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THE EFFECTS OF NEUROLOGICAL AND ENVIRONMENTAL FACTORS ON THE LANGUAGE DEVELOPMENT OF HEAD START CHILDREN--A EVALUATION OF THE HEAD START PROGRAM.

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DESCRIPTORS- *FAILURE FACTORS, *PRESCHOOL CHILDREN, *INTELLECTUAL DEVELOPMENT, *CULTURALLY DISADVANTAGED, *MEASUREMENT TECHNIQUES, MINIMALLY BRAIN INJURED, FAMILY ENVIRONMENT, NEUROLOGICALLY HANDICAPPED, LANGUAGE DEVELOPMENT, COGNITIVE DEVELOPMENT, ACHIEVEMENT, PRESCHOOL PROGRAMS, TESTING, HEADSTART, SCHOOL READINESS EVALUATION TESTS, DISTRICT OF COLUMBIA,

THIS HEADSTART STUDY WAS CONDUCTED TO DETERMINE THE INFLUENCE OF NEUROLOGICAL FACTORS AND HOME ENVIRONMENT ON THE LANGUAGE AND COGNITIVE DEVELOPMENT OF THE DISADVANTAGED CHILD. TWO DISTRICT OF COLUMBIA CENTERS WERE USED. THE SUBJECTS WERE ABOUT 70 NEGRO PRESCHOOL CHILDREN FROM LOW-INCOME FAMILIES. THESE CHILDREN WERE GIVEN SEVERAL BATTERIES OF TESTS DURING THE 8-WEEK SUMMER HEADSTART SESSION. NEUROLOGICAL TESTS OF BOTH VERBAL AND MOTOR TYPES WERE ADMINISTERED INITIALLY TO OBTAIN AN INDICATION OF THE MATURITY OR IMMATURITY OF THE DEVELOPMENT OF THE CHILD'S NERVOUS SYSTEM. THESE RESULTS, INDICATING WHICH CHILDREN NEEDED THE MOST HELP, WERE LATER COMPARED WITH THE RESULTS OF THE SCHOOL READINESS EVALUATION TESTS. THE SRE MEASURES THE LEVEL OF LINGUISTIC AND COGNITIVE ABILITY OF THE CHILD AND IS ESPECIALLY CONSTRUCTED TO REFLECT A DEFICIT OR ABUNDANCE OF THOSE ATTRIBUTES A CHILD WILL NEED IN THE FORMAL SCHOOL SITUATION. THE RESULTS OF THE SRE TEST SHOWED A GENERAL PERFORMANCE GAIN BETWEEN THE 2 TESTING PERIODS, GAINS CONSIDERED TO BE A FUNCTION, IN PART, OF THE CHILD'S MENTAL AGE. IN ORDER IN SHOW THE RELATION BETWEEN THE CHILD'S PERFORMANCE AND HIS HOME ENVIRONMENT, A SOCIAL WORKER VISITED EACH PUPIL'S HOME AND TALKED WITH THE MOTHER. THE WORKER FILLED OUT A QUESTIONNAIRE DURING THIS VISIT AND LATER GAVE HIS IMPRESSION OF THE QUALITY OF THE VERBAL ENVIRONMENT IN THE HOME. (WD)

The Effects of Neurological and Environmental Factors on the Language Development of Head Start Children: An Evaluation of the Head Start Program

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I. INTRODUCTION:

Children of lower socio-economic background have been noted to have a higher incidence of brain damage because of generally higher levels of prematurity and relatively poor pre-natal care. In addition to the disabilities secondary to pre-natal and peri-natal difficulties, the child's home environment may be relatively crowded and has been generally categorized as non-verbal. The concern for these children has recently been heightened in terms of the incidence of school learning problems and the consequent early school leaving with the disabilities so maintained and reproduced. Recent efforts have been made to mitigate the non verbal home environment by means of special educational opportunities.

The Head Start program has been designed to help deal with the needs of these children. The aim has been to identify those children requiring medical and other remedial efforts and generally to help overcome language deficits prior to entry into the regular school curriculum

The evidence of more gross brain dysfunction has been fairly widely appreciated. These children are more easily identified and special classes have been established for their training in many centers. It has not been as easy to identify the larger group of children with so-called minimal cerebral damage whose ability to acquire language skills in the school situation may be limited. Children have frequently been given the "trial of school". Only in the second grade or later are they referred for evaluation and more adequate disposition be made more rapidly than heretofore. Under the best conditions, one may then provide more concerted and more successful educational experience for these children from the start of school.

Under the sponsorship of the Office of Economic Opportunity and the local agency, the United Planning Organization, an exploratory study investigated the effects of neurological and environmental factors on the intellectual development of children from culturally disadvantaged homes. This project involved

some 80 children enrolled in Operation Head Start during the summer of 1965 in the District of Columbia.

The aim was to determine the incidence of relative "immaturity of brain function" and to establish norms of motor perceptual and language maturity in this group of children with a potentially high risk of school learning problems. The motor and perceptual tasks were administered by a neurologist and the tests of language maturity by a team of psychologists. The latter (the School Readiness Evaluation SRE) was designed to be particularly relevant to the requirements of the school learning situation. The home environment was evaluated during a home visit by a social worker using a specially prepared questionnaire determining the qualities of the home environment considered to be related to the learning of language. The children were given the Stanford-Binet as well so that these experimental tests might be compared to a standardized test battery.

The neurological examination from the children and capable of being performed by pediatricians and school health physicians as well as neurologists. The psychological examination was similarly designed to be relatively simple to give and score. The aim is that it could be administered in the future by teachers and other personnel not specifically trained in testing techniques. The home visit questionnaire also involved relatively simple observational data and the verbatim recording of the responses to questions dealing with child rearing.

These instruments were specifically designed for use in this project with the additional aim of determining the achievement during the Head Start program by testing at the beginning and end by the SRE. An additional factor was the differences between the achievement in two of the separate types of summer programs available to children in the District of Columbia.

II Materials and methods:

For purposes of clarity the neurological evaluation, the experimental learning battery or SRE and the home interview schedule will be discussed separately and in that order. The rationale for the selection of certain measures, description of performance, details of the test materials and procedure, and scoring will be discussed separately for each of the three types of evaluations.

A. Neurological evaluation (see Appendix A).

The evaluation of brain function is approached from a developmental viewpoint. A short, quantifiable, easity reproducible test for motor and perceptual abilities was developed. The concept is that the child's ability to learn the more complex language skills in school can best be related to the level of maturity of the nervous system. This would involve several factors. However the increasing complexity and discreteness of motor behavior is a developmental parameter of the degree of integration of the nervous system. The examination is a modification of the Lincoln-Oseretsky Scale with particular emphasis on the more complex types of motor activity that are used to evaluate adults in the clinical neurological examination. More complex perceptual interaction involving several simultaneous stimuli, both homologous and heterologous, are also related to the degree of integration of the nervous system. The entire test takes approximately 15 minutes and the child is to be awarded by candy in view during the examination.

1. Directions for scoring.

The initial portion of the examination involved a short assessment of the appearance and cooperation of the child. The child is asked several questions relating to his age, his birthday and the names of his siblings in attempt to estimate the degree of intelligibility of his speech (subtest # 15).

The intelligibility ratings are defined in the discussion of these ratings in the body of the description of the S.R.S. (page 13). In general, the rating of 1 is for speech as clear as that of the middle class examiner, the rating of 4 is for speech which is completely slurred and unintelligible.

Right-left testing (subtest #16)

The testing of right-left orientation is a modification of the Benton Scale for right-left. The child is given the directions slowly and clearly. He is scored correct only if the directions are accurately followed on the first trial. The last item involves a two stage command. He is given a score of one if he performs one part correctly and two if he does both parts. The total possible score is 16 on this particular sub-test.

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Motor Scale (Subtest # 17)

The motor scale is done following the test for right-left. It requires no materials other than a chalked straight line 6 feet long and an outlined square 18 inches on the side. The total possible score is 60.

Each action to be followed is demonstrated by the examiner. If there is initial difficulty in understanding the directions the action is demonstrated with additional verbal description and the motions are demonstrated on the child as well. When there is particular difficulty in carrying out the commands, such as in the tandem walking sequences, the score must include the fact that the child is unable to do ;these actions under these conditions. Almost all the children in the age group studied were able to carry out the directions. Most of the actions as outlined are quickly and simply done with good cooperation requering 3 - 10 minutes.

The time during which each action is to be performed is fairly significant and should be followed quite closely.

Scoring Criteria:

1. Standing on foot - The child is instructed to stand on one foot with the
2. other leg flexed onto the knee and with hands at his side for 10 seconds. Score 3 is given if follows command without falling on first trial. Score 2 is given if manages to follow command but is unable to maintain position for the full 10 seconds on first trial but does so on second trial. Score 1 is given if child has difficuity maintaining position on second trial but does so for short period. Score 0 is failure to maintain position for any period.
3. Tapping of foot - The child is ;instructed to tap in a synchronous
5. rhytmic manner with hands at his side for ten seconds.

Score 3 is given for synchronous tapping which does not break down during the period. Score 2 is given for synchronous tapping which does not last the full 10 seconds but which breaks down. Score 1 is given if the tapping is done even if dysynchronous. Score 0 is given if unable to follow the direction despite the demonstrations.

4. Associated movements. These are assessed during the foot tapping and the
6. child is asked to take hands away from face etc. during the tapping.

The score is frequently related to the ease and synchrony of the foot tapping. Score 3 is given if there is no associated movements of hands or body. Score 2 is given if there is associated movements of the hands but not body. Score 1 is given if there is associated movements of the body. Score 0 is given if these movements are gross.

7. Hopping in place. The child is instructed to hop in an 18 inch square
8. for 10 seconds. Score 3 is given if the hopping is done easily and child remains in square. Score 2 is given if the hopping is done easily and within a small area immediately contiguous to the square but not entirely within it, for the 10 seconds. Score 1 is given if hopping is done but with difficulty and fails to stay within a single area. Score 0 is given if unable to hop.

9. Crouching on tip toe. The child is instructed to crouch on tip toe with eyes closed for 10 seconds. He may use his arms for balance but not touch the floor or furniture. Score 3 is given if crouches without falling on tip toe on the first trial. Score 2 is given if manages to do so on second trial. Score 1 is given if manages to crouch as directed but fails to maintain position for the allotted period on second trial. Score 0 is given if unable to do so at all.

10. Standing heel to toe. Child is instructed to stand heel to toe for 15 seconds without falling. Score 3 is given if does so on first trial. Score 2 is given if does so on second trial. Score 1 is given if he falls on second trial but does maintain posture for short period. Score 0 is given if he is unable to follow directions.

11. Walking straight line 6 feet. Child is instructed to follow heel to toe on chalk line. Score 3 is given for following straight line without deviation greater than one foot on first trial. Score 2 is given if maintains this on second trial. Score 1 is given if maintains this for only part of the six feet on second trial. Score 0 is given if fails to follow heel to toe directions for even part of the 6 feet.

12. Walking straight line 6 feet (eyes closed). Child is instructed to walk as above with eyes closed. Score 3 is given if does so without deviation of greater than 1 foot for the 6 foot length on first trial. Score 2 is given if does so on second trial. Score 1 is given if does so partially but does not maintain heel to toe for entire length. Score 0 is given if does not follow heel to toe directions.

13. Walking backwards 6 feet (eyes open). Child is instructed to walk backwards heel to toe. Score 3 is given if walks heel to toe without deviation of greater than 1 foot on first trial. Score 2 is given if walks heel to toe without deviation of second trial. Score 1 is given if walks heel to toe for at least part of distance and able to walk backwards under these conditions. Score 0 is given if fails to follow directions.

NOTE: There is frequently much difficulty in following the heel to toe directions. The scoring does include the factor of inability to follow directions in doing the action as well as the breakdown of the action itself.

14. Touching nose. The child is instructed to touch his nose with index finger bringing in outstretched arm. Score 3 if does so at least 2 out of 3 times. Score 2 is given if he does so at least one or twice out of three times on second trial. Score 1 is given if fails to touch at least once. Score 0 is given if fails to follow directions.

15. Rapid alternating touching of fingertips. Child is instructed to touch
16. each finger alternately with thumb and then reversing. Score 3 is given if follows directions on first trial touching each finger alternately and is done quickly. Score 2 is given if touches each finger alternately and separately but done slowly. Score 1 is given if touches each finger but does not follow directions at all or touches more than one finger at a time.

17. Tapping rhytmically with feet and finger, 15 seconds. Child is instructed
18. to tap rhytmically and synchronously with outstretched index finger and ipsilateral foot. Score 3 is given if tapping is done quickly and synchronously. Score 2 is given if tapping is done synchronously on second trial. Score 1 is

given if tapping is done partially but dysunchrony appears toward the end of the period. Score 0 is given if tapping is dysunchronous or fails to follow directions.

19. Puckering of lips. Child is instructed to alternately open and close lips quickly, for 5 seconds. Score 3 is given if done quickly without breakdown of synchrony. Score 2 is given if done quickly with breakdown of synchrony to slight degree. Score 1 is given if done but breakdown in synchrony. Score 0 is given if unable to do.

20. Tungue movements. Child is instructed to do to and fro and side to side movements of tongue quickly. Score 3 is given if does so quickly with rapid alternating movements. Score 2 is given if there is slight breakdown in synchrony. Score 1 is given if there is some associated movements of jaw but able to do movements or there is marked associated movement of jaw or head.

Face-Hand test (subtest #18)

With his eyes open and palms down on knee, touch is quickly and lightly applied to the dorsal surface of both hands simultaneously. He is instructed to point to both areas stimulated. Once he has done so correctly for two trials, he is instructed to close his eyes. Touch is then applied simultaneously to the cheek and contralateral dorsum of the hand. He is asked:"Where did I touch you?" He is to point or otherwise indicate the areas stimulated. The face hand testing is then done on the opposite side of face and contralateral hand. Then he will have touch applied to the hand ipsilateral to the face with randomization of hand chosen. He is then tested with his eyes open if he had previously failed to identify the stimulus applied to the hand or had displaced the hand stimulus to the epsilateral face.

Scoring is "negative" if both the hand and face stimuli are correctly identified. It is "positive" if both these stimuli were not correctly identified. + is the score if the hand stimulus is "displaced" to the face; ++ is failure to identify any second stimulus but only the one applied to the face; ++++ is failure to identify a second stimulus with the eyes open as well.

Sound-touch testing (subtest #19)

Following the face-hand testing, he is instructed to point to the ear in which he hears a snapping of fingers. He is told that he will hear snapping and then at times feel a touch as well. He is instructed to close his eyes. On the first trial sound alone is presented and he is asked "Did you feel a touch?" On the next trial, sound and touch are both applied with touch to the contra-lateral dorsum of the hand. On the succeeding trial the opposite ear is used with its contralateral hand. The touch is then applied to the cheek contralateral to the sound in the ears. After each trial he is asked: "Did you feel a touch?" If he has failed to identify the touch, the same procedure is followed with the eyes open.

Scoring is "negative" if he describes the touch accurately when applied to both hand and face. It is "positive" if he fails to identify the touch: + if he fails to identify the touch on hand but not face with the simultaneous sound: ++ if he fails to identify touch on face as well as hand, +++ if he fails to identify touch on hand with eyes open; ++++ if he fails on face as well as hand with eyes open.

B. School Readiness Evaluation (SRE): (see appendix B).

The experimental test battery selected for administration during the second and eight week of the Head Start Project consisted of six subtests yielding a total of fourteen discrete measures. The rationale for their selection was that these subtests tapped areas of linguistic and cognitive functioning directly applicable to and demanded in the school situation. In addition, it was felt that such measures might be susceptible to improvement over the six week span between the first and second administration assessing thereby the beneficial effects of the Head Start Project. Finally the subtests constituted a theoretical framework of meaningfully related skills. In line with Charles Osgood's formulation of language communication in terms of a model of encoding-integrating activities, - decoding subtests were included in the experimental battery which required the ability to repeat what one heard followed by subtests requiring one to demonstrate comprehension of what he heard. Then the child was reauired not merely to demonstrate completion but to formulate his comprehension in meaningful linguistic responses.

Finally since language symbols are routinely taught in first grade in the form of reading, writing, and arithmetic, the test battery included measures of the ability to recognize and correctly match letters of the alphabet and arabic numerals and also to copy by hand such language symbols. All of these instruments were chosen in part because they possess face validity, i.e., they are literally samples of the kinds of behavior expected of the child in the regular school program. He is expected to be able to repeat what he hears, to understand what he hears and finally to indicate in language his comprehension of what he hears. He is expected to recognize and eventually identify letters of the alphabet and arabic numerals and to possess the manual coordination to copy them legibly.

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The experimental test battery will be presented sub-test by sub-test. The number of the subtest refers to those in the appendix.

I. Repetition of Words and Phrases

This subtest assessed the child's ability to repeat correctly and intelligibly what he heard. It appeared reasonable to assume that the child required this degree of auditory discrimination as preparation for other language development in the school situation. This test consisted of two sub-tests:

Subtest #1 consisted of repeating both monosyllabic and polysyllabic words. Maximum score was eight. Following this, in subtest #2, the examiner recited seven sentences of increasing length with the child attempting to repeat each sentence. Examiner repeated a given sentence a second time if the child appeared to hesitate or produced only a word or two in response to the first recitation of the sentence. The purpose of this task was to obtain repetition of the sentences by the child.

An intelligiblility rating from one (clear) to four (entirely unintelligible) was obtained at this time. The instructions for making intelligibility ratings were applicable to subtests #1 and #2 as above and also to three subsequent samples of the child's speech. These included Repeating numbers (#4) and number problems #5, verbal output #9 and in the child's verbal behavior during the neurological evaluation. These four discrete ratings of language samples are designated as subtests #3, #6 and #10 in the SRE and is designated as subtest #15 in the neurological evaluation.

The instructions for intelligibility ratings were as follows:

Rating Scale for Speech Intelligibility: E will rate each person on each separate verbal test on a four point scale:

1 - child's speech is easily intelligible; every word can be understood even without reference to the background of the communication and the redundant cues which connected discourse customarily provides. Occasional instances of stammering do not detract from this score. A soft drawling pattern which blurs endings of words and lessens intelligibility to the ear of the average listener would lower the score to at least a 2.

2 - person's speech is for the most part intelligible although some terms or entire expressions may not be understood on the first hearing. Complete intelligibility is never quite achieved and approximated only when he repeats what he said and/or E deciphers the communication from knowledge of the context.

3 - person's speech is only partially intelligible and even then only by foreknowledge of what the person is supposed to be saying. In other words, only from knowledge of what he is trying to say, can we determine what, indeed, he is saying, Score 3 also for telegraphic, laconic, truncated phrases.

4 - person's speech is largely unintelligible and cannot be deciphered even with knowledge of the context. Occasional utterances may be inteiligible, but his connected discourse cannot be understood overall. Score 3 also for absence of speech or near absence.

With children, we expect very few scores of 4, indicating serious speech handicaps; we also anticipate a few 1's since underprivileged children may have poor pronunciation and poor fluency in general, habits, etc.

If the child speaks in a characteristic southern dialect he is not to be penalized so long as his speech is intelligible to the listener. If however his utterances are not intelligible to the middle class ear of the E the child's rating is set accordingly notwithstanding the fact that possibly his mother or some other person in his immediate home situation can decipher his speech.

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II. Repeating Numbers and Number Problems.

This subtest had a similar rationale as the one above except that the words for repetition were taken entirely from arithmetic. It consisted of two subtests.

Subtest # 4

Repeating Numbers - required subjects to repeat three sets of one digit numbers, then six sets of two digit numbers and six sets of three or more digit numbers. These numbers were eecited normally as in giving the date 1964 and not in the spaced interval digit span method of the intelligence tests. Maximum score was 15 items correctly repeated.

Subtest # 5

Repeating number problems then followed. It was felt that since the child in first grade is called upon to recite arithmetic statements, the ability measured here to repeat such statements is a minimum requirement upon which to build arithmetic communication. Maximum score was nine items correctly repeated. An intelligibility rating of this sample followed (subtest # 6).

III. Peabody Picture Vocabulary Test- Comprehending Terms- subtest # 7.

PPVT is a newly standardized test measuring the ability of the child to indicate comprehension of words by identifying the correct multiple choice picture which is a referent for word uttered by the examiner. This test is designed to measure the most elementary aspect of communication, the ability to understand what one hears. It goes beyond merely repeating what one hears in that it requires one to understand what is heard. It does not require the child to indicate comprehension by himself having to speak. This test was administered according to the standardized instructions and raw scores were obtained.

IV. Retelling A Story Via Pictures - subtest # 8.

This subtest measured the child's ability to give connected discourse in relating a story which he was told by the examiner. The story, Curious George, was told orally in conjunction with colored pictures representing the content which matched the oral material. The details on the pictures were pointed out by the examiner insofar as they matched the content of the story that the examiner was telling. When the story was completed the child was asked to tell the story. He was shown the pictures as he went along in story-telling to provide him with pictorial cues that would lighten the memory load and make it easier for him to tell the story in an integrated fashion. The story itself was chosen because it is interesting to children of this age level. It was specially simplified for use in this study.

Essential elements of the story were designated per page and were scored for presence or absence. Only sentences or phrases that followed the trend of the story were scored plus so as to avoid crediting sentences that were simply a description of the picture the child was looking at and did not refer to events mentioned in the origianl telling of the story. A child was not penalized if he failed to employ proper grammar. Similarly, a child's tendency to connect sentences by "and" did not dissuade us from scoring each unit as a sentence. The maximum score could be thirty or more facts.

V. Conversing in response to sentences (subtest # 9).

This sub-test consisted of seven questions dealing with the child's own life situation. The aim was to elicit a measure of verbal facility. It wa s planned to use probes when necessary and to measure the number of probes required to elicit a response. This task was designed to assess the child's

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fluency in talking about himself and his own life situation. It differed from the preceding task involving speech int that he was not simply repeating what he heard or telling a story from memory but was talking spontaneously and feely about events in his daily life existence. The examiner recorded verbatim the child's answer to these questions. If the child remained silent or answered very briefly, the examiner would ask one or more leading questions or probes to encourage the child to continue speaking on the question at hand. The number of discrete sentences given by the child was tabulated. In addition, the number of leading questions ("probes") required to elicit conversation from him was recorded and tabulated. It was found subsequently that examiners varied too widely from one another in the number of probes to combine the probing behavior of the different examiners. It appeared not to be an objective index of the child's verbal facility simply but simply of the examiner's idiosyncracies.

An intelligibility rating of the child's speech sample, sub-test # 10, was also obtained.

VI. Matching and copying of Written Symbols.

This consisted of four subtests. The first two subtests assessed the child's ability to match letters of the alphabet (# 11) and to match arabic numbers (# 12). In the former he was shown four letters of the alphabet in a standardized sequence and asked to locate these letters on a placard of eight letters. He was then shown a second and then a third placard sampling thereby two additional sets of four letters each. It was not feasible to place all the letters of the alphabet on one card and expect the child to exercise the patience and concentration required to locate specific letters. Therefore the alphabet was divided on three separate cards and the child was required merely to match four letters to their respective twins on the card.

Subtest # 11

Maximum score was 12 letters correctly matched. Each placard was 13 X 11 in. with eight letters printed by hand with a ruler in Gothic with a thick marking inker. The three cards were:

B	H	O
	M	D
L	A	P

K	T	W
	U	E
S	N	V

C	F	J
	I	G
E	R	Y

Letters to be identified were:

B, A, H, P

E, S, T, N

R, I, C, G

Subtest # 12

The second task presented the child with one card containing ten arabic numerals, and he had to point to each when a printed replica was shown.

Maximum score was ten numerals correctly matched. This placard was 13 X 11 in. with ten numerals printed in Gothic lettering.

1	2	3	4
	5	6	7
	8	9	0

Numbers to be identified were:

7, 3, 2, 5, 9, 0, 1, 4, 6, 8

Subtests # 13 and # 14

The two remaining subtests assessed the child's ability to copy in printing first letters of their name and then additional letters to make a total of ten letters copied (#13). He then copied five numbers (#14). If a child appeared ready to write his own name without having to copy it he was permitted to do so and his performance was noted. Scoring was lenient and any recognizable reproduction of the written symbol was scored plus. Maximum score for #13 and #14 was 10 and 5 respectively.

C. Evaluation of home environment (see Appendix C).

The questionnaire is designed to be used in a home visit by a social worker in evaluation of the verbal environment. The level of maturity of the child in terms of readiness to learn language is a function of both the capabilities of the child's central nervous system at birth and the amount of verbal training and stimulation in the child's home environment. The quality of the verbal environment is assessed by means of a series of questions relevant to child rearing practices and attitudes. The opportunities was also taken to take a history of any possible pre-natal or peri-natal difficulties, as well as data on the developmental milestones.

It was postulated that considerable heterogeneity would be found in the child's environment not necessarily related to the low income level which limited admission to Head Start.

Assessments were particularly made of the physical qualities of the home in terms of materials available for intellectual and aesthetic stimulation (subtest #22). The degree of organization of the family (subtest # 23) and the degree of physical crowding (subtest # 24) were also felt to be important parameters. Most important, the questions were frequently made deliberately

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open-ended. The parent's replies were in all cases taken down in a verbatim manner. The amount of verbiage, the degree of slurring and the use of gesture all contributed to an evaluation of the verbal skill of the mother. The use of methaphor and cliches, anecdotes etc. were considered as measures of verbal facility. This was subtest # 25. It is recognized that the data so obtained are to be considered only as what was found under the specific conditions of testing. It was felt however that the verbal skills so displayed by the mother under the stress of the interview would be relevant to the degree of verbal repertoire available to the child in as school or testing situation.

III Details on Method.

A. Selection of subjects.

Entry into the Head Start Program in the District of Columbia was limited to those families whose incomes were $3000 or below. However an additional $600 of income was permitted per child. An additional pre-requisite was the absence of any previous school experience. The large majority of the children ranged between 4 years 6 months and 5 years 6 months and were pre-kindergarten. There were however a small number of children who had not been to kindergarten due to various reasons and were about to enter first grade in the public schools. The children were selected on the basis of age alone for entry into the test group. All children tested were Negro.

B. Selection of centers.

There were approximately 40 children in each of two Head Start Centers. The participating centers were chosen to illustrate two of the separate types of programs available in the District of Columbia during the summer of 1965.

Monroe Center (M) at Irving and Georgia Ave. was staffed and run by the

D.C. Public School system. It is an old building illustrative of many in the School System. Its personnel although dedicated and hard working were drawn from general pool of teachers available for summer employment. They had no specific training in early childhood teaching other than that provided by a short orientation course just prior to the start of the program. School materials earmarked for these classes did not arrive until the second week. The Center was prey to the type of administrative difficulties that are perforce related to an innovating "crash program" of this sort. However the children were from the adjacent neighborhood and a considerable degree of parent attendance at school meetings and esprit was achieved despite these difficulties.

The National Child Research Center (NCRC) in Cleveland Park is a well equipped, air conditioned private school. The children at this Center were bussed from the Morgan School District. Its personnel were those who had a considerable degreee of training and experience in early childhood teaching. There were plentiful materials and facilities that are used throughout the regular school year. Local high school students were available as volunteers and a small number of middle class white children were enrolled in an attempt to provide a mixed environment. Every attempt was made to run the summer program in a way representative of the best quality private pre-school center. The emphasis was on providing both social and language training in a manner that would make school a pleasant experience.

C. Testing procedures.

1. Calendar of testing:

Phase one took place during the second week of the Head Start Project. At the Monroe Center children were seen on July 7, 8 and 9. At NCRC children were seen on July 12, 13 and 15. During this phase both the neurological

evaluation and the initial SRE were administered. Phase two, the administration of the Stanford-Binet Form LM, took place during the fourth week with Monroe tested on July 19, 20 and 23 and NCRC on July 21, 22 and 26. Phase three was the retest on the SRE taking place during the last week. The Monroe sample was tested on August 17, 18 and 20 and NCR on August 13, 16 and 19. The social worker visited the children's homes throughout the eight weeks.

2. Numbers tested.

The original sampel which had both the neurological evaluation and the SRE during phase one consisted of 79 children. Four of these children were unavailable for testing during phase two (Stanford-Binet). Since we wished complete data on the intercorelations between the experimental test batteries of SRE and the Stanford-Binet, 75 children were available as the initial test sample.

Of these 75, 65 children were seen during phase three for readministration of SRE. The shrinkage was largely due to absence from school due to illness and dropout from the program. Only two children were uncooperative during the repeat testing who had previously been present in the original sample. The ten children who were not used in the retest sample were those who had generally done better than the average on the initial tests. It should not appear therefore that the scores found at the end of Head Start were biased by the removal of the lower scoring children.

3. Examiners.

The neurological evaluation was done by a single neurologist with particular experience in child neurology. The psychological tests was administered by a total of ten examiners in one or more phases of the testing program. Several either held a doctorate in clinical psychology or were shortly to receive it. The majority of examiners were graduate students in clinical psychology with

supervised experience in administration of the Binet. The remaining students had some graduate or professional experience in testing children. All examiners were exposed to a series of orientation sessions to acquaint them with the purpose of the program, the mechanics of the test administration and test scoring. During the initial adminiatration of the SRE, a supervising clinical psychologist, observed the examiners and was available for consultation. The examiners met following the first morning of SRE administration, discussed and ironed out individual problems. Thereafter the testing program met with no obvious obstacles.

4. Procedure:

Each child was seen individually by an examiner. The child was seated at a desk comfortable for his height and in a room or section of a room free of major distractions. There was enough space at NCRC for the children to be tested in completely separate rooms. The children were introduced to the examiner by a Negro teacher on the premises in certain phases of the program. In other instances they were taken out of class and introduced to the examiner.by a specifically designated person. An effort was made throughout to make the child feel comfortable and secure in the face-to-face testing situation with a strange examiner.

All examiners attempted to establish rapport with the child by asking a few questions and encouraging the child to express himself. Depending on the particular phase of the testing the examiner then continued with the appropriate test battery. Each child was told by his examiner that he would receive a lollypop for his efforts and was so rewarded at the close of the session. In most instances the children handled the experience in an agreeable fashion and appeared to enjoy it.

In order to maintain the interest of the child throughout the examination

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it was decided early in the administration of the SRE to give the test in the following sequence:

(A) Subtest # 11, 12, 13, and 14 were given first because they engaged the child's interest, did not require him to speak to begin with and gave him something to do with his hands.

(B) Retelling a story via pictures (#8) followed because it was unquestionably one of the most interesting of the tasks presented to the child, yet a task that depended heavily on his attention span.

(C) Conversing in response to questions (#9) followed.

(D) The repetition tasks (#1, 2, 3, 4) were then administered. They were placed at this point in a sequence because the child was more comfortable in speaking to an examiner.

(E) Comprehending terms of the PPVT (# 7) was the final test in the battery.

IV. Analysis of Results.

There were 75 children on whom there were complete data on the first phase of testing including both the neurological evaluation and the pre-test of the S.R.E. Complete data are available on 65 of these children through the second (Stanford-Binet) and third (post-test of S.R.E.) phase of testing. The data on the 65 for pre and post comparisons and on the total of 75 for the initial correlations were submitted to a series of analyses by machine computation (IBM 620). Each child was classified by sex, age level and school. The distribution of these variables is presented in Table I. It is noted that there were approximately equal numbers of boys and girls and an approximately equal number of pupils in each of the two school programs. The majority of the children were in the 54 to 66 month old group with approximately equal numbers in each.

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A. The affects of school selection and sex.

The population assigned to the various school centers did not differ significantly in the verbal quality of the homes from which the children came. The two school samples did not differ to any marked degree in measures of neurological maturity, on the subtests of the S.R.E., not on the M.A. other than on the basis of age. In addition there were no significant sex differences on the subtests of the S.R.E. or on the Stanford-Binet. There was one significant sex difference on subtest # 16 on the neurological battery with boys earning a significantly higher right-left discrimination score. When separate means for boys and girls at each age level were computed the differences were not consistent at each age level. Given the unequal numbers of boys and girls being compared to each age level and the wide range of scores on this subtest, no definitive statement about sex difference could be made.

B. The Effects of age.

The neurological measures and the experimental test battery S.R.E. showed differences between the various age groups. Means and the standard deviations of the initial SRE scores are presented in Table II. It is noted that the majority of the significant differences are between Level I and Level III children. It appears that these measures are not sensitive to age differences of plus or minus 6 months but the majority of them were significantly sensitive so as to differentiate children differing in age by at least 1 year. These age-specific differences were noted in sub-tests relating to intelligibility as well as those relating to all aspects of language function in which there was room for improvement. Even with those sub-tests where age level comparisons did not attain strict statistical significance, in nearly every instance the mean of the higher age level was in the expected directions.

The neurological measures also showed age-specific results. Table III indicates the means and standard deviations of neurological measures. These measures include # 15-a rating of intelligibility, # 16- right-left discrimination, # 17- motor scale, # 18- face-hand test, and # 19- sound-touch test. It is noted that there were no significant differences as a function of age on the intelligibility rating. On right-left discrimination there was no significant difference between age levels I and II but there was between II and III and by inference between I and III. The Motor Scale also discriminated successfully, on this instance between Levels I and II but not between Levels II and III.

For the face-hand and the sound-touch test there were no significant differences as a function of age although in both instances there was an absolute decrease in the frequency of children deemed to have a positive result.

C. Improvement during Head Start.

The means and standard deviation of the 14 measures on pre and post testing with the SRE are indicated in Table IV. Individual t tests showed a significant change with a probability of occurring by chance of less than .05 for sub-tests # 1, 2, 7, , 11, 12. Improvement occurred on sub tests measuring the ability to repeat intelligibly words and sentences, the ability to comprehend verbal terms, the ability to recall and relate a story in a connected fashion and in the ability to correctly match letters of the alphabet and arabic numerals. It would appear therefore that improvement occurred in many of those skills which are required prior to the acquisition of the more complex reading skills.

Improvement in the intelligibility ratings.

Subtests measuring copying of letters of the alphabet and arabic numerals (#13, 14)showed no significant improvement. These copying tasks were quite difficult. Mean scores were very low and remained so, unaffected by whatever learning experiences occurred during the Head Start Project.

One measure, # 9, conversing in response to questions, changed in the opposite direction. On the whole, less verbal output was achieved on the post-test than on the pre-test. This apparent decline is probably related to transient situation variables. I may be noted that this sub test had a correlation coefficient from test to retest that was not signicicantly different from zero. The correlations between this measure and the other measures on the SRE were also not significantly different from zero. This permits us to conclude that this measure was a poor one oand was unsuccessful in tapping a stable language behavior in these children.

D. Improvement as a function of School program.

One goal of this research study was to ascertain whether one may find differences in the results in the two types of school programs available for study. Specifically one may expect that the better equipped center with its more specifically trained teachers would be the more successful. The two groups differed slightly in terms of pre-test parameters with the public school superior (p.02) on mean numbers legibly copied (sub-test # 14). In contrast the private school group was initially superior (p.05) in repeating numbers and number series (sub test # 14). These differences disappeared during the post-test when either the inferior group improved slightly relative to the superior group (sub test # 4) or the superior group did not do as well on the post-test (sub test # 14). The original differences were largely confined to SRE variables which did not show improvement and disappeared during post-testing.

Although improvement occurred on some of the parameters measured in the SRE there was no significant difference between the two centers. The differences between the programs were not those which are necessarily susceptible to testing via the SRE nor was the period perhaps long enough to demonstrate any

specific long term gain. It may also benoted that the NCRC program went on for 7 weeks rather than the 8 week public school program.

E. Improvement as a function of sex.

Although there were no differences on the pre-test in terms of sex, sub-test # 9 yielded a significant difference favoring girls (p .01) on the post-test. This is because boys did less well on post-test than they had done on pre-test. The implications of this are unknown and undoubtedly inconsequential since as noted above this sub-test had the least pre and post-test consistency and also the lowest relationship with any of the other measures.

Boys were superior to girls (p .05) in matchnng letters in that they improved their scores from pre to post and performed at a consistently higher level than girls (11.7 versus 11.2 letters of the alphabet correctly matched). To the contrary, in subtest # 13 (p .05) girls were significantly superior to boys in copying letters of the alphabet (3.3 versus 1.3 letters legibly copied). It is not uncommon to find small but statistically significant differences favoring girls in tests of language or fine motor coordination. In the case of our sample we have one such instance (# 13) and one finding in the opposite direction (#11). In general, however, it seems reasonable to assume that the differences between the two sexes were not impressive, nor of practical significance, despite the statistical difference between the sexes on the measures mentioned above.

F. Improvement as a function of age.

As noted above, the results on initial testing showed age-specific scores. The differences which had appeared between the age groups on the initial testing (Table II) were significant (p .05) in seven of the sub-tests. In Table V post scores on the S.R.E. test battery are again arranged on the basis of age.

Differences were significant (p .05) in only four of the sub-tests. The significant difference favoring the older children in the copying sub-test (#13, #14) persisted. The difference in retelling a story via pictures (# 3) actually increased in magnitude in the older children.

Although there appeared to be some age-specific improvement in these few areas, the younger children generally gained during Head Start. They overcame the deficiencies on the pre-test in ~~xxx~~ subtests perhaps initially attributible to age level of maturation by means of the training and experience made available to them in the summer program.

G. Improvement as a function of practice and other factors.

As noted above, significant improvement in the SRE occurred on six measures (subtests # 1,2,7,8,11 and 12). Further it was found that these changes between pre and post testing were not apparently related to school program, sex or primarily age level. It may be emphasized that "maturation" in terms of increase in age over the summer cannot be used to explain the change. As noted above, the younger child group seemed, if anything, to improve in more areas than the older level. If the improvement is to be attributed to increase in age, one would assume that the older group would have maintained its initial advantage to a greater degree.

The possibility remains that the improvement which occurred when measured by differences in the SRE may be functions of the practice effect. The repetition of the same test and increased familiarity with the testing situation including dealing with adults may possibly be construed as explaining the changes which occurred. It may be noted that a control group without the six week school experience was not available. However several factors tend to mitigate against this explanation.

The "practice effects" of taking the same test twice are of course much more likely when these has been correction of the initial performance. This was not done with the SRE at any time. The teachers were not familiar with the test materials and no attempt was made to point out deficiencies in particular children's performances. In sub-test # 8, the telling of a connected story, there is the possibility of some greater familiarity on the post-test. However there was at least a six-week interval between tests. Further the teachers were specifically asked not to include this particular story in any of their instructions.

If practice had operated as the major variable one would have assumed it to be relatively unselective. It would have resulted in higher scores on the post-test for all SRE measure and equally so for all age levels. Improvement however occurred only in certain sub-tests and was related to age-level to a certain degree. Moreover improvement was also related to M.A. The higher M.A. level children appeared to improve more than the lower M.A. level. There were highly significant correlations between 13 of 14 SRE measure and the M.A. derived from the Stanford-Binet. The correlations of M.A. and SRE were even higher for the post SRE scores than on initial testing. This would also tend to exclude a blanket practice effect operating for all children.

Familiarity with the testing situation is another possible explanation for the improvement. In fact the third phase of testing during the closing week of school was carried on under the more adverse conditions. Medical examinations, and other testing of the Head Start children were going on almost concurrently. The testing conditions were more crowded and the getting of the children from the classroom was if anything, less smoothly done. Furthermore, rating by the psychological tests adequately of child's performance and degree of cooperation were not different on this phase than on the first.

It therefore appears that the specific and significant trends of improvement on the SRE reflect genuine improvement during the Head Start experience rather than increased age per se, practice or becoming test-wise.

H. Improvement as related to level of "neurological maturity".

One of the purposes of the study has been to relate the improvement in the Head Start program to the level of maturity of brain function found on the neurological screening examination. As discussed previously, the neurological examination had been construed as providing a measure of the developmental maturation in motor and perceptual areas. The aim was to relate these parameters to the achievement and rate of learning in the Head Start program.

The neurological measures were analysed in terms of age level and break off point were established for each of these parameters. A score of 4 on intelligibility rating (sub test # 15) was considered as immature on any age level within our sample. On tests for right-left orientation (sub test # 16) greater than one standard deviation from the mean was established as the "break-off" point. This involved a score of 3 or below for age levels I and II, 5 or below for Level III. On the motor scale (sub-test # 17) the "break off" points for immaturity was similarly established. A score of 2 or below for level I, 33 or below for level II, 3 or below for level III were considered to be "immature". A notation of a positive finding on the face-hand or sound-touch tests was not considered as a determining criterion of neurological immaturity per se. In no case however was this diagnosis made in the absence of a positive result.

The test for right-left orientation did not in general correlate as well with any of the other neurological sub-tests, the M.A. or the sub-tests on the SRE. Those children who did poorly on this test alone were not considered to be

immature. In going over the protocols of testing it was found that a low score on thss test alone was a result of systematic reversal of right-left without breakdown in crossing mid-line. Those who did poorly on thss test as well as the motor test had other sorts of breakdown. They either did not carry out commands at all or did wo erroneously in a random manner. The major criterion therefore for the establishment of "neurological immaturity" was the score on the motor scale (sub-test # 17).

On this basis 14 children were identified as "neurologically immature". They all had scores greater than one standard deviation from the mean for their age group and also had evidence of perceptual difficulties as determined by the face-hand and sound-touch tests. Their scores were not significantly below the mean for their age group on the tests for right-left nor were they in all cases relatively poor in speech patterns. There was but one additional case, however, who was poor in speech patterns who did not fall within this group on the basis of the motor scale. Inclusion in this group of the "neurologically immature" came about for 3 of these children on the basis of the inability to perform a complete test. The point at issue was the value of a screening device such as this neurological one to pick up children who may require special handling in the school situation. These children could not carry out the commands required by the test situation despite several attempts, much candy etc. They differed markedly from the usual child and as such are identified. It is recognized that the specific diagnosis of "neurological immaturity" may not be valid. It may be noted however that all these children were independently identified by the teachers as being "unready for school".

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The incidence of "neurological immaturity" in our sample was approximately 1%. It is not surprising since we defined our population in terms of greater than one standard deviation from the mean. If indeed we had a normal distribution within our population one would expect the group to be around 17%. That this is a true measure of a group requiring special effort in the school population is the real point. The teachers were asked to independently evaluate the children in terms of their own criteria as to whether a child was "unready for school". In all cases but one they identified the children already selected on the basis of the neurological criterion as among those whom they considered to be "unready".

The children so identified as "neurological immature" were analyzed in terms of their performance on the re-test with the SRE. Immaturity in language skills on this test battery was determined on the basis of scores greater than one standard deviation from the mean established for each age group. Each child was separately analyzed. In two cases the child had dropped out of the program prior to the retest of the SRE. These children were analyzed in terms of their initial SRE score. At least 3 of the sub-tests were below one standard deviation for a child to be considered as "immature" on this test battery. On this basis children were found to be "immature" on both the neurological and SRE. The six additional children may be considered as false positives. This group includes the two drop-outs who may have done less well on the second SRE test than their peers but were unavailable for re-testing. There were then 4 children remaining who were false positives. Of these three came from very verbal, well structured families. The possibility exists that these children may have some slight degree of neurological immaturity on motor and perceptual tests. Their ability to perform relatively well on the language battery of the SRE may reflect the better quality of verbal environment and learning whichw went on in the pre-

school period. As initially hypothesized, the level of maturity in the child entering school is a combination of both the capacity of his brain to achieve growth and the quality of the training available. The children may well be able to surmount their difficulties by virtue of their better opportunities to acquire verbal skills in their home.

It is not disturbing that there were perhaps some false positives on the neurological screening examination. The aim is to provide a relatively rapid, simple test which can point out the problem children so that more adequate provision can be made for them prior to the "test of school". There were however two additional children who may be considered as "false negatives". One child (NCRC # 29) had a motor score of 34 when the break-off point had been previous established at 33. She also had a positive sound-touch test. Her speech had been considered as relatively immature. On the SRE she did relatively poorly on 4 out of 10 subtests. She also came from the poorest sort of physical and home environment of all the children in the sample. This latter factor may have contributed to her poor showing in language skills. In any event in retrospect she perhaps may be considered to be "immature", if our criteria were to be intelligently applied. The seoond "false-negative" (NCRC # 36) was the eldest child in the sample. She had not been to kindergarten and was 6 years 10 months at the time of testing. She had a motor score of 42 which was not considered to be significantly below the norm. Her sound-touch test was however positive unlike the other children in the same group of her age sample. She did relatively poorly on the SRE in 3 out of the 10 subtests. Her family environment was also a poor one. In this case as well the quality of the home environment may be the significant factor. Both these cases illustrate the need for adequate evaluation of both home environment and the neurological examination

in any determination of possible retardation of development of skills necessary for school achievement.

V. Conclusion.

A group of 75 children in the Head Start Program in the District of Columbia were analyzed in terms of the relation of neurological and home environmental factors for their language development. Special instruments were designed for rapid assessment of "neurological immaturity" and norms were established for the various age groups in the sample. Special instruments were desinged for the evaluation of language skills with particular relevance to the school learning situation. Norms were also established for these tests known as the School Readiness Evaluation (SRE). Special instruments were designed to evaluate the quality of the home environment with particular emphasis on the verbal skills of the mother. The SRE was administered as the beginning and end of the Head Start program. It was found that improvement occurred in sub-tests measuring the ability to intelligibly repeat words and sentences, to comprehend verbal labels, and to recall and relate a story in a connected fashion. Improvement also occurred in the pre-reading kinds of visual discriminations in matching letters of the alphabet and arabic numerals.

This improvement was not a function of the differing quality of the school programs available for study during the summer of 1965. It was also not apparently related to sex nor primarily to the age level of the child within the range of our sample. It cannot be attributed merely to increase in age nor to practice. It was however related to the M.A. of the child.

Further, the neurological screening examination has been partially validated as a predictor of school achievement within the limits of the SRE. Particularly

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useful is the motor scale as a screening device. Children so delineated have been found to be suseptible to poorer performance on tests for language skills. It is hoped that these children will continue to be followed into the primary grades to further validate this pre-school examination. Particular enphasis should be placed on the quality of the verbal environment in the home as a significant parameter in the evaluation of the child.

VI. Suggestions for further study.

The neurological examination is to be done on a larger sample in the pre-school period. Norms are to be established for the children already examined at higher ages up to 8 years. The sample already seen is to be augmented by an additional group of non Head Start Children. This is to determine the differences in terms of school achievement between the two gooups. Further studies will involve an improved SRE with emphasis on the development of metaphor. The establishment of more adequate norms for the neurological examination depend as well upon a non poverty sample.

The instruments aldeady developed have been put into use by pediatricians to pick up abnormalities prior to school entry. There has been considerable interest in the use of these instruments by school authorities both as a measure of the incidence of these difficulties for planning purposes and for the delineation of the specific child.

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Table I

Distribution of Children Tested at Start of Research Project (Pre-Test)

Age/months	Monroe		NCRC		Total
	Male	Female	Male	Female	
54 - 60	9	7	7	8	31
61 - 66	6	8	2	8	24
67 --	4	3	9	4	20
					75

Distribution of Children Successfully Tested in All Phases of Research Project (Post-Test)

Age/months	Monroe		NCRC		Total
	Male	Female	Male	Female	
54 - 60	9	6	6	7	28
61 - 66	5	8	2	7	22
67 --	4	3	5	3	15
					65

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Table II

Mean and SD of Pre SRE Scores at Three Age Levels

	Age Levels/Months						Comparisons		
	I		II		III		I - II	II - III	I - III
Item	54-- 60		61 - 66		67 --				
	Mean	SD	Meand	SD	Meand	SD			
1	6.07	2.50	6.41	1.56	6.84	1.39			
2	1.46	1.30	2.00	1.65	2.63	1.75			
3	2.56	.73	2.14	.62	1.84	.67			<.01
4	12.25	2.76	12.45	2.98	13.53	2.16			
5	4. 2	2.78	5.14	3.14	6.47	2.39			<.05
6	2.32	.80	1.95	.71	1.74	.64			<.05
7	33.43	11.06	37.50	13.2	41.5	10.03			
8	5.04	3.40	6.45	4.72	9.53	3.76			<.01
9	9.75	7.64	11.64	7.76	10.00	6.66			
10	2.50	.87	2.09	.67	2.05	.89			
11	10.61	1.32	9.91	2.71	11.26	1.07			
12	7.64	1.91	7.50	2.70	.74	1.29			<.05
13	1.21	2.27	4.05	3.85	4.53	3.70	<.01		<.001
14	.25	.57	1.00	1.48	1.42	1.76	<.05		<.01

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Table III

Means and SDs of Neurological Measures as a Function of Age Level (N=75)

Age		15	16	17	18	19
54-60 (I)	Mean	2.6	6.7	37.9	.60	.74
	SD	.61	2.5	8.1	.47	.44
61-66 (II)	Mean	2.5	6.5	42.8	.52	.72
	SD	.64	2.8	8.7	.50	.45
67-- (III)	Mean	2.4	9.0	45.1	.42	.53
	SD	.5	3.1	5.8	.49	.50
I - II		NS	NS	.05	NS	NS
II - III		NS	<.01	NS	NS	NS
I - III		NS	<.01	<.01	NS	NS

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Table IV

Means and standard deviations for Headstart

measures for those children present through all of all examinations.

	Pre		Post		Significant beyond .05	
	Mean	SD	Mean	SD	pos.	neg.
School Readiness Battery (SRE)						
1. Repeating words	6.25	2.04	7.11	1.03	*	
2. Repeating sentences	1.92	1.55	2.49	1.60	*	
3. Intelligibility rating of 1 and 2	2.23	.73	2.15	.70		
4. Repeating numbers and numb.series	12.44	2.82	12.93	2.55		
5. Repeating number problems	5.2	2.87	5.30	2.52		
6. Intelligibility rating of 4 and 5	2.05	.73	2.13	.64		
7. Comprehending terms (PPVT)	35.85	11.97	41.64	11.67	*	
8. Retelling a story via pictures	6.39	4.24	7.77	4.90	*	
9. Conversation in response to quest.	10.02	7.21	7.62	6.99		*
10. Intelligibility rating of 9	2.30	.82	2.26	.77		
11. Recognizing letters of alphabet	10.54	2.00	11.46	.95	*	
12. Recognizing Arabic numerals	7.85	2.26	8.62	1.43	*	
13. Copying letters of alphabet	2.92	3.46	2.64	3.16		
14. Copying Arabic numerals	.82	1.42	.74	1.20		
Stanford Binet Intelligence Scale - IQ			8.73	14.26		

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Table V

Mean and SD of Post SRE Scores at Three Age Levels

	Age Levels/Months						Comparisons		
	I		II		III		I - II	II - III	I - III
Item	54 - 60		61 - 66		67--				
	Mean	SD	Mean	SD	Mean	SD			
1	7.00	1.13	7.18	.94	7.47	.81			
2	2.07	1.28	2.77	1.91	2.93	1.39			.06
3	2.32	.66	2.13	.65	1.00	.65			< .02
4	12.68	1.93	13.45	2.55	13.00	3.10			
5	4.75	2.64	5.50	2.27	5.93	2.29			
6	2.25	.63	2.09	.60	1.93	.68			
7	40.75	9.72	41.95	12.46	44.07	12.40			
8	6.00	4.40	.18	4.81	11.00	4.10			< .001
9	7.68	6.72	9.68	7.69	6.40	7.70			
10	2.43	.68	2.14	.69	2.07	.85			
11	11.46	.91	11.23	1.05	11.80	.54			
12	8.46	1.21	.50	1.65	8.93	1.29			
13	1.07	1.98	3.14	3.23	4.60	3.16	.01		< .001
14	.25	.78	1.00	1.28	1.07	1.34	.02		< .02

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NEUROLOGICAL EVALUATION

Appendix A

Name _____ Age _____ Project No. _____ H.S.No. _____

Handedness _____ Date _____ Center _____

Examiner _____

Subtest # 15

Interaction with examiner (Conditions of testing, level of distractibility and cooperation, ability to follow directions, amount of gesture, laughter, slurring and general appearance.) Intelligibility 1 -- 2 -- 3 -- 4

Subtest # 16

Right - left orientation

Show me your hand as example

	Score 0	1
1. Show me your left hand		
2. Show me your right leg		
3. Show me your left eye		
4. Show me your right ear		
5. Show me your left leg		
6. Show me your right hand		
7. Do as I do (touching right hand to left ear)		
8. Do as I do (touching left hand to left ear)		
9. Point to my left ear		
10. Point to my right eye		
11. Point to my left hand		
12. Touch your right ear with left hand		
13. Touch your left foot with right hand		
14. Cross your left leg over right knee		
15. Touch your right knee with left hand and left elbow with right hand		

NEUROLOGICAL EVALUATION

MOTOR SCALE

Subtest # 17

All actions to be demonstrated. (Scoring is 3 for perfect on first attempt, 2 for perfect on second attempt and 0 for inadequate on second attempt.)

	Score 0	1	2	3
1. Standing on right foot (10 sec.)				
2. Standing on left foot (10 sec.)				
3. Tapping right foot (10 sec.)				
4. Associated movements of hand				
5. Tapping left foot (10 sec.)				
6. Associated movements of hand				
7. Hopping in place, right foot (10 sec.)				
8. Hopping in place, left foot (10 sec.)				
9. Crouching on tip toe (eyes closed) (10 sec.)				
10. Standing heel to toe (15 sec.)				
11. Walking straight line, 6 feet				
12. Walking straight line (eyes closed)				
13. Walking backwards, 6 feet				
14. Touching nose				
15. Rapid alternating touch of fingertips (R)				
16. Rapid alternating touch of fingertips (L)				
17. Tapping rhythmically with feet and finger (R)				
18. Tapping hythmically with feet and finger (L)				
19. Puckering of lips				
20. Tongue movements				

TOTAL SCORE _____

Reflexes

Babinski

NEUROLOGICAL EVALUATION

Cranial Nerves

1. Visual acuity
2. Eye movements
3. Pupillary reaction
4. Eye grounds
5. Facial movements or tics
6. Hearing test (gross)_____ air_____ bone_____

Sensory Testing

1. Face - hand test

   Subtest # 18

2. Hand - leg test

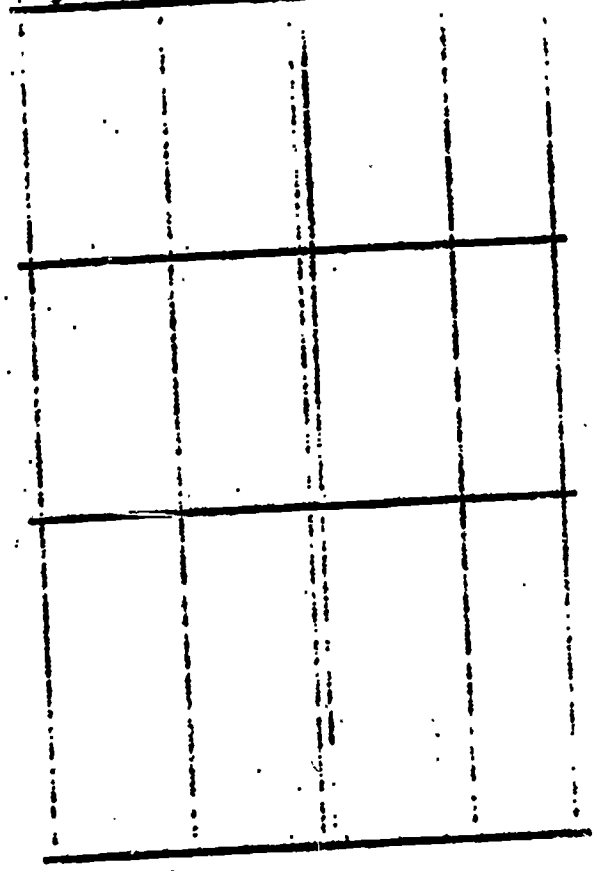
3. Sound - touch test

   Subtest # 19

4. Stereognosis

5. Two-point discrimination

Eyes Closed Eyes Open



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School Readiness Evaluation (SRE) Appendix B.

Name _____ Examiner _____ Date _____

1. Repetition of Words and Phrases. Record child's repetition by bracetting omitted words and writing in additional words.

test # 1 "Please say after me. . . say what I say."

cake _____ duck _____ tar _____ moon _____

baseball _____ fire engine _____ cowboy _____ cherry tree _____

est # 2

I am a big boy (girl).

The balloon is way up in the air.

The monkey swings in the zoo.

The little rabbit is eating flowers and carrots.

I saw a picture of pretty flowers on television.

On Valentine's Day we buy valentine cards and mail them to our friends.

Billy found a nickel on the sidewalk and bought a candy bar for himself and his baby sister.

test # 3

Intelligibility Rating (circle one) 1 2 3 4.

2. Repetition of Numbers and Number Combinations.

"Now listen to what I say and you say it after me. . . don't start talking until I finish say the numbers."

test # 4

7 _____ 3 _____ 9_____

13 _____ 15 _____ 18 _____ 29 _____ 41 _____ 67 _____

145 _____ 692 _____ 873 _____ 1385 _____ 1742 _____ 1965 _____
(e.g., one forty five)

test # 5

1 + 1 = 2 _____ 2 + 3 = 5 _____ 6 + 3 = 9 _____ 5 + 5 = 10 _____

9 + 4 = 13 _____ 7 + 8 = 15 _____

4 take away 2 = 2 8 take a way 3 = 5 13 take away 6 = 7

bt 6

Intelligibility Rating (circle one) 1 2 3 4

Form A

Name _____

Item	Resp.	Key Word
1	(4)	car
2	(3)	cow
3	(1)	baby
4	(2)	girl
5	(1)	ball
6	(3)	block
7	(2)	clown
8	(1)	key
9	(4)	can
10	(2)	chicken
11	(4)	blowing
12	(2)	fan
13	(1)	digging
14	(1)	skirt
15	(4)	catching
16	(1)	drum
17	(3)	leaf
18	(4)	tying
19	(1)	fence
20	(2)	bat
21	(4)	bee
22	(3)	bush
23	(1)	pouring
24	(1)	sewing
25	(4)	wiener
26	(2)	teacher
27	(3)	building
28	(3)	arrow
29	(2)	kangaroo
30	(3)	accident
31	(3)	nest
32	(4)	caboose
33	(1)	envelope
34	(2)	picking
35	(1)	badge
36	(3)	goggles
37	(2)	peacock
38	(3)	queen
39	(4)	coach
40	(1)	whip
41	(4)	net
42	(4)	freckle
43	(3)	eagle
44	(2)	twirl
45	(4)	shining
46	(2)	dial
47	(2)	yawning
48	(2)	tumble
49	(1)	signal
50	(1)	capsule
51	(4)	submarine
52	(4)	thermos
53	(3)	projector
54	(4)	group
55	(3)	tackling
56	(1)	transportation
57	(1)	counter
58	(2)	ceremony
59	(3)	pod
60	(4)	bronco
61	(3)	directing
62	(4)	funnel
63	(2)	delight
64	(3)	lecturer
65	(2)	communication
66	(4)	archer
67	(1)	stadium
68	(1)	excavate
69	(4)	assaulting
70	(1)	stunt
71	(1)	meringue
72	(3)	appliance
73	(4)	chemist
74	(3)	arctic
75	(4)	destruction
76	(3)	porter
77	(2)	coast
78	(4)	hoisting
79	(1)	wailing
80	(2)	coil
81	(3)	kayak
82	(2)	sentry
83	(4)	furrow
84	(1)	beam
85	(3)	fragment
86	(2)	hovering
87	(3)	bereavement
88	(4)	crag
89	(2)	tantrum
90	(1)	submerge
91	(3)	descend
92	(2)	hassock
93	(1)	canine
94	(1)	probing
95	(1)	angling
96	(3)	appraising
97	(4)	confining
98	(4)	precipitation
99	(1)	gable
100	(1)	amphibian
101	(3)	graduated
102	(2)	hieroglyphic
103	(1)	orate
104	(3)	cascade
105	(4)	illumination
106	(1)	nape
107	(2)	genealogist
108	(2)	embossed
109	(4)	mercantile
110	(2)	encumbered
111	(4)	entice
112	(3)	concentric
113	(3)	vitreous
114	(1)	sibling
115	(2)	machete
116	(4)	waif
117	(1)	cornice
118	(3)	timorous
119	(1)	fettered
120	(2)	tartan
121	(3)	sulky
122	(4)	obelisk
123	(2)	ellipse
124	(2)	entomology
125	(4)	bumptious
126	(2)	dormer
127	(2)	coniferous
128	(4)	consternation
129	(3)	obese
130	(4)	gauntlet
131	(1)	inclement
132	(1)	cupola
133	(2)	obliterate
134	(3)	burnishing
135	(1)	bovine
136	(4)	eminence
137	(3)	legume
138	(4)	senile
139	(2)	deleterious
140	(4)	raze
141	(2)	ambulation
142	(1)	cravat
143	(2)	impale
144	(4)	marsupial
145	(3)	predatory
146	(1)	investitude
147	(2)	imbibe
148	(3)	homunculus
149	(4)	cryptogam
150	(3)	pensive

Subtest # 17

PEABODY PICTURE VOCABULARY TEST

Form A

Individual Test Record

Name _____ Sex: M F Grade _____
(Last) (First) (Initial) (circle)

School _____ Teacher _____
(or address) (or parent or phone)

Calculation

Ceiling item _____
Errors _____
Raw score _____

DERIVED SCORES

Mental Age (M. A.) _____
Intelligence quotient (I. Q.) _____
Percentile (%ile) _____

Year Month Day

Date _____ _____ _____
Born _____ _____ _____
Age _____ _____

Examiner _____ Time _____ Code _____

JAN. 1 FEB. 2 MARCH 3 APRIL 4 MAY 5 JUNE 6 JULY 7 AUG. 8 SEPT. 9 OCT. 10 NOV. 11 DEC. 12

TEST BEHAVIOR

Examples needed:	only 1	2 or 3	over 3
Type of response:	Subject pointed	S. called numbers	Examiner pointed
Rapport:	easily attained	slowly attained	poor rapport
Guessing:	prone to guess	guessed when asked	resisted guessing
Speed of response:	fast	average	slow
Verbalization:	talkative	average	taciturn
Attention span:	distractible	average	very attentive
Perseveration:	none noted	some	frequent
Need for praise:	little needed	some needed	much needed

Other test behavior:

PHYSICAL CHARACTERISTICS

Motor activity:	hyperactive	average	hypoactive
Sedation:	none	slight	heavy
Ambulation:	normal	walks with support	none
Speech:	intelligible	fairly intelligible	unintelligible
Hearing: necessity to repeat stimulus words	never	seldom	often
	S. wore hearing aid	S. watched examiner's lips and face closely.	
Vision: distance of eyes from page	under 8"	average (8"-20")	over 20"
	S. wore glasses	S. owned but did not wear glasses during test.	

Other physical characteristics:

OTHER INFORMATION (previous tests, dates, scores etc.; teacher estimates of vocabulary, intelligence, achievement; school or work record)

American Guidance Service, inc. 720 Washington Avenue, S.E. Minneapolis, Minnesota 55414
Litho in U.S.A.

17374

Subtest # 8

Curious George
See, Hear and Tell

4. I am going to read you a picture sotry. The name of the story is Curious George. Listen to the story and look at the pictures. When I am done you will look at the pictures and tell me the story all by yourself. OK?

17377

Subtest # 8

Name _____ Examiner _____ Date _____

4. See, hear, and tell. Underline on this answer sheet the terms and phrases the child uses in telling the story. Where he substitutes a different word, write his word and try if possible to minimize what you have to write. The use of brackets can indicate the omission of material.

Page 1. This is George. He lived in Africa. He was very happy. But there was one thing wrong: he was too curious.

Page 2. One day George saw a man with a large yellow straw hat. The man saw George too. "What a nice little monkey," he thought. "I would like to take him home with me." He put his hat on the ground and, of course, George was curious. George came over to look at the yellow hat.

Page 3. George picked up the hat and put it on his head just like the man did.

Page 4. The hat covered George's head. He couldn't see. The man caught George and tied him up in a bag.

Page 5. The man took George with him on a boat. George saw some birds flying in the air. He wondered how they could fly. He was very curious. Finally he had to try. It looked easy. But --

Page 6. oh, look what happened! First this -- and then this!

Page 7. "Man overboard!" the sailors cried as they threw him a lifebelt. George caught it and held on. At last he was safe on the boat.

Page 8. The man with the yellow straw hat and George came to America. They walked off the ship onto the shore. They went into the city to the man's house.

Page 9. One day George saw a balloon man. George watched. He was curious again. He felt he must have a bright red balloon. He reached over and tried to help himself, but --

Page 10. instead of one balloon, the whole bunch broke loose. Right away the wind picked up the balloons and, with them, went George, holding tight with both hands.

Page 11. Up, up he sailed, higher and higher. The houses looked like toy houses [illegible]. George was frightened. He held on very tight.

17373

Page 12. When the wind stopped blowing, George came down -- bump, on to the top of a trafic light. Everyone was surprised. The traffic got all mixed up. He looked down and saw his friend, the man with the big yellow hat!

Page 13. George was very happy. The man was happy too. Then he paid the balloon man for all the balloons. And then George and the man climbed into the car and at last, away they went

Page 14. to the Zoo! What a nice place for George to live! Now he could play with all the other animals.

17379

Name _____ Examiner _____ Date _____

Subtest # 9

5. Comprehension and Expression of Connected Discourse: E's objective is to keep the person talking and obtaining as large a sample of his speech as possible. If he responds to question briefly, E should ask further leading questions.

1. What is your name? Who else lives in your house? (obtain name).

2. ~~What do you eat for breakfast in the morning?~~

3. Do you watch TV? Which programs do you like the best? Tell me about it.

4. How do you get a drink of water in your house?

5. What do you do if you fall and get scratched and bleed?

6. Do you like coming to school here? What do you like the best? Why?

7. What is your teacher's name? What do you like the best? Why

8. ~~What don't you like about your teacher?~~ ~~What is bad about school?~~

9. What did you do in school this morning (or yesterday)?

10. ~~Tell me what games you like best in school.~~

E must record in writing the number and kind of questions which he asks

Subtest # 10

Intelligibility Rating (circle one) 1 2 3 4

17:44 _____ Examiner _____ Date _____

6. Discrimination and Reproduction of Written Symbols:

Subtest # 11

1. "When you go to school you are going to learn to read and write. Here are some of the letters you are going to learn. I am going to show you a letter and I want you to find the letter that looks just like it up here. Put your finger on the letter down here and then on the same letter up here. (E scores number correct letter identifications out of 12).

B____	E____	R____
A____	S____	I____
H____	T____	C____
P____	N____	G____

Subtest # 12

2. "You are going to learn the numbers too. Here are the numbers and I want you to find the number up here that is the same as the number down here." (E scores number correct out of 10).

7____ 3____ 2____ 5____ 9____ 0____ 1____ 4____ 6____ 8____

3. "What is your name? Can you write your name yet? Well, that is why you are going to school, so that you will learn how to write your own name. I am going to write your name for you over here. See. That is your name. Can you find the letters of your name up here?" E presents suitable cards until S correctly locates all letters of his name. E records S's matching efficiency.

Subtest # 13

Subtest # 14 ____ ____ ____ ____ ____ ____ ____ (Correct recog. of letters in own name)

4. "Now I am going to help you to lern to write your name. Watch me write the first letter of your name. Now you copy it right under here. Etc." Very good, now let me see you copy these letters (any additional number of letters so as to guarantee his attempting a minimum of 10 letters). Now let me see you copy some numbers. Here is a number 3. Now you copy yours under mine. (Five numbers: 3, 4, 6, 7, 8)."

Appendix C.

Verbal Questionnaire

Date

Name

H.S. #

Name of parent

Iterviewer

Any of parents left handed

1. How many children do you have? _____ Tell me their names and when they were born in the order in which they came. (Also note adjoining child's name, any difficulty medically, in relation to school or left handed.)

Now about X (the child in H.S.) (The following should be taken verbatim.)

2. Tell me how did you feel while you were carrying the baby before he was born?

3. Can you tell me about it (if there were difficulties).

4. How was your delivery?

5. Can you tell me about it (if there were difficulties).

6. How much did X weigh when born?

7352

7. When did you feed X (breast or bottle) (and how long)? Routine?

8. Would X cry a lot?

9. Why do babies usually cry?

10. How old was X when he began to sit up?

11. When did X begin to walk?

12. When did X begin to talk?

13. When was X trained to control bowels?

When did X stop wetting during day?

When did X stop wetting during night?

Was X different from your other children?

13A. How do you feel about children going around without clothes on?

14. What would make a parent very proud of a child?

15. What is the best thing anyone could say about a child?

16. What is the worst thing anyone could say about a child?

17. What would you want X to be when X grows up?

18. What makes a child angry?

19. Why would a child be frightened?

20. Why would a child be jealous?

21. What would you do if X started a fight with someone and you were there?

22. How would you get X to do something you want him to do very much?

23. When would you punish X by taking away something that he likes?

24. When would X be whipped?

25 What do you think a child should know before going to school?

26. How would you describe a teacher?

27. How would you describe school?

28. Do you ever have a chance to read to X a great deal?

29. Do you have a chance to teach X the alphabet or numbers?

30. How would you teach X to do the right thing?

31. Give me an example (if has not volunteered any).

32. Do you belong to any church? (Name).

How often do you manage to go? (once/week) _____ (once/ month) _____

(occasionally) _____

33. Do your children go to Sunday School?

34. How much time does X spend watching TV? None 1-2 3-4 all day

35. Does X have crayons
paints
games
pets
children's books
comic books

36. Has X been an eating problem?

37. Does the family eat together:

When?

38. At what times do you eat meals?

39. Does husband (or equivalent) eat any meals with children?

40. How would you describe your husband?

41. Can you tell me about your own family and background?

41A. What do you think are the main problems of living here in America as a Negro?

42. How would you describe X if someone asked you?

43. Is he the sort of child who has a good imagination?

Can you tell me about an example?

44. Does he ask a lot of questions?

Can you give me an example?

45. Does he have nightmares?

Can you tell me about it?

46. What time does he go to sleep?

47. Does he have his own bed?

48. Does he dress himself?

49. Does he tend to play alone or with others?