AMERICAN JOURNAL of MENTAL DEFICIENCY

VOL. XLV OCTOBER, 1940 NO. 2

DIVISIONS

PUBLISHED QUARTERLY BY

THE AMERICAN ASSOCIATION ON MENTAL DEFICIENCY

PUBLICATION OFFICE: 372–374 BROADWAY, ALBANY, N. Y.

EDITORIAL OFFICE: LETCHWORTH VILLAGE, THIELLS, N. Y.

$4.00 PER VOLUME $1.25 PER COPY

Title registered, U. S. Patent Office

Application for entry as second class mail at the Post Office at Albany, N. Y., pending

DEVELOPMENTAL PROGRESS IN YOUNG MENTALLY HANDICAPPED CHILDREN WHO RECEIVE PROLONGED PRE-ACADEMIC TRAINING

By Ruth T. Melcher, Ph.D.
Research Associate

From the Wayne County Training School at Northville, Michigan, Robert H. Haskell, M.D., Medical Superintendent. *Studies in Educational Disabilities and Mental Deficiency*, directed by Thorlief G. Hegge, Ph.D., Director of Research and Education

EDUCATION of the mentally handicapped child has developed on the assumption that content for instruction should be suited to his mental age. In the academic field this concept involves a number of problems. The difficulty of academic work increases rapidly. Mastery of each step in reading and number work opens the way for new achievements, but also requires synthesis of knowledge attained and the ability to apply it in meeting new difficulties. The grade system of the public schools has developed from experience of the speed with which the normal child's rapidly unfolding intellectual powers enable him to progress.

The mentally handicapped child is advancing slowly. When he reaches a mental age of five and one half to six years, he may be as ready in some respects as the normal to begin to learn to read. He can associate word sounds with printed symbols and learn to recognize a number of them. A year later, if his I.Q. is 65, he has not progressed much beyond this level of ability.

Real readiness for academic work assumes more than the power to master the simple mechanics. In addition to maturity and accuracy of visual and auditory perception and muscular coordination, it assumes the possession of a sufficient stock of verbalized information and experience to enable the child to grasp the majority of the ideas presented in the primary grades. It also assumes the ability to advance at a rate which will motivate the learner to continue effort. Academic readiness for the mentally handicapped child should be defined as that time at which he is equipped to advance at a speed satisfying to him and sufficient to bring him to the limit of his achievement at 16 years of age without periods of cessation of progress.

Inspection of the academic records of young children at the Wayne County Training School revealed very slow progress before a life age of 10 to 12 years. Upon the hypothesis that this occurred because the child was being forced to cope with material for which he was not ready, the Prolonged Preacademic Program was initiated by Hegge in September, 1937, in con-

formity with his initial statement in 1934.[1] Upon the institution grounds the unit is known as Cottage 9. A description of this program was reported a year ago.[2] Evidence for the success of the experiment can now be based upon more extensive data. Material is also available which appears to corroborate our hypothesis that mentally deficient children are not ready for academic work as defined above at the same mental test age as normal children.

STATEMENT OF THE PROGRAM

A brief review of the main points of the Prolonged Pre-academic Program is as follows:

1. Boys under 11 years of age with I.Q.'s below 80 are admitted.

2. They are transferred to the regular academic program at 12 years of age, or at any time before 12 if their I.Q.'s rise above 80 or their mental ages exceed their educational ages by as much as two years.

3. During school hours they have no formal academic work. There are two teachers and an assistant. One teacher specializes in a reading readiness program, using the methods and materials suggested by the work of Marion Monroe. The other has an activity program. She allows the children to use a wide variety of materials in constructive work and emphasizes habit training, group coöperation and emotional control through social play. The assistant directs the children in a period of supervised play out-of-doors.

4. A full extra-curricular program is planned in which teachers and assistant participate.

5. A comprehensive testing program is carried.

6. The research associate in charge helps to coördinate the work of the school and cottage staff so that they operate as a unit in handling the problems presented by the children.

RESULTS

Demonstration of the success of this program includes three important aspects. *First,* we must show that it has a social value. Since we are emphasizing social and emotional training in place of academic work during the early years of institutional residence, we should expect fewer personality problems and more socialized attitudes, both toward the succeeding learning situations and toward later adjustment in the community, than result from conventional programs. *Second,* we must show that we are not retarding the children's mental development by deferring the introduction of academic work. *Third,* and crucial to the experiment, we must show that after these children enter the regular school program, they progress fast enough in academic work to reach the same final level of achievement as if they had received academic drill during the entire period of their school lives.

A. Social values.

The social values, while of paramount importance, are most difficult to evaluate at this time. We have found no measuring tool at present which defines group differences. We can offer only our observations that problems such as stealing, antagonism to other children, unwillingness to coöperate with the group, masturbation and enuresis tend to decrease. We could give case studies to illustrate how specific problems have been satisfactorily handled. This would

be true for institutionalization under any program and we can only wait until our children have completed their training and gone into the community to show that, as a group, they are better adjusted or make better use of their educational background than do children who have plodded along through the conventional training program.

B. Mental development.

In respect to mental development the status of our children can now be given fairly definitely.

Each of 58 children enrolled in the program was paired with a child who entered the institution at the same life age with the same I.Q. but at a date previous to the initiation of the Prolonged Pre-academic Program. These paired children constitute a control group matched for I.Q and length of residence during the same life age period as the experimental group. A graph of I.Q. level at successive tests was drawn for each child in both groups and the I.Q. at desired points was read from these graphs.

The mean age of institution entrance for the experimental group was 8.9 years; for the control, 9.0. The mean I.Q.'s at entrance were 66.98 and 66.88 respectively. Most of the children enrolled in the program at the beginning had already spent some time in the institution: consequently the mean age of the experimental group upon entering the program was 9.88 years. At this point the mean I.Q. was 65.84, while that of the control group was 66.42. The experimental group had lost 1.1 I.Q. points while the controls had lost 0.4 of a point. Thus both were following the usual trend of I.Q. loss for children under 16 years of age shown by Hoakley [2] in 1932. The experimental group had lost more than the control. One year later 55 records were available for the experimental group and 57 for the control. The experimental group had gained 0.2 points in mean I.Q. over their score of the year previous, while the control group had lost 2.0 points.

That the trend toward arrest in the fall of the I.Q. occurred at all age levels in the experimental group is shown in Figure 1. The curve for each sub-group shows an upward turn at the end. All but one of the curves for the control group continue to decline.

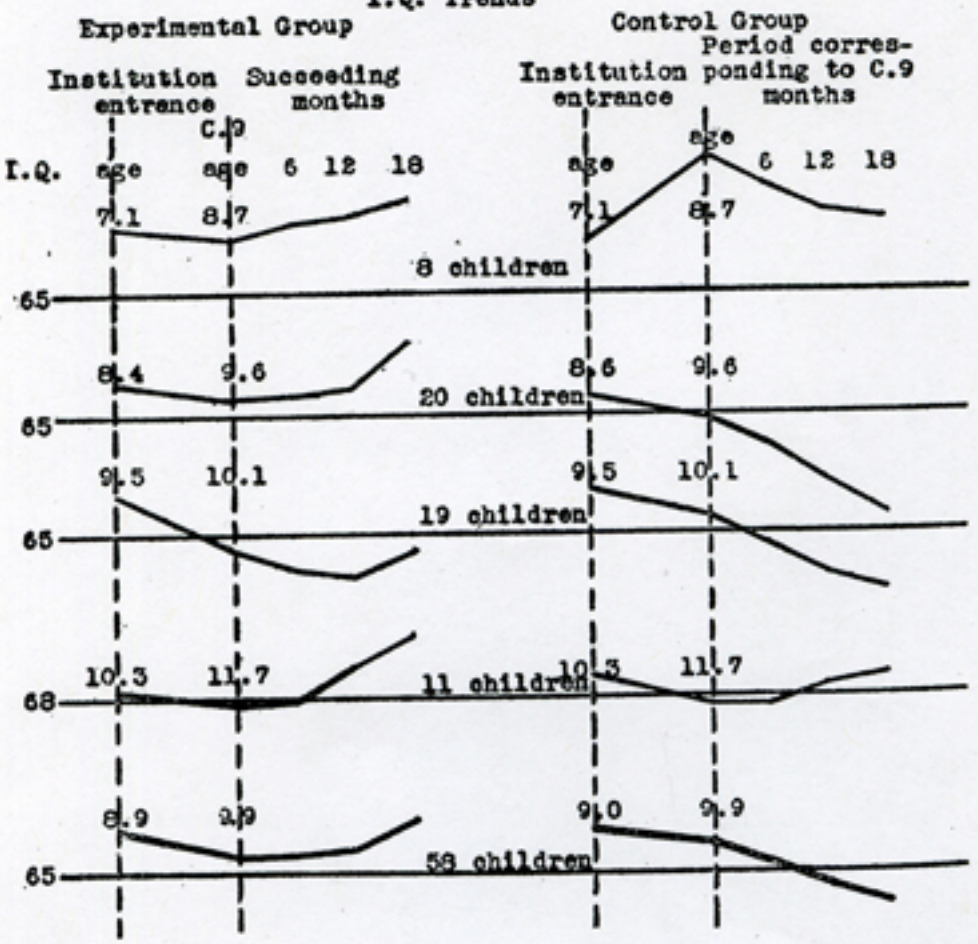
In the experimental group, 48 children were studied whose records were available for 18 months after the point of enrollment in the pre-academic program. Each child's I.Q. at the point of entrance was subtracted from his I.Q. 18 months later. The plus or minus difference over the same period of each child's mate in the control group was obtained in the same way and subtracted from the first plus or minus difference, giving the gain or loss of each child compared with his mate. The mean of these differences was found to be +4.5 I.Q. points in favor of the experimental group. The S.D. of this difference is .88, C.R. 5.1. Twenty-nine children, or 60 per cent of the experimental group, gained in I.Q., while only five children, or 10 per cent of the control group, gained.

The amount of difference, although statistically significant, is small. Our next question is: are there factors other than the difference in the programs to which the two groups were subjected

which might account for the apparent gain of the experimental group. We have investigated two possibilities, (1) the composition of the groups with reference to type, and (2) the frequency of the testing.

dren of the endogenous, or familial type, institutionalized at a mean age of 14.2 years, tended to gain. They have also designated a "mixed" group: children with signs of neurological damage in addition to poor heredity, who

Figure 1
I.Q. Trends



(1) Composition of the groups.

Strauss and Kephart[4] have shown that 39 children entering the institution at a mean life age of 12.9 years whose mental deficiency was due to exogenous causes (damage to the central nervous system through trauma or disease) tended to lose in I.Q. following institutionalization, while 139 children of the endogenous, or familial type, institutionalized at a mean age of 14.2 years, tended to gain. They have also designated a "mixed" group: children with signs of neurological damage in addition to poor heredity, who tended to fall between the two opposing types. Table 1 shows the analysis of our groups on this basis.

Seventy-six per cent of the experimental group (44 children) and 70 per cent of the control group (41 children) were diagnosed by Dr. Strauss. Those remaining were unclassified because of incomplete histories. All of those diag-

nosed in the experimental group were seen by him personally, while most of the controls were diagnosed from the case files. Differences in the proportions of each type in the two groups might be accounted for on this basis, because Dr. Strauss' neurological examination might have revealed defects unnoted in the case files which would have placed some controls in the mixed rather than the endogenous group.

hart should be considered in relation to Hoakley's findings mentioned previously.

(2) Frequency of the testing.

Half of the original group with whom we began the experiment were placed on a yearly Binet testing schedule; the other half on a six-months schedule. Thereafter, alternate children coming into the program were placed on a year or half-year schedule. There

TABLE 1

ANALYSIS OF I.Q. CHANGES

Effects of Etiology

	Experimental Group Per cent Diagnosed—76			Control Group Per cent Diagnosed—70		
	%	Mean I.Q. Change	Interval Months	%	Mean I.Q. Change	Interval Months
Endogenous	26	+0.6	12	38	−2.3	12
Exogenous	17	+3.8	18	10	−2.3	18
Mixed	31	+2.9	18	22	−4.2	18

Effects of Test Interval

	Interval—One Year Mean I.Q. Change +0.2				Interval—Six Months Mean I.Q. Change +3.5			
I.Q.	No.	Rose %	Fell %	Same %	No.	Rose %	Fell %	Same %
−60	9	55	45	0	3	67	33	0
60–69	16	56	38	6	13	69	15	15
70–79	7	71	29	0	9	67	33	0
80–89	0	..	..	..	1	100	..	..
Total	32	59	38	3	26	69	23	8

All three types in the experimental group show a slight mean gain in I.Q. during the interval designated. All three in the control group show a mean loss. It appears that the amount of difference between the two groups might have been affected by a difference in the composition of the groups, but the fact of gain for the experimental group and loss for the control group does not appear to have been affected. The fact that the mean life ages of our groups were three to five years younger than those used by Strauss and Kep-

was no basis of selection other than the order of entrance. The Terman-Merrill Revision of the Binet was used throughout, so that even children on the half-year schedule had the same form of the test only once each year.

Table 1 shows the result of this division. In the group of 58 whose records we have used, more children were on the year than on the half-year schedule. The group tested yearly gained only 0.2 I.Q. points in the 18 months interval, while that on the half-year schedule gained 3.5 points. Ten per cent more

of the children on the half-year schedule gained than on the year and 15 per cent fewer lost.

The relative number of gains and losses at successive I.Q. intervals was calculated on the assumption that children at the higher I.Q. levels might profit more from frequent testing because of better memories. Actually, children with I.Q.'s above 70 appear to have profited less from frequent testing since this is the only level at which a higher percentage gained on the year than on the half-year schedule.

The conclusion seems obvious that the frequency of the testing might have been an important factor in the rise of some of the test scores. As compared with the control group, all of the children in the experimental group averaged 1.3 tests per child at one year, 1.9 tests at 18 months after entrance into the pre-academic program, while the control group averaged .7 and 1.0 tests per child during the same periods. As a group the experimental children had almost twice as many tests as the controls. However, our experiment was not begun with the hope of raising I.Q.'s. Our only concern was that our experimental program should not have a detrimental effect upon the mental growth of the child. With all allowances made for the frequency of the testing, the evidence indicates that delaying academic instruction has not depressed the I.Q. Even on the year schedule, which was only two months shorter than the average interval in the control group, the tendency toward gain predominates at a life age when loss has been reported in previous studies.

C. Achievement tests.

(1) Analysis of Readiness.

We have made a beginning at analysis of the factors which tend to support our hypothesis that mentally deficient children are not ready for academic work at the same mental age as normal children.

The Monroe Reading Aptitude Test was given to 44 children in the program. Scored in terms of the child's percentile rank for his mental age level, it failed to show specific group retardation in any of the fields covered except articulation. In visual, auditory, motor and language tests, the median percentile rank was between 55 and 65. In articulation it was 30. A number of children with speech defects may have lowered the group median here. So far as the mechanics of reading are concerned, the children, as a group, appear to be ready for this activity.

The Sangren Information Tests for Young Children give a different picture. These tests, constructed in 1930 by Dr. Paul V. Sangren at the Western State Teachers College, Kalamazoo, Michigan, cover the fields of Nature Study, Numbers, Vocabulary, Social Science, Household Knowledge, Language and Literature for children of the kindergarten and first grade. The results of tests given to 75 children in our program have been reported previously and will be only summarized here. At every mental age level the median total score of the retarded children was very close to that of normal children of a mental age one year younger. The mentally deficient children ranked lower than the normal in every field except numbers. The dis-

crepancy was widest in vocabulary and social science.

Forty children retested after a year in the pre-academic program approached normal children of their mental age closer than at the previous testing in the total score, and in every field except vocabulary and social science, but even with accelerated progress in the pre-academic program, the mentally deficient children did not achieve the 50th percentile for the first grade until they reached the mental age of eight years. The inference is that not until they have reached a mental age of eight years are they equipped with a sufficient stock of verbalized information and experience to enable them to grasp the majority of the ideas presented in the primary grades. In this respect they have not the equipment of the normal 6 to 7 year old even to begin academic work, much less to progress at a rate approaching normal, until their test ages are one to two years higher than that considered adequate for the normal child. Whether or not this applies only to the group of children selected for institutionalization, or to mentally retarded children in general, we cannot say.

(2) Academic achievement after promotion.

We come, finally, to the crucial point in the experiment, the rate of progress of children who have gone from the Prolonged Pre-academic Program into the academic work of the regular institution school.

Comparison of each child with his mate in the control group is impossible in this respect because we have chosen to discard the Gates Primary Reading Tests as a measure of progress. These were the only tests given below grade 2.5 prior to 1939. Measurable success on the early levels of the Gates Primary Reading Tests can be obtained largely by chance. Many of the children in the control group never arrived at a level of academic attainment measurable on the Stanford Achievement Test. In 1939 the Metropolitan Primary Achievement Test was introduced as a measure of academic progress below grade 2.5. In the following summary, only scores on the Stanford and the Metropolitan Primary Achievement Tests, made by children receiving instruction under ordinary classroom conditions during the period considered, are used. Table 2 shows the results.

In the control group there were 17 children who had consecutive Stanford Achievement scores at 11 and 12 years of age. Their mean I.Q. at entrance to the institution was 71.9, five points higher than the mean for the entire control group. Their mean grade at 11 years was 2.9; at 12 years, 3.3; progress, .4 of a grade. This is almost average progress, since the expectation on the Stanford Achievement is only .5 of a grade at this level.

There were 19 children who had consecutive scores at 12 and 13 years of age. Their mean grade at 12 years was 3.3; at 13 years, 3.8; progress, .5 of a grade. The average expectation for this level is .8 of a grade.

There were 12 children in the control group who had consecutive Stanford Achievement scores at 12, 13, 14 and 15 years of age. Their mean grade at 12 years was 3.4; at 15 years, 4.6; gain 1.2 grades in three years at a diminishing

rate of .5, .4 and .3 grades per year. The average progress at these levels is .8, .8 and 1.0 grades.

In summary, the best learners in the control group, amounting to from 20 to 33 per cent of the group, achieved approximately middle fourth grade by 15 years of age. Their highest rate of progress was .5 of a grade per year.

Twenty-eight children transferred from the Prolonged Pre-academic Program have had either a Stanford or a Metropolitan Primary Achievement Test since school entrance. The mean age at transfer was 11.7 years; at the time of the last test it was 12.8 years; mean grade 2.3. Unfortunately, the majority of these children had no initial Stanford or Metropolitan tests, since we were using only the Gates tests for the lower levels at that time. According to the best estimate possible from the previous Gates scores, their average grade at transfer was 1.5. If this estimate is correct, their mean progress is .82 grades per year. The expectation for average progress on the Metropolitan Primary at this grade interval is .9 of a grade; on the Stanford Achievement, approximately .8.

Thirteen of the 28 children have had two Stanford Achievement or two Metropolitan Achievement tests since leaving the pre-academic program. Two of these children have made no progress in three and eight months respectively. We feel justified in designating these two as cases of special disability, of which there were a number omitted in the control group, and disregarding them in our averages. The remaining 11, under ordinary classroom instruction, have progressed .86 grades per year, which is slightly above the expectation for average progress at this grade level.

We cannot state that the program is a success on the basis of data from 11 children. We can, however, point out the following considerations:

a. This group of 11 children is less highly selected than the 12 of Control

TABLE 2

ACADEMIC PROGRESS

	Age Level	No.	Mean M.A.	Mean Grade	Mean Progress Per Year	Progress Expected of Normal Children at This Grade Level
Control group 1.....	11	17		2.9		
Entrance I.Q. 71.9..	12	17		3.3	.4	.5
Control group 2.....	12	19		3.3		
Entrance I.Q. 69.8..	13	19		3.8	.5	.8
Control group 3.....	12	12	8.3	3.4		
Entrance I.Q. 71.8..	13	12	8.7	3.9	.5	.8
	14	12	9.3	4.3	.4	.8
	15	12	9.9	4.6	.3	1.0
Experimental group...	12.1	11	8.6	1.8		
Entrance I.Q. 69.5..	13.3	11	9.4	2.8	.86	.8

Control groups 1 and 2 had two consecutive Stanford Achievement tests.
Control group 3 had four consecutive Stanford Achievement tests.
The experimental group, promoted from the prolonged pre-academic program, had two consecutive Stanford or Metropolitan Achievement tests.

Group 3 who made the progress shown. These 11 represent 39 per cent of our promoted children, while the 12 represent only 21 per cent of the control group.

b. It is hardly to be expected that our children will continue this high rate of progress throughout the remaining years of their schooling. They have three more years in which to make 1.8 grades if the entire group reaches an average of 4.6 by 16 years of age. The mean grade of all 21 children in the control group who scored at 15 years of age was only 4.0.

SUMMARY

Records of children who have had a prolonged period of pre-academic work, with the introduction of ordinary classroom instruction in academic subjects at a mental age of approximately eight years, show the following trends:

1. Intelligence tests indicate that the group tends to gain in I.Q. rather than to lose.

2. Analysis of readiness for academic work has shown that children entering the institution lack chiefly knowledge concerning their environment. They improve in this respect during the pre-academic work but do not reach a level adequate for first-grade work until a mental age of eight years.

3. In terms of academic achievement after leaving the Prolonged Pre-academic Program, the children promoted appear to have made slightly better progress during their first year than is expected of the normal child at the same grade level.

REFERENCES

1. HEGGE, THORLIEF G. Special Reading Disability with Particular Reference to the Mentally Deficient. 1934, *Proceedings of the Fifty-eighth Annual Session of the American Association on Mental Deficiency.*

2. HOAKLEY, Z. PAULINE. The Variability of Intelligence Quotients. 1932, *Proceedings of the Fifty-sixth Annual Session of the American Association for the Study of the Feeble-minded.*

3. MELCHER, RUTH T. A Program of Prolonged Pre-academic Training for the Young Mentally Handicapped Child. 1939, *Proceedings of the Sixty-third Annual Session of the American Association on Mental Deficiency,* Vol. XLIV: 1.

4. STRAUSS, ALFRED A., AND KEPHART, NEWELL C. Rate of Mental Growth in a Constant Environment Among Higher Grade Moron and Borderline Children. 1939, *Proceedings of the Sixty-third Annual Session of the American Association on Mental Deficiency,* Vol. XLIV: 1.

EDUCATION AND TREATMENT OF AN IMBECILE BOY OF THE EXOGENOUS TYPE

BY BETTY MARTINSON, PH.D.
Research Assistant

AND ALFRED A. STRAUSS, M.D.
Research Psychiatrist

From the Wayne County Training School at Northville, Michigan, Robert H. Haskell, M.D., Medical Superintendent

SPECIAL methods for the education and training of the brain-injured child and the mentally defective child of the organic type have been widely discussed in the past few years.[1, 2, 3, 4, 5] The discussion, however, has centered on the problems of motor reëducation. It was the established conviction of Strauss, after many years of experience with mentally defective children of the brain-injured or exogenous type,[6] that their mental characteristics were as definitely determined by their injury as were their motor disturbances. He further believed that, if educational training were to be effective for these children, they must be taught by procedures adapted to their specific defects,[8] and to the reaction-patterns which characterize this type of child.

His performance shows, first, a marked degree of incoherence and lack of organization. This disorganization has been demonstrated in experimental situations by Strauss and Werner.[7] It interferes seriously with the learning of certain educational processes. For example, if addition is being taught by the use of two rows of dots, such as

oooo
oo

, the brain-injured mentally defective child calls the first dot in the second row "1," rather than "5." This tendency is only increased by the repetition of the instructions to count *all* the dots, but is easily overcome if both rows of dots are enclosed in a circle and he is told to count all the dots in the circle. The circle has enabled him to perceive the two rows of dots as a continuous series, an integrative process which he could not have achieved otherwise. This particular technique is one of several which might be helpful in work with normal children, but for many exogenous children it is the only successful one.

He also shows a marked tendency toward perseveration, *i.e.*, the persistent repetition of some detail of an activity just completed. This perseveration must be distinguished from the rigidity and lack of plasticity found also in non-organic feebleminded children. It is most noticable in speech and in any kind of motor activity. When it occurs, the procedure at hand must be abandoned immediately, and another approach to the problem initiated.

Thirdly, the exogenous child is quite distractible, and seems unable to ignore stimuli which would not be a source of disturbance to a non-organic child. If this distractibility is not to interfere

with the learning process, the materials themselves must be very interesting to the child, and his lapses of interest the signal for a change of activity. As in the case of the perseverative tendencies, a wide variety of material will aid the exogenous child, whereas it would tend to confuse the mentally defective child of the endogenous type.

We have outlined only three of the most important principles in the training of the exogenous child. The case study to be presented in this paper was undertaken as a demonstration of these principles.

K., who is now sixteen years and five months old, comes from a middle class American family. Both parents seem to be of average intelligence, and two brothers, one a high school graduate and the other having left school when a junior in high school, are successfully employed. There is no record of any hereditary disease in the family.

The mother's health during pregnancy was good, and the birth normal. When K. was two weeks old, he had an attack of whooping cough. He seemed quite normal, however, until he was five months old, when it was noticed that he could not move his arms or legs. The attending physician concluded that an encephalitic process had accompanied the whooping cough. The boy did not walk until he was six years old or talk until he was nine. An affliction of the rectum caused him to soil his clothes frequently, and he was enuretic.

He entered a special class room in school when he was nine, but showed no progress for two years and was placed in a schoolroom for lower grade children.

On various psychological examinations given before his admission to the Wayne County Training School he received I.Q.'s between 41 and 45. On special recommendation he was admitted to the Training School, although the institution is designed for moron and borderline children. The psychiatrist stated at the time of admission, "I look upon the boy as a case of organic inflammatory etiology with a bad prognosis for any acceleration in intellectual maturity."

He was admitted in September, 1937. Four months later the physician stated, "According to all reports from the cottage his adjustment has been very doubtful. He is unable to enter into activities with other children. His chief difficulty seems to be that of soiling himself. He has little or no rapport with other boys in the cottage because of this specific difficulty and because of his extremely low intellectual level. There is a pronounced speech impediment which is accompanied by bizarre facial grimaces. It is extremely doubtful whether there will be any continued improvement should he remain here."

The school reported that "he is pleasant, anxious to please and to be helpful. He is unable to do any kind of simple work." It may be mentioned here that K. has never been a behavior problem in the cottage or at school. He has a ready smile, enjoys life immensely, and is very coöperative.

The psychological examiner noted especially his distractibility, signs of perseveration, and lack of ability to keep the goal idea in mind.

The neurological examination revealed a right facial paralysis, the presence of the Babinski-sign on both sides, athetotic movements of the right arm, paralysis of the extensor muscles of the left foot, and a sensory-motor aphasia.

In spite of these reports and of the high chronological age, almost fifteen years, training was begun in October, 1938. He has received one hour of individual instruction and one and a half hours of supervised study each school day. In the afternoons he has been entered in a regular classroom. When special lessons began he had been in the Training School fifteen months without visible academic improvement. His mental age was five years, six months, and his I.Q. 38. The aims of training were (1) to improve his social adjustment, and (2) to demonstrate an increase in the rate of mental growth, thus reversing the trend which had been apparent in the years previous.

The problem of soiling was attacked first. By special medication and training it was possible in a few weeks to reduce the weekly instances from twenty to one or two. This automatically made him more acceptable to his group.

K.'s training, in addition to the three R's, has included motor and manual training activities, and has emphasized certain procedures designed to improve the visual perception. Special gymnasium exercises were given, but since motor reëducation is not the theme of this paper, these will not be discussed.

Three types of arithmetic training were given—training in counting objects, in reading and writing numerals, and in the process of addition. The perseverative tendencies were very clearly demonstrated in the early weeks of the instruction in counting. K. might miss a sequence which he had seemingly mastered, for example, skip from 3 to 5, and this omission would be repeated time after time. The tendency to perseverate could often be overcome if K. was asked to count pennies rather than counting on his fingers. When the mechanics of counting had been learned he was taught to count the number of blocks in a tower. Usually several of the blocks in the tower-base were hidden from view.

The great need for a variety of approaches has been illustrated in the teaching of addition. This proved particularly difficult, and during the period of training K. has used (1) counting on his fingers, (2) two strips of cardboard with dots about an inch apart which could be used as the two parts of a slide rule, (3) groups of dots, as in the problem illustrated above, and (4) a Chinese abacus. For the normal or endogenous child, the abacus is a counting device, but for this boy it became the instrument upon which all concepts of number were based. For example, the relative lengths of the rows of dots were used to teach him the meaning of number, etc. With the aid of the abacus he can now complete all addition combinations whose total is ten or less. He can count objects to fifty, and writes and recognizes most of the numerals to thirty.

Since K. was already familiar with beginning reading activities when special training began, it was necessary to approach this subject as he had been taught previously. He was taught to

read by the story method until he had acquired a sight vocabulary of about fifty words, and quite recently phonic training has been introduced. In the year and a half since his training began he has read two pre-primers and about half of a primer.

The reading is interesting primarily as it reflects the marked agrammatism of K.'s speech, which is telegraphic in style. He almost never uses a preposition, article, or conjunction, and rarely uses adjectives, adverbs, and pronouns. He uses verbs almost exclusively in the present tense, rarely in the past tense or with auxiliary verbs. In a review of the second pre-primer, given early last November, he recognized seventy-five per cent of the (twenty) nouns which had appeared in the book as against fifty-five per cent of the (eleven) adjectives, and recognized seventy-nine per cent of the (fourteen) verbs as compared with twenty-five per cent of the (eight) adverbs. He recognized fifty per cent of the (eight) pronouns.

The telegraphic character of K.'s speech has been described above. His speech handicap at the beginning of training amounted to an almost complete lack of conversational speech. He usually answered direct questions in a monosyllable or by gestures, but rarely made any spontaneous comments. The few sentences he did attempt consisted of a noun, a verb, and sometimes another noun. For example, "I go cottage," and "sled broke," were substituted respectively for "May I go to the cottage now?", and "I broke my sled yesterday afternoon." We do not mean to imply, however, that K. lacked the desire to communicate ideas to others. As is common with brain-injured children, the organic blocking of the motor speech increases the desire for communication.

In addition to the agrammatism of the speech K. had a marked articulatory defect due largely to the inactivity of the tongue muscles and the muscles controlling all puckering movements of the lips. The speech had a very muffled and indistinct character. Articulatory speech correction was begun much later than training in conversational speech. Both have been continued up to the present time. Before articulatory exercises were introduced he was asked to repeat series of three or four unrelated words, and later single polysyllabic words. When he discovered in the pronunciation of the latter that he could not pronounce certain sounds, the foundation was laid for the introduction of regular exercises such as are customarily used in the correction of articulatory disorders. These were carried out with a mirror.

In the early efforts to encourage conversational speech he was asked to repeat very simple three sentence stories pertaining to his own activities. At first he repeated the idea of the first sentence after much urging. Later he was asked to re-tell the stories read in his primer. Of course there were many opportunities for incidental training in conversation. In November, 1939, he had progressed so far that short periods of conversation could be introduced in the regular lesson period. A little later he was asked to describe and interpret pictures in a magazine. At present he is asked to re-tell short stories read to him from a pre-primer which was not used in his reading activities. If the

subject matter is within his comprehension, the sentence structure simple, and the story not more than one hundred lines long, he can re-tell the story, omitting few of the essential events. He relies heavily on the pictures, however, as a guide to his memory of the events of the story.

The progress in speech has been accompanied by, and closely related to, K.'s social progress. It has been at the same time a stimulus for, and a result of, his increasing eagerness to participate in his group. As mentioned above he made almost no spontaneous comments, even to the teacher, in the first months of training. Recently he initiated a conversation with one of the staff members whom he knew only slightly. He frequently asks for help from an older boy who is the messenger boy of the department, or offers his services if the regular messenger is absent.

The manual training activities have been of a pre-vocational nature and his progress in this field more rapid than in any other. After he had acquired a certain degree of manual dexterity through the manipulation of clay, he was trained in the use of hammer and scissors. About two months later he began to cut pictures from a magazine and paste them in a scrapbook. His next task was to weave a small 9" by 5" rug of heavy twine. At the end of the first school year of training he was constructing a bead mat.

In October, 1939, he was entered in the woodshop, and has constructed quite creditably a wooden box, a door stop, a footstool, a model sailboat, and a small stand for shining shoes. He has adjusted to the routine of the shop and has been an accepted member of the group.

As you will have noted, the materials and general methods used in the training of the exogenous child resemble, in many instances, those commonly used with feebleminded children. The techniques of their application, however, must conform to the principles of training set forth earlier.

Wherever possible, training in two fields has been combined in a single activity. This has been illustrated in the reading and re-telling of a story in the primer. The most important illustration, however, is the manner in which materials used in the teaching of each subject field have contributed to the training in visual perception. Geometric forms cut from colored paper gave training in form perception as well as manual skill. The towers whose blocks were counted gave practice in the perception of mass. The sorting of letters of the alphabet served the double purpose of familiarizing K. with individual letters and increasing his discrimination of details of form.

In addition to this incidental training, however, there were a number of activities introduced for this purpose alone. In one of the earliest of these K. was asked to tap the blocks in a row, as in the Knox cube test. The most extensive training in visual perception, however, has been carried out with picture puzzles. The first one of these was a picture from a children's nursery rhyme book cut into twenty-six square pieces all the same size, and the last is an eighty piece commercial jig-saw puzzle.

That this training in visual perception

of form and size has been successful is indicated by the improvement evident in his earliest and latest drawings for the Goodenough test. No practice or instruction in this drawing were given, but he has drawn a series of nine pictures at approximately bi-monthly intervals for research purposes. The lack of detail in the early picture is especially noticeable, and the proportion is also much poorer than in the later one. His score increased two and a half years in a period of eighteen months, from six years, three months to eight years, nine months. The improved visual perception is also evident in the increased score on the Grace Arthur Performance Scale. In October, 1938, his performance age was six years, nine months, and in April, 1940, it has increased to eight years, two months.

When this boy was accepted for training we hoped that we could demonstrate a reversal of the downward trend of his mental development and an increase in mental age and educational achievement after the almost complete lack of progress in the years preceding the initiation of special training. Table I presents the results obtained, showing scores on the Stanford-Binet Intelligence Test, the Grace Arthur Performance Scale, the Goodenough Drawing Test, and the Vineland Social Maturity Scale. If test records are available for a period preceding the initiation of special training these are indicated. The test-retest interval from the beginning to the end of training was, in every instance, eighteen months. In this time, he gained fourteen months in Stanford-Binet mental age as compared with eight months in the preceding four years; seventeen months in performance age; thirty months mental age as measured by the Goodenough test; and thirty-seven months in social age. These scores represent not only a reversal of K.'s former trends but an increase comparable to that expected of a child below fifteen years of age with an I.Q. of 78 on the Stanford-Binet test and of a child with 94 P.Q. on the Grace Arthur scale.

TABLE I

Test	Scores: Beginning of Training C.A. 14–9 Test Age	Scores: Beginning of Training C.A. 14–9 Quot.	Scores: End of Training 16–3 Test Age	Scores: End of Training 16–3 Quot.	Progress: In 18 Months Preceding Training	Progress: In 18 Months During Training
Stanford-Binet	5–6	38	6–8	42	3 mo.*	14 mo.
Grace Arthur	6–9	46	8–2	51	..	17 mo.
Goodenough	6–3	..	8–9	..	3 mo.	30 mo.
Social Maturity	4–10	33	7–11	49	..	37 mo.

* This rate of progress is interpolated from actual test scores indicating an increase of eight months in the four years preceding the initiation of training.

SUMMARY

We have outlined certain principles for the education of the brain-injured mentally defective child, and illustrated these principles in the training of an imbecile boy. This particular case was selected because the prognosis for an increase in mental development was

very unfavorable. At the age of two weeks this boy had suffered an attack of encephalitis which resulted in a diffuse lesion of the brain. The mental and motor development were severely retarded. Special training was initiated at a life age of fifteen years, when the mental growth of the feebleminded child is commonly assumed to have reached its peak. The effectiveness of the training methods is demonstrated by an increased rate of mental growth as revealed in the Stanford-Binet, Grace Arthur, and Goodenough Intelligence tests. The score on the Vineland Social Maturity Scale indicates that the growth in social competence has been comparable to the mental growth.

We believe that this growth has taken place, not because the materials used have been new or unusual, but because, in their presentation, we have been able to circumvent the limitations imposed upon K.'s learning ability by tendencies toward perseveration, the need for aid in forming integrations, and a tendency to direct his attention toward the strongest stimulus in his immediate environment.

In the training of the normal child, a variety of materials and methods is needed in order to give the child extensive knowledge and experience; since the endogenous feebleminded child learns at a much slower rate than the normal, it is necessary to train him more intensively, using carefully chosen materials and basic methods; in the training of the exogenous child, a variety of approaches must be available in order that the ones appropriate to the particular reaction-patterns resulting from the organic defect may be selected. After the general methods are selected, however, the materials should be presented in many similar but varied forms.

REFERENCES

1. CARLSON, E. R. Neurological Aspects and Treatment of Birth Injuries. *New York State Journal of Medicine,* Volume 34, 1934.

2. DOLL, E. A., PHELPS, W. M., AND MELCHER, R. T. Mental Deficiency Due to Birth Injuries. Macmillan, New York, 1932.

3. GESELL, A. A Behavior Study of Birth Injury. *Proceedings of the American Association on Mental Deficiency,* Volume XLIII, Part 2, 1938.

4. LORD, E. Children Handicapped by Cerebral Palsy. Commonwealth Fund, New York, 1937.

5. ROGERS, G. G., AND THOMAS, L. C. New Pathways for Children with Cerebral Palsy. Macmillan, New York, 1935.

6. STRAUSS, A. A. Typology in Mental Deficiency. *Proceedings of the American Association on Mental Deficiency,* Volume XLIV, Part 1, 1939.

7. STRAUSS, A. A. *Pedagogia Terapéutica,* Editorial Labor, Barcelona, 1936.

8. STRAUSS, A. A., AND WERNER, H. The Mental Organization of the Brain-Injured Mentally Defective Child (The Mentally Crippled Child). Paper presented before the meetings of the American Psychiatric Association, May, 1940.

Read at the Sixty-fourth Annual Meeting of the American Association on Mental Deficiency, Atlantic City, New Jersey, May 25, 1940.