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ABSTRACT

To determine the effectiveness of the Peabody Language Development Kits over an extended period (2.5 years) with educable mentally retarded (EMR) children, daily oral language stimulation lessons using Levels One and Two of the kit were given to 27 classes for the EMR in schools with culturally disadvantaged populations. Results showed the effectiveness of Peabody Language Development Kit (PLDK) lessons to be significant in areas of language and cognitive growth, but negligible in school achievement. The greater effect indicated by Level One of PLDK was discounted due to unequal treatment; no differentiation in performance was seen among the sexes, with an exception in the area of mathematics. Parallel characteristics in research findings among non-retarded disadvantaged were noted. (RD)

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GEORGE PEABODY COLLEGE FOR TEACHERS/NASHVILLE, TENNESSEE 37203

EFFECTIVENESS OF THE PEABODY LANGUAGE DEVELOPMENT KITS WITH EDUCABLE MENTALLY RETARDED CHILDREN: A Report After Two and One-Half Years

by

Lloyd M. Dunn, Margaret [illegible],

Prayot Pochanart and Malcolm Bransky

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EFFECTIVENESS OF THE PEABODY LANGUAGE DEVELOPMENT KITS WITH EDUCABLE MENTALLY RETARDED CHILDREN: A Report After Two and One-Half Years[1]

Lloyd M. Dunn, Margaret Nitzman, Prayot Pochanart & Malcolm Bransky

Oral language facility is basic to school achievement and overlaps markedly with verbal intelligence. In turn, verbal intelligence has been found to be the best single indicator of academic success (Terman and Merrill, 1960, Cronbach, 1960). Given this, cultural-familial educable mentally retarded children, coming as they do from deprived areas, are doubly at a disadvantage. First, an inappropriately stimulating and restricted environment impedes the development of those language abilities needed for success in standard "middle class" school systems (Riesman, 1959). Second, the effect of this environment on the educable mentally retarded who have lesser ability initially is compounded. The circular reaction between an impoverished environment and familial retardation results in progressive language maldevelopment. In turn, this causes increasing failure in school tasks and falling IQ scores (Bloom, 1964). The purpose of the present study was to determine the

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possibility of arresting or retarding this chain reaction through a program of oral language stimulation.

Background

Language Characteristics and Development in the EMR

A major question basic to the development of an oral language stimulation program is: what type of psycholinguistic processes are found in cultural-familial retardates in comparison to normal children? The *Illinois Test of Psycholinguistic Abilities* (McCarthy & Kirk, 1963) has enabled us to study these differential language abilities. Smith (1962), Blessing (1964), Weaver (1964), and Aserlind and Keehner (1967) have reported that retarded children have an overall language deficit which is below expectancy even for their Stanford-Binet mental age scores. When the overall ITPA language age (LA) is broken down by subtest scores, the resulting profile indicates that EMR children show significantly greater abilities in the areas of the visual-motor skills as compared to the auditory-vocal skill areas (Smith, 1962; Mueller and Weaver, 1964). This is typical not only of educable retarded children, but of disadvantaged children generally. Weaver (1964) found the following sequence in descending order of ability for three groups of deprived children: visual, motor, vocal, and auditory (see Figure 1). As Deutsch (in Klausmeier and Harris, 1966) points out, the auditory environment of the disadvantaged population differs not only quantitatively, but qualitatively, from that of middle-class children. This may be due in part to a suppression of appropriate auditory stimulation by young deprived children who live in a world of noise.

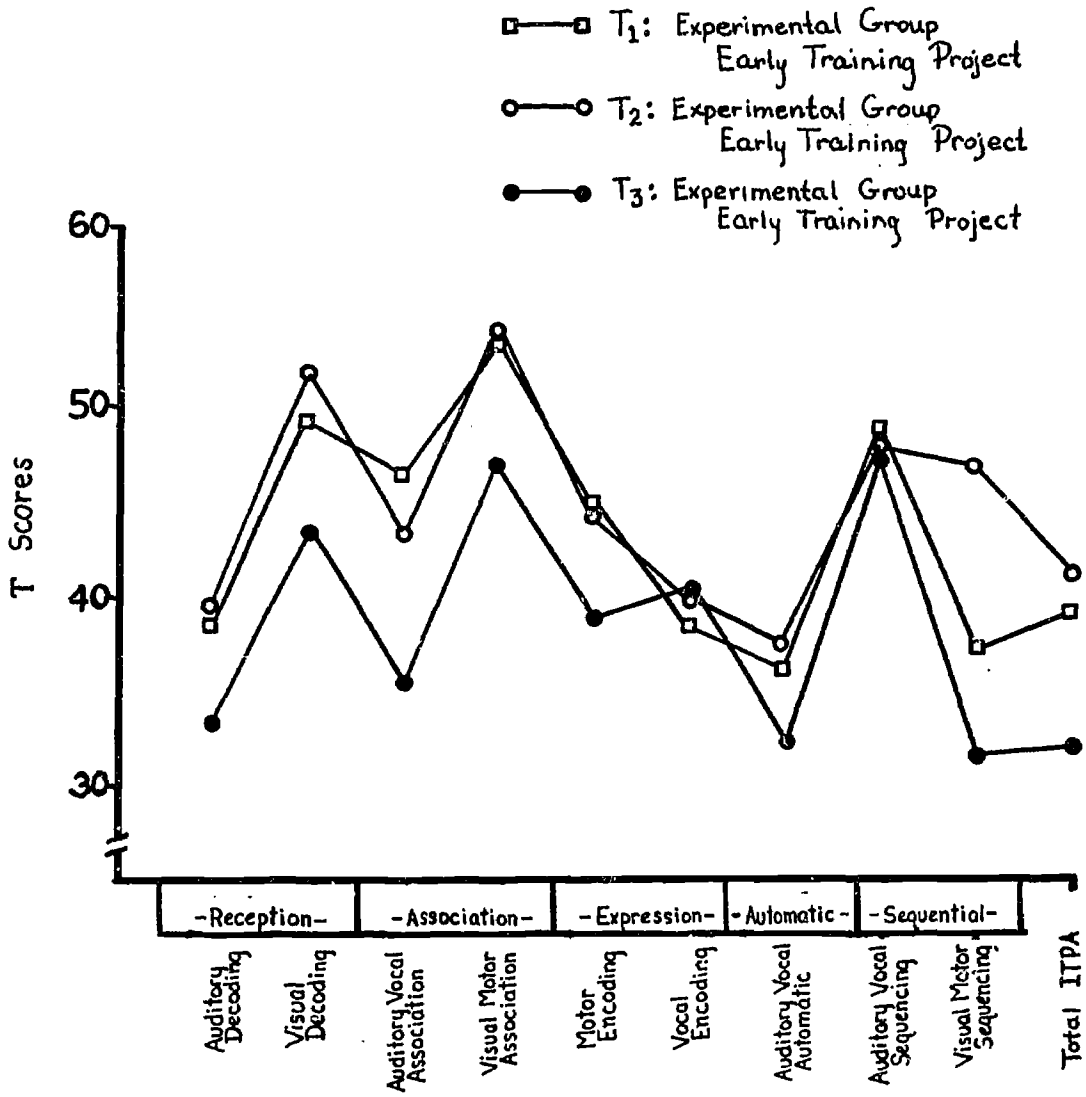


Fig. 1. ITPA performance of disadvantaged children (after Weaver, 1964).

As already indicated, oral language abilities have consistently been found to correlate with verbal intelligence measures. In a series of studies with the mentally retarded, Dunn and Brooks (1960), Dunn and Hottel (1961) and Mein (1962) found the *Peabody Picture Vocabulary Test* (PPVT), which measures hearing vocabulary to correlate 0.76, 0.66, and 0.71 respectively with the *Stanford-Binet Intelligence Test.* Coppinger and Ammons (1952) found that Southern Negro children were two years behind the white population norms on the *Full Range Picture Vocabulary Test*, a test similar to the PPVT. Blessing (1964) reported that the S-B vocabulary scores of 40 EMR special class children were significantly correlated with mean sentence length (0.37), and with the mean of the five longest remarks (0.39) produced by these children. In this same study, a correlation of 0.71 was found between S-B vocabulary scores and ITPA total scores. It would appear from this research that an oral language stimulation program should result, not only in an increase in language age on such tests as the ITPA, but also in a corresponding increase in intelligence on such measures as the Stanford-Binet.

Training Oral Language Development

A major program which purports to enhance oral language abilities, and thus general intellectual development and school progress, has been the series of *Peabody Language Development Kits* (PLDK). The PLDK emphasizes general oral language stimulation, rather than training to specific language abilities or disabilities. Studies of its effectiveness have analyzed gains in both overall language and specific areas of language ability as measured by the ITPA. Various subject populations with language deficits have been used, including disadvantaged, slow-learning, and educable mentally retarded children.

One variable which seems important in the success of an oral language stimulation program is the length of the treatment period. Smith (1962) found that EMR special class students receiving lessons from a forerunner to the PLDK for three months made significantly greater gains on the ITPA than did a control group which did not receive this treatment. However, in a follow-up one year later (Mueller & Smith, 1964), these differences were no longer significant, suggesting that a longer treatment period is necessary to maintain progress. Blessing (1964) and Weld (1964) report essentially the same results from a four-month oral language development program designed specifically to increase ITPA vocal encoding (talking). In a replication by Blue (1963) of the Smith (1962) study with trainable mental retardates, no significant gains were found. The lack of success was again believed due to the short treatment period, which probably had an even greater effect on this subject group than on those with greater ability. Gibson (1966) and Forgnone (1966), utilizing Level #1 PLDK treatments lasting six and three months respectively, found no significant gains in scores on the ITPA.

Several studies with the EMR have attempted to determine the differential effects, as measured by the ITPA profile, on the development of specific language abilities by the PLDK lessons. Keehner (1966) found the Level #1 PLDK program, supplemented with additional activities, to be equally effective on most ITPA subtests. In a report after a four and one-half month treatment with the subjects in the present study, Mueller and Dunn (1967) reported that the PLDK enhanced associative and expressive subtests more than the receptive and automatic components

of the ITPA. Results of studies with other subject populations support this finding. Ensminger (1966) found that the effectiveness of the Level #1 PLDK lessons was greatest on the auditory-vocal association and vocal encoding subtests for slow-learning children. He noted that these are areas where the need for improvement is greatest (Weaver, 1964). Carter (1966) gave 32 disadvantaged third grade children daily 50-minute lessons from Level #1 PLDK for 10 weeks; a matched control group received no special treatment. Results showed that the experimental group gained significantly over the control group on ITPA LA, as well as on S-B MA and IQ scores. In this case success was obtained over a short treatment period.

After three years, a long-term study with disadvantaged children indicates that the PLDK program in combination with an ITA approach to teaching reading facilitates the three areas of school achievement, language development, and intellectual growth (Dunn, Pochanart & Pfost, 1967). Based on results from the *Metropolitan Achievement Test*, children utilizing ITA were significantly advanced in written language achievement over those in the conventional basal reading program. Furthermore, the PLDK lessons enhanced school achievement significantly. As measured by the *Illinois Test of Psycholinguistic Abilities*, the language age gains of the PLDK subjects were significantly greater than for the non-PLDK, with a tendency for ITA and PLDK to be facilitating. On the 1960 Stanford Binet, the PLDK lessons enhanced IQ gain scores, particularly for children in both ITA plus PLDK. In sum, research evidence on the PLDK generally shows a clear enhancement of oral language development and a corresponding growth on secondary measures of intellectual

and academic gains when the treatment is extended over a protracted period of time.

Training cognitive development through language programs has also received some attention in recent years. Rouse (1965) gave 47 EMR children a series of 30 brain-storming lessons and found significantly greater gains on the *Minnesota Test of Creativity* for this group than for a control group. Gray and Klaus (1965) emphasized concept development, as well as oral language skills, in a preschool program for deprived Negro children and found a significant increase in IQ as well as ITPA scores. (The PLDK lessons include activities in brainstorming and concept attainment.)

Purpose

The present study was designed to test the differential effectiveness of the PLDK program with educable mentally retarded children (EMR) over an extended treatment period. The Subjects (Ss) were EMR children, largely from deprived homes in special day classes in a mid-Southern city. The treatment provided were the lessons from the *Peabody Language Development Kits, Levels #1 and #2.* The question asked was: When the classroom teacher provides daily oral language lessons with a minimum of outside supervision, will significant pupil gains result in the linguistic, intellectual and academic areas?

Method

Treatment

The experimental edition of Level #1 PLDK designed by Dunn and Smith (1965) was used for the first half year, the commercial edition of

Level #1 for the next half year, and the commercial edition of Level #2 PLDK (Dunn & Smith, 1966) was used in the last year. (Generally, the teachers took one and one-half years to complete the 180 lessons in Level #1 which should have required only one academic year; thus, the lessons were not presented every school day.) These lessons are intended to stimulate oral language and verbal intelligence and therefore to enhance school progress. Figure 2 outlines a model of the psycholinguistic processes trained by the lessons.

Level #1 lessons were designed for children who are functioning intellectually from the four and one-half to six and one-half year mental level. Included in each level of the Kits were 180 detailed 35 to 45 minute daily lesson plans, each containing two to five activities from among some 23 different categories. Level #2 of the Kits was designed for children whose mental ages were in the six to eight year age range. Typical categories for both levels 1 and 2 were: brainstorming, classification, describing, following directions, imagination, memory, relationships, story time, and vocabulary building.

The philosophy of the PLDK was that Language Time should be a half-hour interlude from conventional school. Though early lessons required considerable teacher participation, the overall goal was to maximize the oral language behavior of the pupils, giving them an opportunity to talk, to think, and to learn effectively in a setting that was less structured than during a regular period of school work. The children were never called on either to read or write. In fact, no seat work was involved. The total group participated together, the emphasis being on thinking as well as on talking and understanding Standard English.

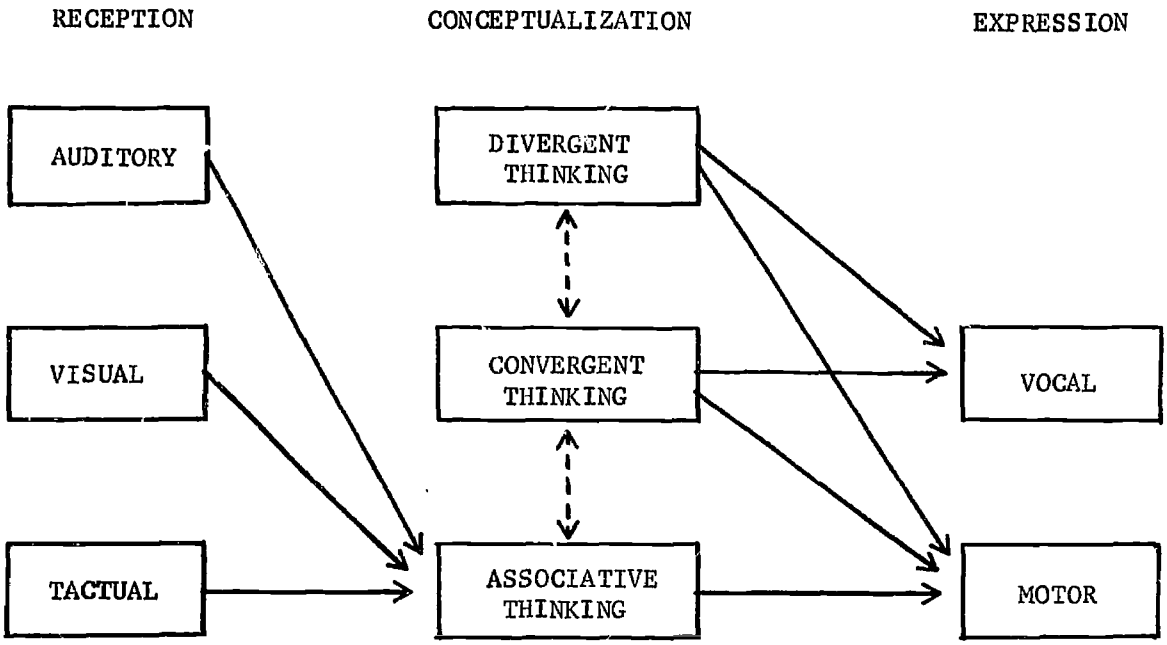


Fig. 2. Model of the psycholinguistic processes trained by the lessons in the Peabody Language Development Kits.

Teachers

A total of 36 experimental and control teachers were involved in the study. All were certified in special education and held one or more degrees. The experimental teachers were provided with a kit approximately one month prior to the beginning of the treatment period and asked to familiarize themselves with the materials and lessons. One training session was held prior to the beginning of the treatment program to describe the project, to emphasize important points in the PLDK, and to answer questions arising from the teachers' examination of the kit. In addition, in-service training meetings were held at the beginning of each semester, and each teacher was visited twice a year by the project staff to insure that her materials were in order, that she was using the kit regularly, and to answer her questions. The general philosophy in regard to the treatment was to interfere as little as possible with the teacher, but to provide guidance when the PLDK manuals proved insufficient. It was believed that this procedure would most nearly simulate conditions under which the PLDK would ordinarily be used. Control teachers were not involved in any special treatment program.

Subjects

Thirty-six primary and intermediate special classes for educable mentally retarded children in the Nashville-Davidson County Metropolitan Schools were selected for the study. The classes were divided into an experimental group of 27 classes in 22 schools and a control group of nine classes in six schools. The 28 schools involved were all located in urban slum areas serving about one-third Negro and two-thirds Caucasian children. The special classes were generally, but not

completely, segregated racially. PLDK treatment extended over two and one-half years for the experimental group. Both experimental and control groups were tested for language and intellectual development and scholastic achievement at the beginning of the program in January, 1965, after four and one-half months, at the end of the second year, and again at the end of the third school year.

At the end of the third year, a total of only 108 subjects (72 experimentals and 36 controls) remained with complete test data (see Table 1a). The initial pool had been 584 subjects. However heavy attrition occurred due to a number of factors, but mostly because of promotion to secondary special classes, and to parents moving away from the neighborhood school area. Analysis of variance on pre-test data showed significant differences between experimental and control groups on chronological age, intelligence quotient, and language age. Therefore, a selected study sample was constituted from the available 108 subjects (see Table 1b). Chronological age was restricted to the range from 8 years 4 months to 12 years 5 months. Establishing proportionality on sex further reduced the groups to a final total of 72, of which 48 were experimental Ss and 24 were control Ss. IQ range on the final sample was from 50 to 82 for the experimental group, and from 50 to 83 for the control group. It should be pointed out that the relatively low mean IQ is probably due to the use of the *Primary Mental Abilities Test.* This group test consistently underestimates the IQ scores of educable mental retardates. Analysis of variance on the final sample showed no significant differences on chronological age and intelligence quotient although language age was still significant in favor of the

Table 1a

Pre-Test Information on the Final Subject Pool of 108 Subjects

Group	N	CA*		PMA-IQ		ITPA-LA*	
		$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
Experimental Boys	48	122.12	12.18	58.54	10.24	72.38	13.34
Experimental Girls	24	116.92	27.27	57.29	9.83	62.92	10.93
Experimental Total	72	120.39	18.45	58.13	9.98	69.22	13.20
Control Boys	24	133.04	16.53	60.00	11.04	77.88	12.45
Control Girls	12	131.58	9.60	55.75	19.93	72.58	13.53
Control Total	36	132.56	14.26	58.58	14.26	76.11	12.70
Total	108	124.44	18.10	58.28	11.59	71.52	13.43

*Reported in months

Table 1b

Pre-Test Information on the Final Selected Sample of 72 Subjects

Group	N	CA*		PMA-IQ		ITPA-LA*	
		$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
Experimental-Boys	28	122.89	11.46	57.57	10.26	72.10	13.51
Experimental-Girls	20	122.50	10.43	58.00	10.24	61.85	11.30
Experimental Total	48	122.73	10.81	57.75	10.15	67.83	13.51
Control-Boys	14	130.21	11.91	63.50	11.96	80.71	14.02
Control-Girls	10	127.70	9.19	59.60	10.70	73.50	14.52
Control Total	24	129.17	10.49	61.88	11.38	77.71	14.38
Total	72	124.88	11.13	59.12	10.68	71.12	14.49

*Reported in months

control group (see Table 2). In fact, in terms of the descriptive statistics, control group boys were ahead on all three pre-test measures. This needs to be kept in mind in interpreting the results.

Table 2

Analysis of Variance on Pretest Data for the Final Selected Sample of 72 Subjects

Source of Variation	Degree of Freedom	Sum of Squares	Mean Squares	F Ratio
	A. Chronological Age			
Between Groups	3	701.7392	233.9130	1.9359
Within Groups	68	8216.1358	120.8255	
Total	71	8917.8750		
	B. Language Age			
Between Groups	3	3091.2892	1030.4297	5.9317*
Within Groups	68	11812.5858	173.7144	
Total	71	14903.8750		
	C. Intelligence Quotient			
Between Groups	3	363.1178	121.0392	1.0649
Within Groups	68	7728.7572	113.6581	
Total	71	8091.8750		

*$F_{.95} = 2.76$

Evaluation

Data were collected in three areas: intellectual development, language development, and school achievement.

Intellectual Development

Intellectual gains were measured by the *Primary Mental Abilities Test* (Thurstone & Thurstone, 1962). This group test has two levels: one designed for children in the second to fourth grade range; the other for the fourth to sixth grade range. The second to fourth grade level PMA consists of four subtests, including verbal learning, spatial relations, number facility, and perceptual speed. The fourth to sixth grade PMA has an additional subtest in reasoning. Ss below the CA norms on the fourth to sixth grade PMA (below eight years six months) were given the second to fourth grade level of the PMA.

Language Development

The *Illinois Test of Psycholinguistic Abilities* (McCarthy & Kirk, 1963) was developed as an individual test of the psycholinguistic abilities for children between the ages of two and one-half and nine years. It consists of nine subtests which measure two input channels (auditory and visual), two output channels (vocal and motor), and two levels of organization (representational and automatic-sequential). The nine subtests are: auditory decoding, visual decoding, auditory-vocal association, visual motor association, vocal encoding, motor encoding, auditory-vocal automatic, auditory-vocal sequencing, and visual-motor sequencing. In the first three testings, only four subtests were given (*auditory-vocal association, auditory-vocal automatic, visual-motor sequencing, and auditory decoding*), as these areas were

thought to be most highly correlated with the overall ITPA language age. However, recent research indicated that other ITPA subtests appeared to be influenced by the PLDK lessons (Dunn, *et al.*, 1967). Therefore, all nine ITPA subtests were administered in the final post-testing.

School Achievement

The *New York Achievement Tests* (Wrightstone, *et al.* 1959) is a non-standardized test. It was designed for educable mentally retarded children. The mathematic and core achievement subtests were used in this study. The mathematical concepts subtest stresses understanding of such concepts as money, clock and calendar time, and mathematical terms and symbols rather than purely computational proficiency. The core achievement subtest measures non-academic aspects of the EMR special class program, such as personal care, health and safety, familiarity with the home and neighborhood, and other areas of socialization.

Results and Discussion

Analyses of variance were carried out on gain scores on all three measures from pre-testing to the end of the second year (representing Level #1 PLDK) and from the end of the second year to the end of the third year (representing Level #2 PLDK). The pre-test data were gathered in January, 1965; the interim-test data were obtained in June, 1966; and the post-test data were secured in June, 1967.

Intellectual Development

Means and standard deviations of pre-, interim-, and post-test scores on the *Primary Mental Abilities Test* are presented in Table 3

Table 3

Means and Standard Deviations of Pre-[a], Interim-[b], and Post-Test[c] Scores on the *Primary Mental Abilities Test* and the Short Form of the *Illinois Test of Psycholinguistic Abilities*

Group	N		PMA-IQ			ITPA-LA (short form)		
			Pre	Int.	Post	Pre	Int.	Post
Experimental Boys	28	$\bar{X}$	57.57	67.17	70.43	72.11	81.36	86.46
		S	10.26	12.47	11.46	13.52	20.73	12.62
Experimental Girls	20	$\bar{X}$	58.00	63.80	67.40	61.85	73.60	78.10
		S	10.24	10.50	12.47	11.30	11.57	12.44
Experimental Total	48	$\bar{X}$	57.75	66.08	69.17	67.83	78.12	82.98
		S	10.15	11.73	11.85	13.51	17.78	13.10
Control Boys	14	$\bar{X}$	63.50	72.07	68.64	80.71	85.86	88.64
		S	11.96	11.67	11.25	14.02	10.85	14.72
Control Girls	10	$\bar{X}$	59.60	61.00	68.40	73.50	78.60	77.60
		S	10.70	22.87	7.53	14.52	15.18	10.16
Control Total	24	$\bar{X}$	61.88	67.46	68.54	77.71	82.83	84.04
		S	11.38	17.69	9.68	14.38	13.04	13.92
Total Boys	42	$\bar{X}$	59.55	69.17	69.83	74.98	82.86	87.19
		S	11.08	12.24	11.28	14.13	18.03	13.22
Total Girls	30	$\bar{X}$	58.53	62.87	67.73	65.73	75.27	77.93
		S	10.24	15.38	10.94	13.43	12.84	11.55
Total	72	$\bar{X}$	59.12	66.54	68.96	71.12	79.69	83.33
		S	10.68	13.89	11.11	14.49	16.41	13.29

[a] January, 1965

[b] June, 1966

[c] June, 1967

for experimental and control groups. Interim scores represent the effects of Level #1 PLDK,while post scores represent Level #2 PLDK. Table 4 shows the analysis of variance on difference scores from the pre- to the interim-testing and for the interim to the post-testing. Two significant main effects were found. The IQ gains were significantly different in favor of the experimental group, indicating that PLDK treatment does enhance intellectual development. However, gains in the Level #1 period were significantly greater than gains in the Level #2 period. This is probably due to two factors. First, the PLDK treatment extended over a longer period of time (one and one-half years) for Level #1, as opposed to one year for Level #2 treatment. Second, the early larger gains could result from a spurt effect due to initial teacher and pupil enthusiasm at the beginning of the experimental treatment. There were no significant interactions. Results thus reinforce findings of a parallel three-year study with disadvantaged children,indicating the facilitating effect of PLDK lessons on IQ growth (Dunn, Pochanart & Pfost, 1967).

To determine the specific area of intellectual functioning enhanced by the PLDK lessons, scores on the *Primary Mental Abilities* subtests were analyzed. Means and standard deviations of pre- and post-test scores on PMA subtests for experimental and control groups are presented in Table 5; a profile of mean scores is shown in Figure 3. Results of t-tests performed on within group pre- and post-test scores and on between group scores at pre- and post-test periods are found in Table 6. On the verbal meaning subtest, no significant difference was found between experimental pre- and post-test scores. However, the

Table 4

Analysis of Variance on IQ Gains as Measured by the *Primary Mental Abilities Test*

Source of Variation	Degree of Freedom	Sum of Squares	Mean Squares	F Ratio
Between				
A (Exp. vs Con.)	1	180.4999	180.4999	3.5579*
C (Sex)	1	10.3142	10.3142	.2033
A x C	1	98.4144	98.4144	1.9398
Error	68	3449.7715	50.7319	
Subtotal	71	3739.0000		
Within				
B (1st yr. vs 2nd yr.)	1	1863.3610	1863.3610	14.4038*
A x B	1	272.2223	272.2223	2.1042
B x C	1	155.7532	155.7532	1.2039
A x B x C	1	17.8349	17.8349	.1378
Error	68	8796.8286	129.3651	
Subtotal	72	11106.0000		
Total	143	14845.0000		

*$F_{.95} = 3.98$

$F_{.90} = 2.79$

Table 5

Means and Standard Deviations of Pre-[a] and Post-[b] Test Scores on *Primary Mental Abilities* Subtests

Group	PMA Subtests				
	Verbal Meaning	Number Facility	Spatial Relations	Reasoning[c]	Perceptual Speed
Experimental					
Pre-test					
N	48	48	48	12	48
$\bar{X}$	60.44	62.94	75.67	69.25	78.31
S	10.37	10.70	15.38	6.59	17.81
Post-test					
N	48	48	48	48	48
$\bar{X}$	60.44	69.71	82.06	70.19	95.31
S	10.67	12.09	16.17	9.36	16.67
Mean Gain	0.00	6.77	6.39	.94	17.00
Control					
Pre-test					
N	24	24	24	11	24
$\bar{X}$	60.71	63.42	83.92	68.09	80.33
S	11.49	9.82	19.22	6.88	19.59
Post-test					
N	24	24	24	24	24
$\bar{X}$	57.17	69.83	87.04	70.46	95.00
S	6.25	9.93	13.86	8.63	14.66
Mean Gain	-3.54	6.41	3.12	2.37	14.67

[a] January, 1965

[b] June, 1967

[c] The reasoning subtest data are only available on the reduced sample of subjects who took the fourth to sixth grade level of the PMA.

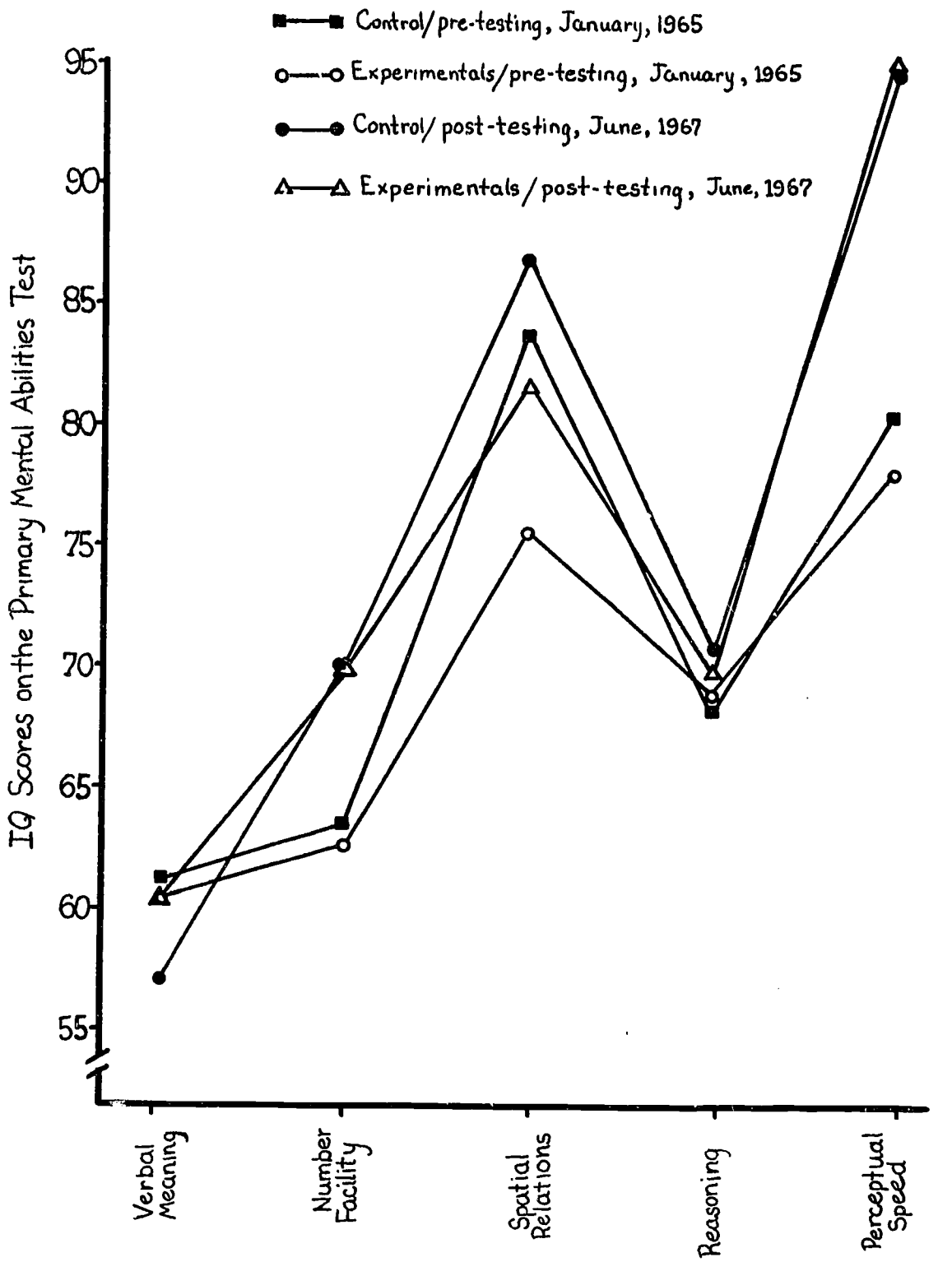


Fig. 3. PMA profiles of experimental and control subjects, January, 1965, and June, 1967.

Table 6

Results of t-tests on *Primary Mental Abilities* Subtests Scores

Group	Subtests				
	Verbal Meaning	Number Facility	Spatial Relations	Reasoning	Perceptual Speed
Experimental					
Pre vs post	0.000	2.905**	1.984**	0.604	4.828**
Control					
Pre vs post	1.325*	2.249**	0.645	0.569	2.938**
Experimental vs Control					
Pre-test	0.100	0.184	1.972**	0.413	0.439
Experimental vs control					
Post-test	1.384*	0.042	1.290*	0.270	0.077

* $t_{.90}$

** $t_{.95}$

control group lost significantly in this area over the experimental period, with the result that the experimental group was significantly superior to the control group at the end of two and one-half years. Thus, PLDK lessons appear to have offset a loss in vocabulary ability. This is understandable when it is pointed out that half of the verbal meaning subtest is a measure of hearing vocabulary, an area receiving some emphasis by PLDK lessons. However, the lessons do place more emphasis on the expressive language development of the child than on his receptive language development, so that a more positive gain could not necessarily be expected. Expressive language is not measured by the PMA.

The experimental group showed a significant increase in pre/post scores on the number facility and perceptual speed subtests. However, in number facility, the gains are offset by a correspondingly significant increase in control group scores. On the spatial relations subtest, the experimental group scores were significantly lower than those of the control group both at pre-testing and post-testing. However, the experimental group showed a significant difference between pre- and post-test scores, while the control group did not. The spatial relations subtest measures the ability to see relations between shapes and forms rotated in space. Why this area only should be positively affected by PLDK lessons is difficult to explain, except in terms of a statistical artifact due to the initial inferiority of the experimental group. However, another possible explanation is the fact that the PLDK lessons contain an extensive set of coordinated visual materials known as stimulus cards. No significant differences were found on comparisons of scores on the

reasoning subtest. Note that comparisons were made on only 12 experimental Ss and 11 control Ss who were initially administered the form of the PMA (4-6) which includes a subtest in reasoning. Perhaps this best explains the results, since the PLDK lessons are intended to stimulate convergent thinking (or reasoning) but they did not.

In sum, PLDK lessons primarily affected intellectual functioning in the area of verbal meaning and spatial relationships as measured by subtests on the *Primary Mental Abilities Test.*

Language Development

The means and standard deviations of the ITPA (short form) scores were reported earlier in Table 3. Results of the analysis of variance on these data are presented in Table 7. Similar to the IQ findings, two significant main effects appear, indicating that PLDK treatment significantly improved language abilities. Again, gains over the Level #1 period were greater than over the Level #2 period. The failure to find a main effect on sex aroused interest, as previous research with young disadvantaged children in the primary grades had indicated that boys profited differentially over girls, at least for Level #1 (Dunn & Mueller, 1966). Table 3 shows that, although experimental boys made greater overall gain (14 points vs 8 points), control boys were superior on LA initially; the main effect may thus have been hidden. Also, both experimental and control Ss were approaching or into adolescence, which may have differentially affected interest in PLDK materials in favor of the girls, especially for Level #1. Again, no significant interactions were found.

Table 7

Analysis of Variance on Language Age Gains as Measured by the *Illinois Test of Psycholinguistic Abilities*

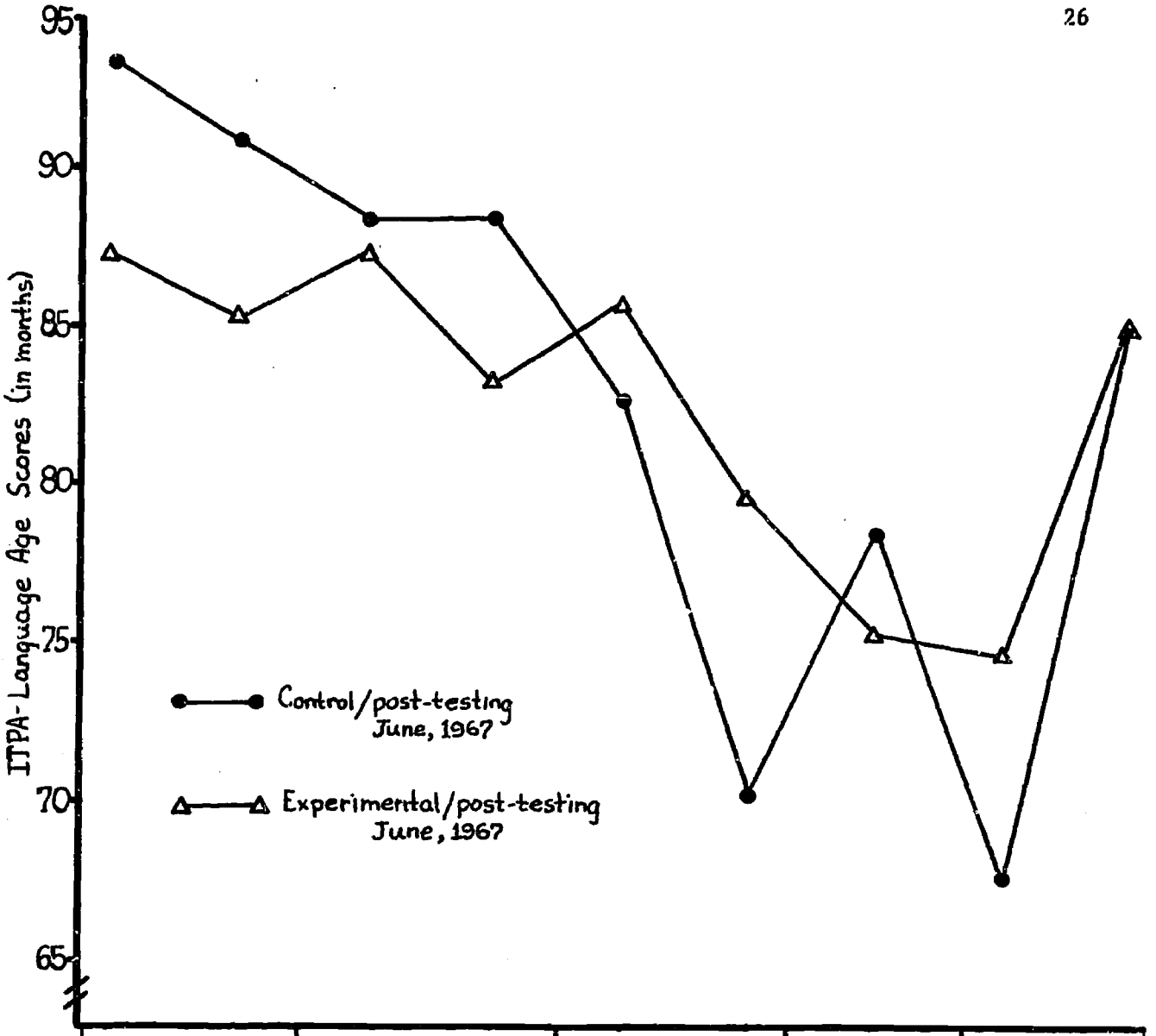
Source of Variation	Degree of Freedom	Sum of Squares	Mean Squares	F Ratio
Between				
A (Exp. vs Con.)	1	621.2812	621.2812	10.2318*
C (sex)	1	.0017	.0017	0.0000
A x C	1	63.6510	63.6510	1.0482
Error	68	4129.0036	60.7206	
Subtotal	71	4813.9375		
Within				
B (1st yr. vs 2nd yr.)	1	1943.3402	1943.3402	15.7747*
A x B	1	211.8368	211.8368	1.7195
B x C	1	5.9383	5.9383	.0482
A x B x C	1	91.2382	91.2382	.7406
Error	68	8377.1465	123.1933	
Subtotal	72	10629.5000		
Total	143	15443.4375		

*$F_{.95} = 3.98$

$F_{.90} = 2.79$

A profile of the full-scale ITPA administered in June, 1967 to the total of 108 subjects is presented in Figure 4. The t-tests performed on means of experimental and control groups for each of the nine subtests revealed that the experimental group scores were significantly higher on the motor encoding and auditory-vocal sequencing subtests, while control group scores were superior on the auditory decoding, visual decoding, and visual-motor association subtests. No significant differences were found between groups on the other four subtests. It will be noted that gains as a result of PLDK treatment are in the areas of expression (gestures) and sequencing (memory)--areas where effects of oral language training could be expected to appear. Thus, the lessons were effective in training thinking (memory) and expression. PLDK lessons do not appear to have positively affected reception, association, or automatic skills. In contrast to these results, Dunn and Mueller (1967) found that disadvantaged children also profited in the area of expression, but in the vocal rather than the motor form; furthermore, significant gains were found in association subtests but not on sequencing subtests, both areas which stress thinking abilities.

Why the PLDK lessons failed to significantly improve oral expression in the retarded, as it did for the disadvantaged, is difficult to interpret. It may be that since the retarded are initially at a lower level, and/or lower in ability than the slow-learning disadvantaged child, initial gains for the retarded will appear in different areas. Thus, expression through means of gestures may be already sufficiently developed in the child of more normal ability, and PLDK lessons serve to develop vocal expression, a higher level of expressive ability.



N=79	E	87.35	85.28	87.39	83.39	85.91	79.81	75.34	74.70	85.04
	C	93.79	90.83	88.31	88.45	83.03	70.76	78.79	67.59	85.41

Fig. 4. Full-scale ITPA profile of 108 experimental and control subjects, June, 1967. (* Significant differences)

However, the retarded child may not have sufficiently developed motor expression, so that PLDK lessons are first effective here. Perhaps more time or emphasis is needed to show enhancement of oral skills. The same reasoning may be applied to the differential gains noted between sequential and association areas for the two groups of children.

Results on the means of the subtest scores of experimental and control groups for the short-form of the ITPA are shown in Figure 5. Here it can be seen that control group scores were significantly higher initially on all four psycholinguistic subtests, and continued to be ahead after the two and one-half year experimental period, though the experimental subjects caught up to some extent. (Because of the initial inequities between the groups, no inferential statistics were run on these data.)

School Achievement

Means and standard deviations of pre-, interim-, and post-test scores on the mathematics and core achievement subtest of *New York Achievement Tests* are presented in Table 8. It should be noted that the number of subjects on which data were gathered differed over the three test periods. Analysis of variance on mathematics test scores (Table 9) showed a significant main effect in favor of the experimental group on mathematics scores but no significant main effect between PLDK levels. A significant difference was also found on sex in favor of the boys. There were no significant interactions. It should be pointed out that the significant main effect in favor of the experimental group gain scores may be an artifact rather than a true difference in achievement, since the experimental group was initially at a lower achievement level than the control group (see Table 8).

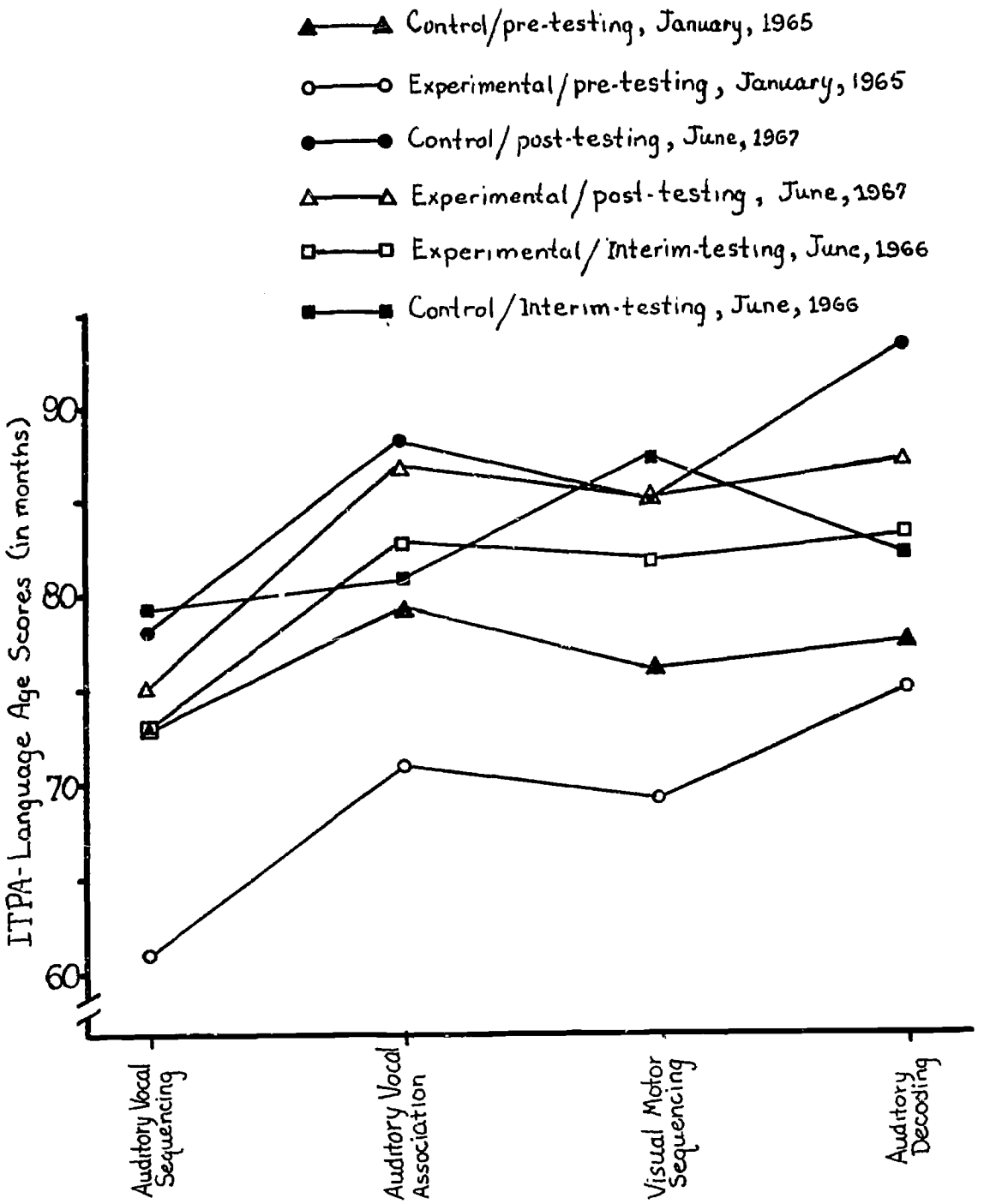


Fig. 5. Profile of the short-form of the ITPA for the 108 subjects.

Table 8

Means and Standard Deviations of Pre-, Interim-, and Post-Test Scores on *New York Achievement Test* Data

Group		Mathematics			Core Achievement		
		Pre	Int	Post	Pre	Int	Post
Experimental Boys	N	28	28	25	28	28	26
	$\bar{X}$	11.79	16.75	20.12	27.93	32.96	36.88
	S	6.58	6.74	5.14	6.01	8.22	5.67
Experimental Girls	N	20	20	19	20	19	19
	$\bar{X}$	10.70	13.95	16.42	25.45	29.58	32.47
	S	3.69	5.85	5.78	6.75	4.61	6.65
Experimental Total	N	48	48	44	48	47	45
	$\bar{X}$	11.33	15.58	18.52	26.90	31.60	35.02
	S	5.54	6.47	5.67	6.38	7.13	6.42
Control Boys	N	14	14	12	14	14	12
	$\bar{X}$	17.21	19.86	21.33	30.43	33.07	35.58
	S	6.33	6.60	7.39	6.51	11.91	8.35
Control Girls	N	10	10	8	10	10	8
	$\bar{X}$	11.70	15.40	16.00	25.60	30.10	32.75
	S	5.89	5.60	7.76	6.55	5.93	5.34
Control Total	N	24	24	20	24	24	20
	$\bar{X}$	14.92	18.00	19.20	28.42	31.83	34.45
	S	6.63	6.47	7.81	6.83	5.76	7.27
Total Boys	N	42	42	37	42	42	38
	$\bar{X}$	13.60	17.79	20.51	28.76	33.00	36.47
	S	6.92	6.78	5.89	6.22	9.46	6.54
Total Girls	N	30	30	27	30	29	27
	$\bar{X}$	11.03	14.43	16.30	25.50	29.76	32.56
	S	4.46	5.72	6.27	6.57	5.00	6.19
Total	N	72	72	64	72	71	65
	$\bar{X}$	12.53	16.39	18.73	27.40	31.68	34.85
	S	6.12	6.53	6.36	6.53	8.06	6.64

Table 9

Analysis of Variance on Scholastic Achievement Gains as Measured by the Subtest of Mathematical Concepts of the *New York City Core Achievement Test*

Source of Variation	Degree of Freedom	Sum of Squares	Mean Squares	F Ratio
Between				
A (Exp. vs Con.)	1	57.2762	57.2762	5.7358*
C (Sex)	1	34.5204	34.5204	3.4569**
A x C	1	16.2999	16.2999	1.6323
Error	60	599.1457	9.9857	
Subtotal	63	707.2422		
Within				
B (1st yr. x 2nd yr.)	1	43.9452	43.9452	1.0533
A x B	1	3.3253	3.3253	.0797
B x C	1	2.8060	2.8060	.0672
A x B x C	1	7.1990	7.1990	.1725
Error	60	2503.2245	41.7204	
Subtotal	64	2560.5000		
Total	127	3267.7422		

*$F_{.95} = 4.00$

**$F_{.90} = 2.79$

Table 10 shows that no significant main effects or interactions were found on the core achievement test gain scores. It will be recalled that core achievement scores are primarily a measure of non-academic areas. Dunn, Mueller, and Pochanart (1967) found significant gains in written language proficiency on the *Metropolitan Achievement Test*. It is, thus, possible that PLDK lessons do not differentially affect non-academic areas of the curriculum, areas which are already particularly suited to the initial low learning abilities of EMR children, but do enhance academic areas which are highly correlated with verbal IQ and oral language ability. This would explain the significant finding in mathematics achievement when it is remembered that the *Wide Range Test of Mathematical Concepts* stresses conceptual ability rather than computational proficiency.

Summary

The purpose of this study was to determine the effectiveness of the *Peabody Language Development Kits* when used over a relatively long time period of two and one-half years in facilitating the linguistic, intellectual, and academic development of educable mentally retarded (EMR) children. Thirty-five to 45 minute daily oral language stimulation lessons, utilizing Levels #1 and #2 of the *Peabody Language Development Kits*, were given by the special-class teachers in 27 classes for the EMR; a control group of nine classes received no special treatment. The classes were located in 28 schools serving inner-city disadvantaged children in a mid-Southern city.

Table 10

Analysis of Variance on Scholastic Achievement Gains as Measured by the *New York City Core Achievement Test*

Source of Variation	Degree of Freedom	Sum of Squares	Mean Squares	F Ratio
Between				
A (Exp. vs Con.)	1	24.8188	24.8188	1.7941
C (Sex)	1	5.9575	5.9575	.4306
A x C	1	31.9569	31.9569	2.3101
Error	60	829.9856	13.8330	
Subtotal	63	892.7188		
Within				
B (1st yr. vs 2nd yr.)	1	63.2813	63.2813	1.3783
A x B	1	17.4005	17.4005	.3789
B x C	1	.0102	.0102	.0002
A x B x C	1	3.6043	3.6043	.0785
Error	60	2754.7037	45.9117	
Subtotal	64	2839.0000		
Total	127	3731.7188		

$F_{.95} = 4.00$

$F_{.90} = 2.79$

Results support parallel research findings with disadvantaged children (Dunn, Pochanart & Pfost, 1967) except in the critical area of school achievement. The effectiveness of PLDK lessons in fostering language and cognitive growth of educable mentally retarded children was confirmed. However, PLDK treatment effects were not so clear for school achievement. This may be due to the fact that oral language abilities correlate more highly with verbal intelligence than with school achievement, or it may be due to the choice of achievement measure. The significant main effect found between PLDK levels in favor of Level #1 on IQ and LA gains cannot be interpreted as a difference in actual effectiveness of the two levels, as unequal treatment periods, as well as "the initial spurt phenomenon" may have been involved. Finally, PLDK lessons did not differentially affect the two sexes (except in mathematics).

It can be concluded that an extended treatment period does indeed increase the effectiveness of PLDK, at least in oral language and intellectual development for educable mentally retarded children. Perhaps a longer time is needed to show scholastic gains. Further, the program is effective when used by the special class teacher without a great amount of supervision. Whether the gains were sufficient to provide long-lasting results remains for a follow-up study to investigate.

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