity to strangers.
3. Frustration, primarily induced by inability to behave in expected ways.
4. Unexpected changes in familiar routines.
5. Anxiety about events over which Davey realized he has no control, such as: fears about what might happen to his parents or teacher; fears about his own safety.
6. Situations in which Davey could not have his own way (spoiled child behavior).
7. Situations which engendered ambivalent emotional behavior reactions in Davey.

At times the expressed hostility and verbal aggression flares up quickly and subsides equally as fast. At other times fear or anxiety sets a negative mood for hours or an entire day.

Teachers, parents, and others have told E-O that there has been a marked lessening of hostile behavior on Davey's part. E-O also finds him more cooperative and less likely to be hostile or aggressive. In the latter case, it may be possible to attribute Davey's lessened hostile behavior



toward E-O as primarily resulting from the forming of a relationship which has become important to Davey, and this undoubtedly is a factor. On the other hand, E-O makes harder demands on Davey than anyone else in his environment. Many of these are difficult for him to fulfill. E-O continues to make these demands, yet the amount of hostility has lessened.

The most important criterion of change in Davey's aggressive behavior undoubtedly are the perceptions of others in Davey's complete egosystem. Surprise and favorable comments on Davey's better control of his emotions and his cooperative attitude came from a substitute teacher who had not seen him for over half a year; from the school psychometrist who found him much more cooperative in the testing situation than he had been three years earlier; from his present teacher; from aunts and uncles and grandparents, and from his own parents. All of these reactions, which have occurred independently of each other, and many of them from persons who knew nothing of the year long study with Davey, document a change in Davey's interpersonal interactions.

In the early part of the study E-O saw very little communication taking place between Davey and his mother. E-O never saw any display of physical affection between mother and son, and encountered a number of instances where Davey publicly directed a barrage of hostile verbal abuse toward his mother. In the last few months of the study,

E-O saw no instances of hostile behavior by Davey toward his mother. She also saw Davey and his parents working together nightly on his "reading lessons," whereas, at the outset of the study Davey spent most of his time after school secluded in his room watching TV. There is still much TV watching, but there also is a joint family activity, which includes Davey, taking place.

Early in the study, E-O also initiated the idea of having Davey wash his own hair, something Davey's mother had always done for him. He has done this chore weekly for three-quarters of a year without complaint. Prior to the study, and throughout the study, Davey has been responsible for taking the garbage out to the curb weekly and collecting the newspaper daily. He also has been shopping a number of times with E-O "for his mother" and takes his responsibility very seriously. He has asked that he be allowed to do other chores, such as cleaning up the garage. He has expressed verbally his pride in helping his mother. His mother, other than in the reading situation, has not responded to this eagerness to help, and even continues to cater to dependency behaviors in ways which are not justified by Davey's willingness to show more initiative and independence.

Davey's increased ability to control his own emotions has also been reported by his teachers, parents, and E-O. His teacher reports fewer and shorter episodes of crying, negativism, and uncooperativeness. His parents both report fewer "bad" days and a general decrease in emotional out-

bursts. (In the three months following the close of E-O's research, Davey's ability to control his emotions apparently continued to increase. His parents report no episodes of verbal aggression, crying, or negativism taking place in the home for a period of two months following the end of the study.)

Increased control of emotional outbursts has been accompanied by a decrease in covert public masturbation. An indication of the effectiveness of training in verbal control of behavior is seen in Davey's frequent statements made to himself, such as, "stop that" or "that is wrong," with the initiation of anti-social behaviors followed by the halting of such behavior.

Moral feelings as motivators. E-O has done no programmed intervention in the area of Davey's moral development. Observations show instances where Davey expressed the wish to please his mother. Using Lawrence Kohlberg's (CRM, 1975) scheme to explain the progress of moral development in children, this would put Davey in Kohlberg's third stage of moral development which revolves around doing what is right in order to please others--parents, peers, teacher, etc.



## CHAPTER IV

### DISCUSSION

In the results section of this study, the facts relating to the psychometric assessment and the facts derived from this longitudinal study are presented. In this section, the resultant strategies derived from both types of assessment for Davey's education are compared and evaluated. There is also an assessment of the role played by the specific circumstances of Davey's upbringing in the etiology of the behavior pattern he exhibited at the inception of this study. Finally, there is a brief indication of the implications of this study for the assessment of mentally retarded children.

The following differences in educational and home treatment of Davey stand out when a comparison is made between the treatments which resulted from psychometric assessment as compared with treatments which resulted from an ecological assessment:

(1) The wide variability in the psychometric assessments raises the question of the reliability of these procedures. There is nothing to indicate that the personnel involved in psychometric assessment did anything but follow standard procedures as they are prescribed for testing and interpretation of test results.

(2) Each assessment, between 4 years of age and 17

years showed a deterioration in "intelligence." Is this actually what happened, or is the decline an artifact of the testing instruments used? It appears to be an artifact of psychometric procedures.

Two factors are involved in the periodic testing of children after placement in a mentally retarded classroom setting. First, credit for items passed on IQ tests are based on the average child's ability to answer the item the way the tester requires. It is well known that the mental development of mentally retarded children is much slower than that of normal children. Thus, while the mentally retarded child's intelligence is growing, it is far outpaced in rate of growth by that of the normal child. Thus, the older the retarded child gets, the more "intelligence" he loses relative to the norm.

Second, items on intelligence tests are based on academic skills which average children attain at each chronological age. The retarded child, placed in a classroom where many of these skills are not taught, because it is presumed that the retarded child is incapable of learning them, never has had the opportunity to learn the skills the IQ test measures. Once a child is diagnosed as retarded, the possibility of further intellectual growth is often restricted or eliminated by his/her subsequent educational treatment.

(3) Naturalistic observations showed that many of

Davey's negative social behaviors, as well as his restlessness, inattentiveness, etc., were in part caused by his treatment as the stereotypic retarded child by teachers and parents, a view imposed by the psychometric supposition of a limited "amount" of intelligence. This view biased the perceptions of all of those in Davey's different ecological settings and produced the well known self-fulfilling prophecy. Davey, when first observed at the beginning of the study, was frequently "bored to tears" in the dull, repetitive, monotonous classroom atmosphere and had become a serious behavior problem. His dramatic turnaround, both in academic progress and social behavior, based on the interventions derived from an ecological view of intelligence, illustrates the inaccurate and defeatist nature of conclusions reached by psychometric procedures.

The interventions which were decided upon by E-O were based on a realistic assessment of Davey's strengths and weaknesses, derived from naturalistic observation data and from criterion-related diagnostic tests. The interventions were designed to determine Davey's actual potential for progress, and as they were carried through, they became the vehicle which further promoted his progress. All of the interventions involved teaching Davey academic and social behaviors which parents and teachers had considered impossible for him.

Davey's progress in reading, a complex cognitive skill,



has been dramatic. His reading skills now appear to be at the level which makes the pleasure of reading its own reinforcement. His further progress toward becoming an independent reader requires increasing his conceptual knowledge. This can be done partly within the reading activity itself by discussing with him the meaning of what he has read. He needs to become more proficient in what are called "word attack" skills. These skills will bring to his aid his large receptive and expressive speech vocabulary. Specific suggestions designed to promote Davey's individual adaptive potential are presented in Appendix E.

The interventions on the whole have been dramatically successful according to the testimony of Davey's teacher, parents, and others in the community. The intervention which attempted to teach Davey elementary arithmetical concepts was the only major intervention on which Davey showed no progress. This may be because the mental processes involved are the most difficult for Davey. No task analysis or sustained attack on this problem was carried through in this study. It may be that this type of learning will be impossible for Davey. It will not, however, be possible to reach this conclusion until a more careful and sustained plan of attack in this area is made.

The data produced by Stage II of the study demonstrated in real life situations the specific cognitive skills which Davey possessed and those he lacked. As the result section indicates, in most instances these findings were at variance

with the psychometrist's interpretation of the Stanford-Binet results. The validity of the ecological approach was demonstrated by the types of learning which Davey showed himself capable of during the interventions, particularly his progress in reading competency. This correspondence between diagnosis and real life behavior is what is meant by an ecologically valid concept of intelligence.

Many researchers in the area of mental retardation have stressed that ultimately the IQ test fails as a diagnostic instrument because it provides no data on which a viable educational plan can be constructed for the child diagnosed. Psychologists committed to the use of IQ tests answer this criticism by saying that much can be learned about the child's potential by observing him/her in the testing situation. This proposal suggests that the subjective judgments of the tester about the child's test behavior be made part of the diagnostic process. This suggestion would appear to be irreconcilable with the aim of the IQ test itself, to produce an objective measure of the child's intelligence. Another suggestion for use with the Stanford-Binet is Sattler's (1974) classification of the areas of intelligence tested in the Stanford-Binet, called the "Binetgram." This procedure was used by the psychometrician who tested Davey. The suggestions made for Davey's educational program based on the use of this procedure were either inaccurate or vacuous.

The decisions to make learning to read the principal intervention and to use Davey's verbal system as a means of controlling maladaptive social behaviors were partly suggested by noting the similarity of Davey's retardation with the type of mental retardation described by A.R. Luria (1963) as "excitable oligophrenia."

"Excitable oligophrenics are frequently excited, uninhibited, and susceptible to distraction. They react impulsively to everything going on around them. The behavior of each child is highly dependent upon the circumstances in which he finds himself. In quiet circumstances with individual tasks, they are more organized, but with changes in the situation, they easily become excited. They have a low work capacity and an insufficiency of goal-directed activity. They, however, understand speech addressed to them and build phrases properly. They are able to discriminate similar sounding phonemes. They utter a series of collateral associations when examining a thematic picture, and these incidental associations lead them away from the task. The characteristic feature of this group of oligophrenics is the ease with which they slide away from the tasks given into a series of collateral associations. Particularly great difficulties appear during the instruction of these children in arithmetic. They may master the technique of reading, although comprehension presents difficulties. Physical complaints of head pains, nausea, vomiting, vertigo, and psychosensory disturbances may be symptomatic." (Luria, 1963)

Part of the success of the interventions used in this study was due to certain techniques, some suggested by Luria, and others developed by E-O. Among these were the



following:

(1) Instruction was limited to tasks that were believed to be just within Davey's capabilities. This minimized frustration, negativism, and loss of emotional control. Much of the instruction with Davey included activities in which E-O and Davey participated simultaneously. Davey was not pressured to complete a task on his own unless it was believed to be within his capabilities. This markedly reduced collateral associations and focused his attention on the activity in process. Despite its demonstrated success, this approach is not followed by his teacher in the school classroom.

(2) The instructional plans devised required Davey to use his verbal system in all of his learning tasks, thus, strengthening his ability to control his own behaviors.

(3) This study demonstrated that when sequential tasks are presented in both a verbal and a written form, learning is greatly accelerated as Davey, with his short-term memory deficit, is able to constantly refer to the written algorithm for guidance until the task is learned.

The data, produced by this study, made it possible to make inferences about the relationship between the brain damage shown by EEG examination and the type of experiences Davey has had growing up. These experiences partially resulted from the biased perceptions of those around him because of the diagnosis of mental retardation. Brain

damage, in and of itself, as a cause of mental retardation does not entail the psychometric view of retardation, e.g., fixed limits on abilities. Brain damaged children have many potentialities for both cognitive and social growth.

Davey's fear and anxiety when placed in strange situations or confronted by strangers, his inability to form interpersonal relationships, and his anxiety over any change in routine, resulted at least partly from his long history of isolation from peers, from new and varied surroundings, and even from his family.

Davey was raised for twelve years on an isolated farm which eliminated the availability of after school playmates. When he moved with his family to his present residence, his interaction with peers was restricted by his mental retardation. In addition to the isolation caused by these factors, Davey's situation was further compounded by his mother's attitude toward his retardation. Her embarrassment at his appearance and his behavior is so great that she has refused to take Davey anywhere he might be seen with her. Davey's existence, at the time this study began, was restricted to the family residence, the school bus, and his classroom. His interaction in the community was severely limited. In addition, he spent most of his hours at home in the seclusion of his room watching television. To his isolation from normal interactional experiences with people must be added the apparent lack of close affectional ties with his parents,

particularly his mother. This apparently contributed to his difficulty in forming emotional ties with other persons, his inability to understand and/or express emotions, and his feelings of insecurity about his ability to cope with personal relationships.

Davey was also raised in an atmosphere of complete permissiveness, on the advice of a clinical psychologist seen when he was three years old. This resulted in a parental policy of keeping Davey "happy" at all costs, never disciplining him, and never giving him responsibilities or allowing him to do things for himself which he was fully capable of doing. This pattern was still in full force at the time of the beginning of this study. The result of the interventions, in both academic and social areas, was to allow Davey to develop an independence which he had never experienced before, to increase his self-confidence, and to greatly reduce his hostile aggressive behavior which he had shown toward his mother and toward strangers.

Many of the techniques used for assessing Davey in this study were the results of trial-and-error. The study showed, however, that there are alternatives to the current types of psychometric testing and the resulting types of educational placement. The following proposals are suggested as more valid procedures than those now used:

1. The child being assessed should be observed in as many ecological settings as possible and careful note taken



of his/her coping abilities. This could be done efficiently by a psychologist-social worker following a systematic worked out procedure.

2. The assessment should be conducted by a team with the child's parents, teacher, and specialists present, all of whom provide input for the assessment.

3. The psychologist should spend some time interacting with the child in areas indicated by other team members as in need of further psychological interpretation. This interaction would not be limited to interviews or observing behavior under testing conditions, but observation of the child in particular ecological settings.

4. A series of developmental-level diagnostic tests should be given in such areas as language development, conceptual development, attentional processes, memory processes, etc. These tests could be given by para-professional technicians. Additional diagnostic tests of academic level in the basic areas of reading, arithmetic, and of general knowledge (science, social science, current events, etc.) could be given by teachers and/or para-professional technicians on the school staff.

5. The psychologist should function as the evaluator of input from all team members and recommend the broad outlines of an individual educational plan for the child.

6. The team would discuss the psychologist's evaluation and recommendations, and suggest additions and/or modifications. This would become the basis for the child's educational treatment.

7. The team's plan for the child would be monitored at least twice during a school semester and appropriate changes made, when needed. Progress could be evaluated by the use of diagnostic tests in all of the areas suggested in point four as given above.

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## A P P E N D I C E S

A P P E N D I X    A

TAXONOMY OF DAVEY'S BEHAVIORS

APPENDIX A  
TAXONOMY OF DAVEY'S  
BEHAVIORS

I. Cognitive Processes

A. Perception

1. Visual perception.
2. Auditory perception.
3. Motor coordination and perceptual-motor coordination
4. Holistic visuo-spatial processing

B. Memory

1. Immediate or working memory
2. Long-term memory
3. Audioverbal memory
4. Visual memory

C. Attentional Mechanisms

1. Alertness
2. Curiosity and investigation
3. Ability to concentrate vs. distractability

D. Cognitive Mechanisms which Appear at Transition from Iconic to Symbolic (Concrete Operations) Stage

1. Conceptual level and processes
  - a. Concepts possessed
  - b. Concept learning ability
  - c. Conceptual reasoning
2. Ability to Learn and Use Rules and Algorithms
  - a. Spontaneous use of observational learning in new contexts
  - b. Ability to perform sequences of behavior toward a pre-set goal
  - c. Ability to behave in complex patterns, using simple routines PREVIOUSLY learned



E. Linguistic Level & Verbal System Abilities

1. Receptive language
  - a. Vocabulary
  - b. Syntactic complexity
2. Expressive language
3. Verbal control of behavior
4. Reading level and abilities

II. Motivational Factors\*

- A. Desire for praise and approval
- B. A close personal affectional relationship with E-O
- C. Strong curiosity and investigative motivation
- D. Strong desire for mastery of the environment and for achievement

III. Emotional Structures and Nature of Interpersonal Interactions

- A. Emotions expressed
  1. Negative
  2. Emotions whose valance depends on context
  3. Positive emotions
- B. Ability to Understand Own Emotional State and That of Others
  1. Crying as vehical for expressing most emotional states
  2. Impulsive and labile expression of emotion
  3. Ability to verbally label own and other's emotions
- C. Need for Attention From Adults and Peers and Response to Attention
- D. Appropriateness of Behavior: in Classroom, Toward Teacher, Toward Parents, Toward E-O, Toward Strangers, Toward Peers

E. Moral Feelings as Motivators

1. Developmental Moral level
2. Expression of Moral behaviors

\*Some of the motivational factors included with Cognitive Processes, the others with Emotional and Interpersonal Structures

## EXPLANATION OF THE TAXONOMY

1. The taxonomy was not established in advance, but after an analysis of a large number of the subject's behaviors. It is neither a complete catalogue of the subject's behavior, nor of the gamut of children's behavior in general.
2. Behavior is categorized in three major areas: cognitive, motivational, and emotional. Human behavior in real life, of course is not divided into neat, isolated categories. Rather, every behavioral act simultaneously incorporates cognition, emotion, and motivation as components or aspects. Behavior as perceived in this study is holistic.
3. The observations upon which the categories were formed were initially baseline behaviors, or behaviors produced as a result of interventions, mini- or quasi-experiments, standardized tests, everyday interactions, and major interventions. Whether behaviors are baseline or subsequent to baseline in the written observations, the context of the behavior is indicated briefly and dated.
4. Because of the inter-relatedness and holistic quality of the behaviors categorized, in some cases the same behaviors may appear under more than one category heading.



A P P E N D I X    B

EXAMPLE OF DATA GATHERED IN THE TAXONOMY

## APPENDIX B

### EXAMPLE OF DATA GATHERED IN THE TAXONOMY

#### I. A. 1. Visual Perception

Reverses, occasionally, letters and words when reading text out loud. Examples: was for saw; vegetables canned for canned vegetables (super market aisle 2/15/78)

#### 2. Motor Coordination and Perceptual-Motor Coordination

Ungainly gait; unable to correct same; great difficulty in trying to; when attempted voluntary control of foot position seemed unable to succeed (2/15/78)

#### 3. Holistic Visuo-Spatial Processing

Could point out correct route to supermarket, but could not verbally label (2/25/78)

#### B. 1. Immediate or Working Memory

Unable to repeat more than two digits forward when presented aurally and asked to repeat (2/25/78) baseline.

#### 2. Long-term Memory

Remembered facts about properties of a magnet given him five days earlier (2/15/78). Remembered what items he had bought two days earlier in first experience with supermarket and how

much each item cost two days later. Remembered pop cost 30¢ a can, two days later (2/27/78)

C. 1. Alertness

First time in study room with E-O alone, away from classroom. Alert, walks around, comments on bulletin boards, size of chairs, tables, objects in room (2/15/78). Showed surprise when he saw large magnet attracted several metal objects at one time (2/15/78)

2. Ability to Concentrate vs. Distractability

Teacher put D. into cardboard cubicle enclosing him. Cooperated, attended more, less distracted by activities in the room (2/27/78)

D. 1. Concepts Possessed

Showed no knowledge of use of globe as a representation of the earth (2/15/78)

Demonstrated knowledge of names of ordinary fruits and vegetables (2/25/78)

II. A. Need for Attention from Adults and Peers and Response to Attention

Willingly left the classroom with E-O to work in an empty classroom down the hall (2/15/78)

B. Appropriateness of Behavior: in Classroom, Toward Teacher, Toward Parents, Toward E-O, Toward Strangers, Toward Peers

Highly anxious when went to supermarket for a



time, especially in crowded area of the store.  
 Made derogatory comments to other people,  
 such as "Get out of my way, blockhead!"  
 (2/25/78)

#### DATA FROM MAJOR INTERVENTIONS

##### I. D. 1. Baseline knowledge of concept money.

No understanding that one must have enough  
 "money" in order to buy things sold in stores;  
 no understanding that one must add up the  
 prices of items wanted and have enough money  
 to buy them; no understanding which price  
 represents a larger or smaller amount as  
 compared with one, i.e., that some items cost  
 more or less than others (2/25/78)

##### E. Baseline-Reading Ability

Read labels on groceries such as brand names,  
 sizes, quantity, types; read aisle markers  
 in supermarket, reversed order of words, i.e.,  
 "vegetables canned" instead of "canned vege-  
 tables," (2/25/78)

#### DATA FROM MINOR INTERVENTION - MOTOR COORDINATION

I. A. 1. Learned to tie shoe laces, tied successfully for  
 the first time today, still cannot pull loops  
 taut so that laces stay tied. Experienced  
 great difficulty in mastering the fine motor  
 coordination required. (2/15/78)

A P P E N D I X    C

CLINICAL DATA COMPILED DURING STAGE ONE

# APPENDIX C

TABLE I Evaluations, Psychometric, Neurological, Emotional

<u>AGE</u>	<u>EVALUATION SETTING</u>	<u>REASON FOR EVALUATION</u>	<u>TEST SCORES</u>	<u>FINDINGS</u>
Birth				Brain damaged due to forceps used in delivery
9 months	University Hospital A	Find cause of inability to sit up or hold head erect		Shortened neck muscle
3 years	University Hospital B	Question normality of development		Normal and healthy
6 years, 3 mos.	Mental Health Center Clinical Psychologist	Assessment of level of development	Vineland: MA 4-2 PPVT: MA 3-10 IQ 67	Moderately retarded
6 years, 11 mos.	University Hospital B Psychologist	Re-evaluation	CMMS: MA 6-4 IQ 75 Stanford-Binet: IQ 52	Psychoneurological Learning disorder, recommended special learning problem class and parental counseling
7 years, 6 mos.	State Mental Hospital Multi-disciplinary team	Question of psychosis vs. mental retardation?	Borderline range intellectual functioning, Adaptive behavior development normal	Abnormal EEG, damage with mental retardation, recommended placement in special education class



TABLE I (Continued)

<u>AGE</u>	<u>EVALUATION SETTING</u>	<u>REASON FOR EVALUATION</u>	<u>TEST SCORES</u>	<u>FINDINGS</u>
11 years, 3 mos.	Mental Health Center Psychologist	Question of school placement?	Stanford-Binet MA 6-0 IQ 55	Mental retardation organic brain damage, development uneven; definitely indicative of marked visual motor defi- cit. Remain in EMR class.
14 years, 1 mo.	School Psychometrist	Re-evaluation	Stanford-Binet MA 6-7 IQ 50	Strengths: concept formation and verbal discrimination, coordination, reason- ing, convergent and divergent thinking, attention; recommen- ded continued place- ment in TMR classes
17 years 2 mos.	School Psychometrist	Re-evaluation	Stanford Binet MA 6-8 IQ 43	No specific areas of weakness, no specific recommendations made

TABLE 2

## Physical Appearance and Physical Abilities as Described by Adults Who Know Davey

<u>Appearance or Physical Characteristics</u>	<u>Age</u>	<u>Person Describing</u>	<u>Comments</u>
Head deformed, bruised left temple, dented right post-auricular area due to forcep delivery	Birth	Mother and Father	Mother dismayed and upset by appearance at birth. Father felt Davey abnormal at birth due to misshapen head.
Poor eater, vomited often, cried frequently	1st 6 months	Mother and Father	
Vomited at "sight" of mashed potatoes, noodles, dumplings, marshmallows	6 mos. to 7 yrs.	Mother and Father	
Sat, unsupported	9 mos.	Mother	Inability to sit up earlier possibly due to shortened muscle in neck
Single words spoken	12 mos.	Mother	
First walked: gait flat-footed, stiff, awkward	15½ mos.	Mother	Parents viewed rate of development as slow when compared to sister's developmental history.
Incomplete, somewhat inarticulate sentences spoken	3 years	Mother	

TABLE 2 (Continued)

<u>Appearance or Physical Characteristics</u>	<u>Age</u>	<u>Person Describing</u>	<u>Comments</u>
Toilet trained	3½ yrs.	Mother	
Very active, jumped frequently in crib, opened and closed doors by the hour, frequently rocked, jerked head	3 years.	Mother and Father	
Hyperactive, poorly coordinated, flaccidity and flexibility (peculiar) to gross movements; at times enunciates clearly and seems to have an even broader vocabulary than usual, also loud, jabbering as if to prevent communication at times	6 yrs., 3 mos.	Mental Health Center Clinical Psychologist	
Hyperactive, short attention span, overly dependent	6 yrs., 11 mos.	University Hospital Psychologist	
Irregular gait, poor motor coordination, increased deep tendon reflexes, bilateral foot clonus, doubtful right Babinsky, short-to-fair attention span, impaired eye-hand coordination, needs help dressing	7 yrs., 6 mos.	State Mental Hospital Worker	
Rocked frequently, possible "focusing" problem, gait abnormal, clumsy, tiptoed imitation of principal	8 yrs. - 12 years	1st EMR Teacher	
Rode bike unaided	9 yrs., 6 mos.	Mother	Up to this time, Mother unwilling to have training wheels removed



TABLE 2 (Continued)

<u>Appearance or Physical Characteristics</u>	<u>Age</u>	<u>Person Describing</u>	<u>Comments</u>
Rocked, head jerked, waved hands repeatedly when seated, frequency increased with teacher eye contact, sat in chair unless asked to move	13 yrs.	2nd EMR Teacher	
Enuretic nightly for approximately nine months	13 yrs.	Mother	Occurred during school year with second EMR teacher
Hyperactive	14 yrs., 1 mo.	School Psychometrist	
Extremely sensitive to loud noises, gait awkward and stiff, clumsy, cannot skip, hops with difficulty	16 yrs.	TMR Teacher	
Poor coordination: unable to tie shoes, fasten belt, zip jacket, twist off bottle caps or bread wrapper twists. Gait: appears clumsy and abnormal, but has no problem maneuvering on stairs at home	16 yrs.	Mother	
Starts, stops, steers riding mower, but unable to cut grass in a pattern; Unable to drive a truck in a pattern; Acts the comedian constantly	16 yrs.	Father	

TABLE 2 (Continued)

<u>Appearance or Physical Characteristics</u>	<u>Age</u>	<u>Person Describing</u>	<u>Comments</u>
Very little body activity was displayed other than continuously running the palms of his hands over the top of his legs	17 yrs., 2 mos.	School Psychometrist	
Trouble using can opener, fairly good at making bed, but difficulty keeping bedspread straight	17 yrs., 3 mos.	TMR Teacher (Report card)	

TABLE 3  
Cognitive Characteristics, Alertness, Adaptation to Physical Environment

<u>Behavior (Cognitive and/or adaptive)</u>	<u>Age</u>	<u>Observer</u>
Learned to read, taught (for short period) by mother using Sullivan method	7 yrs.	Mother
Alert, tremendous difficulty adjusting to school	8 yrs.	1st EMR Teacher
Read at approximately 2.0 level at entrance to school	8 yrs.	1st EMR Teacher
Alert, understands most of what is said to him, answers filled with puns, plays on words and comedy gestures, excessively verbal, preoccupied with effort to make jokes	11 yrs., 3 mos.	Mental Health Center Clinical Psychologist
Read at 3.0 to 3.5 reading level, reversed words and letters, wrote and recognized capital and small letters, copied words, confused "b" and "d," recognized and wrote numbers, little knowledge of number concepts, added and subtracted using discs, knowledge of social studies and science exceeds that of classmates	12 yrs.	1st EMR Teacher
Cannot answer questions, is extremely verbal	12 yrs.	1st EMR Teacher
Read at 3.0 level, recognized words at 4.0 level, but only in one-to-one relationship with the teacher; knowledge of number concepts at much lower level	13 yrs.	2nd EMR Teacher



TABLE 3 (Continued)

## Cognitive Characteristics, Alertness, Adaptation to Physical Environment

<u>Behavior (Cognitive and/or adaptive)</u>	<u>Age</u>	<u>Observer</u>
Strengths: concept formation and verbal facility; Weaknesses: visual discrimination, coordination, reasoning, convergent and divergent thinking, attention	14 yrs.	School Psychometrist
Alert, reads at approximately the 4.0 grade level, adds (with carrying) and subtracts three column numbers using discs, tells time at hour and half hour, excellent memory; does not write cursive, confuses "b" "d" and "g" when printing, reverses numbers when reading	16 yrs.	TMR Teacher
Reads grocery ads, headlines, and weather report in newspaper, <u>TV Guide</u> , <u>TV Mirror</u> , cursive hand writing; good memory, very observant, cannot tell time	16 yrs.	Mother
Does not know the value or names of coins	16 yrs.	Father
Very mature attitude toward the session, maintained a good level of eye contact and appeared to be listening well to directions being read	17 yrs., 2 mos.	School Psychometrist
Reading improved greatly, likes reading and is most willing to read for the teacher; performs 3-digit addition and subtraction problems independently with the use of the calculator with approximately 95% accuracy; loves cooking class, knows all the symbols and words, measures well; does fairly well in bedmaking	17 yrs., 3 mos.	TMR Teacher

TABLE 4

## Emotional, Motivational and Social Interactions

<u>Behavior</u>	<u>Age</u>	<u>Observer</u>
Hyperactive, uncooperative, destructive and hostile, more evident when mother present; difficult for evaluator to establish rapport with Davey	6 yrs., 3 mos.	Mental Health Center psychologist
Overly dependent, psychosomatic complaints	6 yrs., 11 mos.	University Hospi- tal B; psychologist
Unmanageable, frequent temper tantrums, negativistic	Up to 7 years	Mother
Temper tantrums stop; behavior modification techniques used by mother (ignoring "bad" behavior; praising "good" behavior)	7 years	Mother
Suffering from acute anxiety, cries often, reported as unable to play with other children; poor relationship with mother, aggressive, hostile, dependent and clinging	7.6 yrs.	State Mental Hospi- tal; multi-discipli- nary team
Wary of strangers, afraid of doctors, terrified of new surroundings, highly anxious in crowds	7.6 yrs. on, possibly before	Mother
Academically uncooperative, worked well only in 1:1 situation with teacher, would not cooperate during group instruction, never physically hostile, rejected by classmates, appeared to dislike classmates, formed one good friendship with girl in class, often in tears	13 yrs.	2nd EMR Teacher

TABLE 4 (Continued)

<u>Behavior</u>	<u>Age</u>	<u>Observer</u>
Extremely dependent, preoccupied with effort to make jokes	14 yrs., 1 mo.	School Psychometrist
Often uncooperative and negative, behavior deteriorates when mother present, uncooperative and verbally hostile toward her; moody at times; obnoxious when strangers enter the room, verbally hostile, rude, but never physically abusive; verbal chastisement and/or physical punishment of others or self upsetting to Davey, often leads to tears; accepted by his classmates in the role of leader, no close friends in the classroom, interacts well with all classmates	13 yrs. to 16 yrs.	TMR Teacher
Uncooperative, negativistic as an initial response followed by cooperation only when Davey is ready to cooperate; easily upset by loud voices, noises, punishment of others or self; afraid of strange buildings, people, crowds and crowded places	16 years	Mother
Loud and rude in public places, embarrasses mother when in public; extremely poor relationship with mother who feels she has no control over his behavior, reported better rapport with father; moody, despondent at times, unable to express emotions verbally; extremely possessive of his bedroom and its contents; does not tolerate physical changes in his bedroom which contains a portable TV, a record player, a cassette tape deck, a few books, various games and puzzles, and a collection of match box cars;	16 years	Mother



TABLE 4 (Continued)

<u>Behavior</u>	<u>Age</u>	<u>Observer</u>
(narrative continued) plays occasionally with neighbor girl, age 8, boy age 14, and classmate who lives nearby; prefers to be alone in his room when at home; watches television in his room much of the time.		
Cooperates well at times, not at all other times; moody; afraid of crowds, including groups of relatives; acts the comedian constantly	16 years	Father
Refuses to help even with the simplest tasks; takes good care of two year old nephew, is seldom "emotional" in recent years; had no friends except sister during first 12 years of life when the family lived on an isolated farm	16 years	Sister
Much less dependent on his teacher than before, handled the testing situation with a much improved attitude	17 yrs., 2 mos.	School Psychometrist
Much more adaptable to situations this year, changes don't seem to bother him as much as they have in previous years, accepts criticism and types of punishment with less resistance than before.	17 yrs., 3 mos.	TMR Teacher (report card)

TABLE 5

## School Placements

<u>School &amp; Type of Class</u>	<u>Age</u>	<u>Progress Made</u>
School for handicapped: cerebral palsy and physically handicapped class	4½ to 7 years on an irregular basis	Unknown
Behavior Modification Training class at University A	7 years approximately	Tantrum behavior controlled, basic reading skills taught
Elementary School A - EMR contained classroom, 2 years; open "pod" classroom with normal second graders and EMR students, 2 years	8 years to 12 years	Adapted to school environment, recognized and wrote letters of the alphabet and numbers, subtracted and added with discs (read at 3.0 to 3.5 level) (knowledgeable in social studies and science)
Elementary School B - EMR classroom, one year	13 years	Unable to adapt to school environment, academically uncooperative (no progress made), (read at 3.0 level), (recognized words at 4.0 level), number knowledge poor, recommended placement in TMR class.
School for the handicapped; TMR class, 2 years	14 years to 16 years	Adapted well to school environments, (Reads at 4.0 level), adds and subtracts three column numbers with discs, tells time at hour
Elementary School C-TMR class, presently enrolled (same teacher in both TMR classes		

\*Materials put into parentheses are assertions by teachers for which there is no specific diagnostic information or scores available.

TABLE 6

Evaluation of Possible Adaptive Potential and Proper  
Academic Placement by Adults Who Know Davey

<u>Age</u>	<u>Possible Adaptive Potential</u>	<u>Proper Academic Placement</u>	<u>Evaluator</u>
6 yrs., 3 mos.	Doll play, complicated word use, extreme variability of behavior possibly indicate a higher intel- ligence level than indicated by IQ test score of 67	-----	Mental Health Center Psychologist
6 yrs., 11 mos.	Psychoneurological learning disorder	Special learning problem class	University Hospital B Psychologist
7 yrs., 6 mos.	Functioning in borderline range with normal development of adaptive behavior	Special education class	State Mental Hospi- tal team evaluation
8 yrs., 12 yrs.	Much more potential to learn than he has demonstrated, primary problem emotional disturbance	Class for the emotion- ally disturbed	1st EMR Teacher
11 yrs., 3 mos.	Mentally retarded with unique behavior and verbalizations indicative of much higher comprehension ability than would ordinarily be attributed to a child of his IQ	Continuation of EMR class	Mental Health Center



TABLE 6 (Continued)

Evaluation of Possible Adaptive Potential and Proper  
Academic Placement by Adults Who Know Davey

<u>Age</u>	<u>Possible Adaptive Potential</u>	<u>Proper Academic Placement</u>	<u>Evaluator</u>
13 years	Almost nothing Davey could not do if placed in a 1:1 situation with the teacher; primary problem, emotional disturbance with autistic-like behaviors evident.	Class for the emotionally disturbed, or class for autistic and autistic-like children	2nd EMR Teacher
16 years	His IQ score, a low estimate of his actual potential; primary problem, emotional disturbance	Class for the emotionally disturbed	TMR Teacher
16 years	Not working at full capability, at times has appeared "brighter than average;" has given up on Davey getting "appreciably better"	Does not know	Father

A P P E N D I X    D  
RESULTS OF DIAGNOSTIC TESTS

Table 1

Kraner Preschool Math Inventory Results

<u>Concepts Understood</u>	<u>Age at which 80% of the children tested passed</u>	<u>Concepts Not Understood</u>	<u>Age at which 80% of the children tested passed</u>
<u>Counting</u>		<u>Counting</u>	
Rate	5-6	*Rational	5-6
		Serial	6-6
		*Ordinal	6-6
<u>Cardinal Numbers</u>		<u>Cardinal Numbers</u>	
Recognition	5-0		
Comprehension	5-6		
<u>Quantities</u>		<u>Quantities</u>	
All	3-6	*More than	5-6
Empty	3-6	Less than	6-6
Each	4-6	One more	6-6+
Same Object	4-6	*Smallest to largest	6-6+
<u>Sequence</u>		<u>Sequence</u>	
First	4-0	Middle	4-6
Behind	4-6	End	5-0
In front of	4-6	*After	6-0
In back of	4-6	Before	6-0
Last	5-6		
Next to	5-6		
Ahead of	5-6		
Beginning	6-6		
<u>Positional</u>		<u>Positional</u>	
In	3-6	*Highest	4-6
Out	3-6	*Lowest	4-6
Top	4-0	Nearest	5-6
Together	4-0	Farthest	5-6
Apart	4-0	*Right	6-6+
Bottom	4-6	*Left	6-6+
Under	4-6		
Over	4-6		
Between	4-6		
Inside	4-6		
Outside	4-6		



<u>Concepts Understood</u>	<u>Age at which 80% of the children tested passed</u>	<u>Concepts Not Understood</u>	<u>Age at which 80% of the children tested passed</u>
<u>Directional</u>		<u>Directional</u>	
Forward	3-6		
Backward	3-6	*To the right	6-6+
Up	4-6	*To the left	6-6+
Down	4-6		
Toward	4-6		
Around	4-6		
Away from	4-6		
<u>Geometry/Measurement</u>		<u>Geometry/Measurement</u>	
Big	3-6	*Shortest	5-6
Little	3-6	*3 sides	5-6
Longest	3-6	4 sides	5-6
All	3-6	5 sides	5-6
Tall	4-6	*One-half	6-6+
Short	4-6		
Largest	4-6		
Tallest	4-6		
Same size	4-6		
Triangle	4-6		
Circle	4-6		
Smallest	4-6		
Same shape	5-0		
Square	5-0		
Rectangle	5-0		
Different size	5-6		
Different shape	5-6		
Straight line	5-6		
Closed curve	6-6+		

\*Answered correctly only with additional help not included in test instructions.

<u>Age at which 80% of the children tested passed</u>	<u>Number Passed</u>	<u>Number Failed</u>	<u>% Passed</u>	<u>% Failed</u>
3-6	10	--	100%	----
4-0	4	--	100%	----
4-6	22	3	88%	12%
5-0	4	1	80%	20%
5-6	9	8	53%	47%
6-0	0	2	----	100%
6-6	1	2	33%	67%
6-6+	1	8	11%	89%

APPENDIX D

Table 2

Wide Range Achievement Test Results

<u>Subject</u>	<u>Raw Score</u>	<u>Grade</u>
Spelling	5	1.9
Arithmetic	6	Kg. 6
Reading	23	2.6

# APPENDIX D

TABLE 3 Doren Diagnostic Reading Test of Word Recognition Skills Results

	<u>Letter Recognition</u>	<u>Beginning Sounds</u>	<u>Whole Word Recognition</u>	<u>Words Within Words</u>	<u>Speech Consonants</u>	<u>Ending Sounds</u>
Number of items passed	28	19	39	23	19	25
Number of items failed	2	6	6	7	1	10
Percentage of correct responses	93	76	87	77	95	71
	<u>Blending</u>	<u>Rhyming</u>	<u>Vowels</u>	<u>Discriminate Guessing</u>	<u>Spelling</u>	<u>Sight Words</u>
Number of items passed	13*	21	N.G.#	10	11	N.G.#
Number of items failed	20	40		5	9	
Percentage of correct responses		52		66.7	55	

\*Too much additional help had to be given to count this score

#Not given, attempts to give these tests led to high levels of anxiety, confusion and frustration due to Davey's unfamiliarity with the concepts being tested.



A P P E N D I X    E

DAVEY'S INDIVIDUAL REHABILITATIVE PROGRAM

## APPENDIX E

### Davey's Individual Rehabilitative Program

#### I. Areas of Academic Instruction

A. Reading - Individualized instruction in reading should be continued daily. Emphasis is to be placed on comprehension of material read, and not on the speed at which the material is read. The following specifics need to be stressed:

1. Areas of weakness as measured by the Doren Diagnostic Reading Test of Word Recognition Skills (Doren, 1973) to include:

- a. rhyming
- b. discriminate guessing
- c. spelling
- d. blending
- e. vowels
- f. sight words

2. Building of an increased vocabulary by:

- a. Reading children's dictionaries, using progressively harder dictionaries, introducing a minimum of words weekly with exercises to insure comprehension.

3. Adding to expressive capabilities by:
  - a. Exercises such as "fill in the blank" and "complete the sentence" to help clarify the use of new words, antonyms, homonyms, and synonyms, etc.
  - b. Writing experiences where Davey provides the story to be written, initially using short sentences increasing to theme base paragraphs.
  - c. Encouraging the participation of Davey in discussion sessions where he is given the opportunity to relate events, detail facts, etc.
4. Comprehension exercises should include:
  - a. Initially asking Davey to listen to material read by the instructor and to answer specific questions.
  - b. Stopping Davey when he is reading to ask him to repeat what he has just read.
  - c. Following all reading exercises with questions pertaining to the reading material to be answered orally or in writing.
5. Readings in the area of current events, science, and social studies intermixed with thematic stories.

B. Concept Instruction - At this time, instruction to broaden conceptual knowledge should emphasize:

1. Kraner Preschool Math Inventory (1976)

concepts not understood including:

- |              |             |                 |
|--------------|-------------|-----------------|
| a. more than | g. before   | l. right        |
| b. less than | h. highest  | m. left         |
| c. one more  | i. lowest   | n. to the right |
| d. middle    | j. nearest  | o. to the left  |
| e. end       | k. farthest | p. shortest     |
| f. after     |             | q. one-half     |

2. Daily lessons in comparative concepts that require understanding of "similarities" or "differences."
3. Introduction of concepts of categorization first on a more concrete level, progressing to a more abstract level.

C. Arithmetic Instruction - Emphasis should be placed on learning basic arithmetic concepts as well as on the maintenance of calculator training now well-established. Suggestions include:

1. Following the step-by-step instruction pattern outlined by Martha E. Snell (1978) in Systematic Instruction of the Moderately and Severely Handicapped.



2. Calculator use continued and applied to simple story problems.
3. Continued work on basics necessary to handle counting of change, counting by fives, counting by tens, counting by twenty-fives.

II. Social-interpersonal relationship and Emotional Control - Attempts to increase Davey's ability to feel comfortable with the expectations of society should include the following:

- A. Continued feedback at school, at home, and in the community as to the correctness and/or incorrectness of Davey's behavior including rewards and punishments when appropriate.
- B. Progressively more and varied trips into the community with different individuals accompanying Davey in order to widen Davey's experiential background.
- C. Continued explanation to Davey of the behaviors of others and his behaviors toward others, emphasizing the positive factors in the relationships.

III. Motor and self-care skills - Training (where necessary) with the use of written algorithms for serial tasks.

- IV. Teacher-Pupil Relationship - Ideally the relationship between the teacher and Davey should include the following:
- A. Appropriate demands for performance by Davey based on the teacher's highest expectations of his potential capabilities.
  - B. Appropriate feedback on Davey's performance which can take many forms.
- V. Optimal instruction techniques to be emphasized should include:
- A. Short, simple, concise, written instruction to accompany verbal instruction when possible.
  - B. Written algorithms when the task to be learned is sequential in nature.
  - C. One-to-one instruction until Davey's mastery of new material allows for his independent study.
  - D. An instructional environment where distractions are reduced to a minimum.
  - E. Verbal explanation and verbal self-control instruction to include:
    - 1. Continued emphasis on verbal self-command to control emotional outbursts, negative hostile comments, and covert public masturbation.
    - 2. Immediate verbal explanation of Davey's feelings and the feelings of others expressed within Davey's environment.