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ABSTRACT

The language skills category of objectives of the Appalachia Preschool Education Program as measured by the Illinois Test of Psycholinguistic Abilities (ITPA), is discussed. The point is made that one of the difficulties associated with evaluating language development is the loose fit between available theoretical and operational definitions of language. Often language is not theoretically defined at all and must be operationally defined by the particular evaluation instrument being used. Consequently, the theoretical model underlying the ITPA is considered to be applicable to the Appalachia program. The ITPA was a primary instrument in gathering data for the development of the preschool curriculum objectives. The text of this report gives an overview of the instrument as well as separate descriptions for each subtest. Also, statistical descriptions and inferences are presented for each subtest. Three of the 10 subtests administered showed significant treatment of effects after covariance, indicating that there was some correspondence between program and test objectives. Findings indicate that a primary area of program effect is that of expressive language. (Author/CK)

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# Detailed Analysis of the Language Development of Children in AEL's Preschool Education Program

Technical Report No. 15

December, 1971

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Detailed Analysis of the Language Development  
of Children in AEL's Preschool  
Education Program

Introduction

The original curriculum for the Appalachia Preschool Education Program was divided into four major categories--motor activities, language skills, cognition, and orienting and attending skills (Hooper and Marshall, 1968). This report is concerned with the language skills category of objectives, as measured by the Illinois Test of Psycholinguistic Abilities.

One of the difficulties associated with evaluating language development is the loose fit between available theoretical and operational definitions of language. Often language is not theoretically defined at all and must be operationally defined by the particular evaluation instrument being used. This procedure has been followed for the summative evaluation of language growth in the AEL program. Consequently, the theoretical model underlying the Illinois Test of Psycholinguistic Ability, the test used for language evaluation, is considered to be applicable to the Appalachia program. The definition of language used, therefore, was that of the authors of the ITPA.

The ITPA was a primary instrument in gathering data for the development of the preschool curriculum objectives (Hooper and Marshall, 1968, pp. 76-89). Since this is so, it was assumed that the ITPA would measure many of the language objectives of the program as it proceeded through its three-year development cycle. The ITPA also has the advantage of being a nationally normed test and thus of providing comparisons with a large, representative sample of children outside of Appalachia.

The text of this report will give an overview of the instrument as well as separate descriptions for each subtest. Following this, statistical descriptions and inferences will be presented for each subtest. Finally, an overall summary of the findings for the third year's program effects on language development will be presented.

## The Model of the ITPA

According to the authors, the purpose of the ITPA is to:

Relate those functions whereby the intentions of one individual are transmitted (verbally or nonverbally) to another individual, and, reciprocally, functions whereby the environment or the intentions of another individual are received and interpreted. It attempts to interrelate the processes which take place, for example, when one person receives a message, interprets it, or becomes a source of a new signal to be transmitted. It deals with the psychological functions of the individual which operate in communication activities (Kirk, McCarthy, and Kirk, 1968).

It was hoped that not only would the child model his language behavior on the example provided by the paraprofessional, the teacher on the mobile facility, and the television teacher, but that in addition the paraprofessional would influence the parent's behavior in a manner which would produce increased rates of language development among children in the program. Additionally, the program stresses nonverbal communication, listening skills, and vocabulary as well as verbal expression. Thus, the theoretical model of language just described is closely congruent with the objectives of the APEP.

The ITPA itself consists of ten subtests, each of which attempts to measure a different aspect of language skills and those cognitive abilities which are related to language. These subtests overlap somewhat in the functions which they measure but cover the broad areas of auditory memory and acuity, verbal expression and grammar, syntax and transformations, and the ability to associate various auditory and visual stimuli. A total score for the test gives an overall picture of the individual's psycholinguistic functioning. The ITPA was administered pre and post-test by testers trained by AEL but not otherwise associated with the program.

Although the ITPA's major function is the identification of individual deficiencies in receptive or expressive language abilities, it has two advantages which qualify it as a major evaluation instrument. First, it was used to gather data in the pilot study by the Hooper and Marshall, and second, it provides national norms and data from a large number of other research projects with which to compare AEL's progress.

### Method of Analysis

The primary statistical technique used to analyze the data from the ITPA was analysis of covariance on post-test scores, using chronological age and PPVT raw score as covariates. The eta-squared statistic is modified for the ANCOVA and indicates only the proportion of variance accounted for by the treatment, sex, treatment-sex interaction, and error. An analysis



of variance also was performed and showed significant effects across treatments on these two covariates. However, since the oldest group (TV only) consistently had the lowest overall mean scores, it is likely that covariance obscured some treatment effects which were actually present. For this reason ANOVA is considered a secondary analysis technique. Gain score analysis also was performed and will be reported where appropriate.

Data were collected from a sample of approximately 300 children in June and September, 1970, as a pretest and in June, 1971, as a post-test. The sample was comprised of three treatment groups and a control group. The three treatments were: a group which took part in activities on a mobile classroom once a week and received weekly home visits from a paraprofessional as well as viewing a daily television program (TV-HV-MC); a group visited weekly by the paraprofessional and who also watched the television program (TV-HV); and a group who only watched the television program (TV only).

Additionally, a control group of 120 children was selected in Monongalia County, West Virginia, and tested with the same battery of tests administered to the three treatment groups. A detailed description of the sampling procedure is included in the introduction to the total report.

## Description of ITPA Subtests and Data Analysis

### ITPA Subtest 1 (Auditory Reception)

Auditory reception measures the ability of a child to derive meaning from verbally presented material. Since the receptive rather than the expressive process is being sampled, the response throughout is kept at the simple level of a "yes" or "no" or even a nod or shake of the head. The vocabulary becomes more and more difficult while the response remains at a two-year level. Similarly, the automatic function of determining meaning from syntax has been minimized by retaining one sentence form. The test contains 50 short, direct questions printed in the manual. Typical items are: "Do dogs eat?" "Do dials yawn?" "Do carpenters kneel?" "Do wingless birds soar?" (Kirk, McCarthy, and Kirk, 1968, p. 9).

It seems likely that this subtest measures functions more complex than the ability to hear and understand simple questions. At the very least it is responsive to the vocabulary level of the individual, especially in the area of noun-verb relationships.

Table 15.1 lists means, standard deviations, and sample sizes for each age by sex cell within the four treatment groups on Subtest 1, as well as overall means for each group for pre and post-test measures.

To provide graphical comparison, Figure 15.1 shows group means adjusted for analysis of covariance. Normative means for groups of similar ages are shown also for comparative purposes.

Table 15.1

Pre and Post-test Means, Standard Deviations, and Sample

Sizes for ITPA Subtest 1 (Auditory Reception)

Age	Sex	TV-HV-MC		TV-HV		TV only		Control	
		Pretest	Post-test	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test
3	M	$\bar{x}$ = 11.90 N= 10 $\sigma$ = 3.92	$\bar{x}$ = 18.50 N= 12 $\sigma$ = 5.02	$\bar{x}$ = 12.08 N= 11 $\sigma$ = 5.24	$\bar{x}$ = 18.56 N= 16 $\sigma$ = 8.42	$\bar{x}$ = 8.55 N= 11 $\sigma$ = 6.16	$\bar{x}$ = 9.88 N= 8 $\sigma$ = 6.33	$\bar{x}$ = 12.00 N= 8 $\sigma$ = 4.36	$\bar{x}$ = 14.24 N= 17 $\sigma$ = 5.91
	F	$\bar{x}$ = 10.29 N= 11 $\sigma$ = 6.49	$\bar{x}$ = 17.46 N= 13 $\sigma$ = 4.22	$\bar{x}$ = 11.10 N= 10 $\sigma$ = 5.79	$\bar{x}$ = 16.22 N= 18 $\sigma$ = 7.79	$\bar{x}$ = 8.20 N= 5 $\sigma$ = 3.98	$\bar{x}$ = 13.40 N= 5 $\sigma$ = 6.71	$\bar{x}$ = 11.38 N= 8 $\sigma$ = 6.65	$\bar{x}$ = 14.37 N= 19 $\sigma$ = 6.71
4	M	$\bar{x}$ = 16.89 N= 9 $\sigma$ = 3.52	$\bar{x}$ = 22.69 N= 20 $\sigma$ = 6.33	$\bar{x}$ = 16.22 N= 9 $\sigma$ = 5.09	$\bar{x}$ = 13.68 N= 22 $\sigma$ = 8.69	$\bar{x}$ = 17.54 N= 13 $\sigma$ = 6.84	$\bar{x}$ = 14.07 N= 14 $\sigma$ = 7.69	$\bar{x}$ = 15.38 N= 13 $\sigma$ = 5.57	$\bar{x}$ = 13.58 N= 17 $\sigma$ = 3.77
	F	$\bar{x}$ = 17.78 N= 9 $\sigma$ = 7.56	$\bar{x}$ = 22.16 N= 19 $\sigma$ = 7.55	$\bar{x}$ = 20.10 N= 10 $\sigma$ = 8.65	$\bar{x}$ = 23.55 N= 22 $\sigma$ = 8.58	$\bar{x}$ = 15.80 N= 10 $\sigma$ = 8.05	$\bar{x}$ = 12.00 N= 8 $\sigma$ = 5.43	$\bar{x}$ = 13.46 N= 13 $\sigma$ = 4.68	$\bar{x}$ = 18.00 N= 17 $\sigma$ = 5.57
5	M	$\bar{x}$ = 26.23 N= 13 $\sigma$ = 8.93	$\bar{x}$ = 26.93 N= 16 $\sigma$ = 6.12	$\bar{x}$ = 22.50 N= 8 $\sigma$ = 6.86	$\bar{x}$ = 26.85 N= 27 $\sigma$ = 8.34	$\bar{x}$ = 20.50 N= 8 $\sigma$ = 6.16	$\bar{x}$ = 24.58 N= 12 $\sigma$ = 7.32	$\bar{x}$ = 18.11 N= 9 $\sigma$ = 6.62	$\bar{x}$ = 22.89 N= 18 $\sigma$ = 6.62
	F	$\bar{x}$ = 22.40 N= 11 $\sigma$ = 4.14	$\bar{x}$ = 23.06 N= 15 $\sigma$ = 4.82	$\bar{x}$ = 19.40 N= 10 $\sigma$ = 3.66	$\bar{x}$ = 23.45 N= 22 $\sigma$ = 6.06	$\bar{x}$ = 20.23 N= 13 $\sigma$ = 5.63	$\bar{x}$ = 23.14 N= 19 $\sigma$ = 6.32	$\bar{x}$ = 24.40 N= 10 $\sigma$ = 8.51	$\bar{x}$ = 24.13 N= 15 $\sigma$ = 7.46
TOTAL		$\bar{x}$ = 17.96 N= 63 $\sigma$ = 6.26	$\bar{x}$ = 22.72 N= 95 $\sigma$ = 5.95	$\bar{x}$ = 16.64 N= 58 $\sigma$ = 6.06	$\bar{x}$ = 21.94 N= 130 $\sigma$ = 8.03	$\bar{x}$ = 15.80 N= 60 $\sigma$ = 6.54	$\bar{x}$ = 19.50 N= 66 $\sigma$ = 4.68	$\bar{x}$ = 15.88 N= 61 $\sigma$ = 6.16	$\bar{x}$ = 18.79 N= 105 $\sigma$ = 6.11

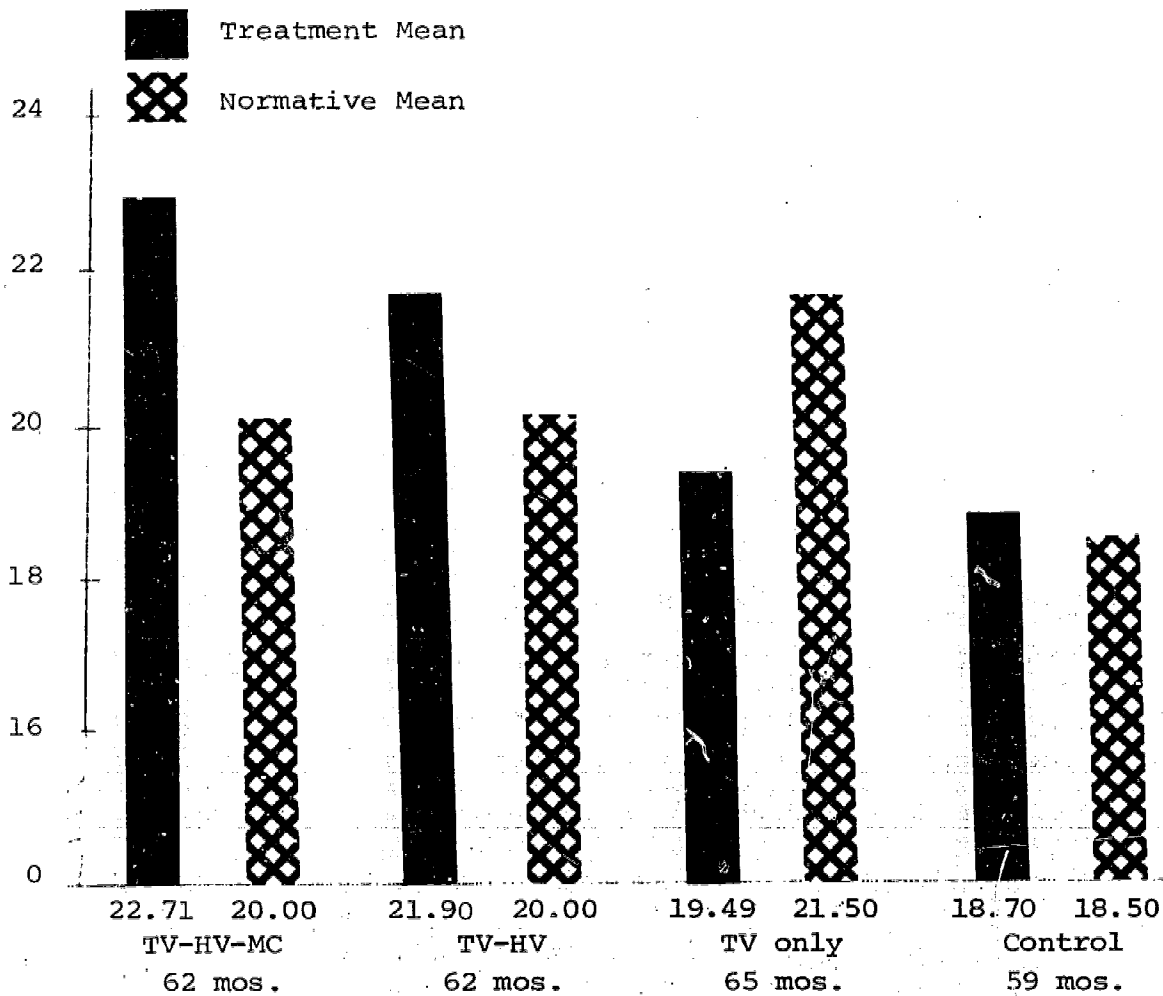


Figure 15.1

Adjusted Overall Group Means and Normative Means for ITPA Subtest 1 (June, 1971)  
(Normative means differ because of differing treatment group ages)

The differences between treatment means are not significant as Table 15.2 indicates.  $\eta^2$ , a measure of the proportion of variance attributable to each source, also is included. Although neither sex nor treatment effects was present, it is of interest to note that all groups scored near the national norms for their mean age. This finding runs contrary to the traditional view that Appalachian children are consistently behind their peers in language development.

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Table 15.2

## Analysis of Covariance Table for ITPA Subtest 1 (June, 1971)

Source	eta <sup>2</sup>	d.f.	Mean Square	F	p
Trt.	.01	3	62.76	1.05	NS
Sex	.00	1	6.67	0.18	NS
Trt. by Sex	.00	3	15.77	0.41	NS
Covs.		2	84899.81	2229.37	-
Cov. 1		1	19.79	0.52	-
Cov. 2		1	5474.82	143.78	-
Error	.98	386	38.08		

ITPA Subtest 2, Visual Reception (Visual Decoding)

The visual reception test is comparable to the Auditory Reception Test but utilizes a different sense modality. It is a measure of the child's ability to gain meaning from visual symbols. In this test there are 40 picture items, each consisting of a stimulus picture on one page and four response pictures on a second page. The child is shown the stimulus picture for three seconds with the directions, "See this?" Then, the page of response pictures is presented with the direction, "Find one here." The credited choice is the object or situation which is conceptually similar to the stimulus. The other choices include pictures with varying degrees of structural (rather than functional) similarity or pictures which are associated with the stimulus or with the acceptable choice (Kirk, McCarthy, and Kirk, 1968, p. 10).

The title of this subtest is somewhat misleading since functions more complex than visual acuity are involved. It is possible that this type of matching-to-sample task is dependent on the ability to make logical classifications as well as simple visual reception.

Table 15.3 gives mean scores, standard deviations, and sample size for each age and sex cell within the treatment and comparison groups as well as overall means for each treatment group on both pre and post-test measures.

Using means from analysis of covariance adjusted for age in months and PPVT raw scores, Figure 15.2 illustrates the differences between treatment groups on ITPA Subtest 2 as well as comparisons with national norms for children of similar ages.

Table 15.3

Cell Means and Sample Sizes for ITPA Subtest 2 (Visual Decoding)

Age	Sex	TV-HV-MC		TV-HV		TV only		Control	
		Pretest	Post-test	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test
3	M	$\bar{x}$ = 8.11 N= 10 $\sigma$ = 1.20	$\bar{x}$ = 12.58 N= 12 $\sigma$ = 3.30	$\bar{x}$ = 9.92 N= 11 $\sigma$ = 4.25	$\bar{x}$ = 9.44 N= 16 $\sigma$ = 2.79	$\bar{x}$ = 7.09 N= 11 $\sigma$ = 2.39	$\bar{x}$ = 7.75 N= 8 $\sigma$ = 2.95	$\bar{x}$ = 9.25 N= 8 $\sigma$ = 3.93	$\bar{x}$ = 12.47 N= 17 $\sigma$ = 5.96
	F	$\bar{x}$ = 8.25 N= 11 $\sigma$ = 2.45	$\bar{x}$ = 11.69 N= 13 $\sigma$ = 3.07	$\bar{x}$ = 9.90 N= 10 $\sigma$ = 3.59	$\bar{x}$ = 9.33 N= 18 $\sigma$ = 4.51	$\bar{x}$ = 8.20 N= 5 $\sigma$ = 4.12	$\bar{x}$ = 8.20 N= 5 $\sigma$ = 3.76	$\bar{x}$ = 8.75 N= 8 $\sigma$ = 4.60	$\bar{x}$ = 10.47 N= 19 $\sigma$ = 3.80
4	M	$\bar{x}$ = 12.67 N= 9 $\sigma$ = 3.67	$\bar{x}$ = 15.84 N= 20 $\sigma$ = 4.98	$\bar{x}$ = 11.76 N= 9 $\sigma$ = 5.19	$\bar{x}$ = 13.68 N= 25 $\sigma$ = 5.99	$\bar{x}$ = 11.85 N= 13 $\sigma$ = 5.49	$\bar{x}$ = 14.07 N= 14 $\sigma$ = 5.51	$\bar{x}$ = 10.15 N= 13 $\sigma$ = 5.80	$\bar{x}$ = 14.41 N= 17 $\sigma$ = 5.15
	F	$\bar{x}$ = 15.27 N= 9 $\sigma$ = 5.63	$\bar{x}$ = 15.74 N= 19 $\sigma$ = 5.37	$\bar{x}$ = 12.60 N= 10 $\sigma$ = 5.54	$\bar{x}$ = 16.70 N= 22 $\sigma$ = 5.87	$\bar{x}$ = 10.80 N= 10 $\sigma$ = 4.13	$\bar{x}$ = 9.38 N= 8 $\sigma$ = 4.87	$\bar{x}$ = 11.38 N= 13 $\sigma$ = 4.75	$\bar{x}$ = 13.90 N= 17 $\sigma$ = 5.33
5	M	$\bar{x}$ = 14.92 N= 13 $\sigma$ = 5.77	$\bar{x}$ = 19.50 N= 16 $\sigma$ = 4.68	$\bar{x}$ = 14.63 N= 8 $\sigma$ = 7.05	$\bar{x}$ = 18.85 N= 27 $\sigma$ = 5.77	$\bar{x}$ = 14.63 N= 8 $\sigma$ = 6.44	$\bar{x}$ = 18.42 N= 12 $\sigma$ = 6.02	$\bar{x}$ = 12.11 N= 9 $\sigma$ = 3.66	$\bar{x}$ = 17.17 N= 18 $\sigma$ = 4.72
	F	$\bar{x}$ = 14.80 N= 11 $\sigma$ = 4.08	$\bar{x}$ = 19.40 N= 15 $\sigma$ = 5.26	$\bar{x}$ = 11.60 N= 10 $\sigma$ = 5.15	$\bar{x}$ = 16.55 N= 22 $\sigma$ = 7.22	$\bar{x}$ = 13.38 N= 13 $\sigma$ = 4.56	$\bar{x}$ = 17.00 N= 19 $\sigma$ = 4.80	$\bar{x}$ = 14.30 N= 10 $\sigma$ = 7.75	$\bar{x}$ = 16.46 N= 15 $\sigma$ = 6.53
TOTAL		$\bar{x}$ = 12.37 N= 63 $\sigma$ = 4.18	$\bar{x}$ = 16.02 N= 95 $\sigma$ = 4.66	$\bar{x}$ = 11.60 N= 58 $\sigma$ = 5.15	$\bar{x}$ = 14.70 N= 130 $\sigma$ = 5.68	$\bar{x}$ = 11.20 N= 60 $\sigma$ = 4.68	$\bar{x}$ = 13.92 N= 66 $\sigma$ = 4.97	$\bar{x}$ = 11.08 N= 61 $\sigma$ = 5.35	$\bar{x}$ = 14.05 N= 105 $\sigma$ = 5.26



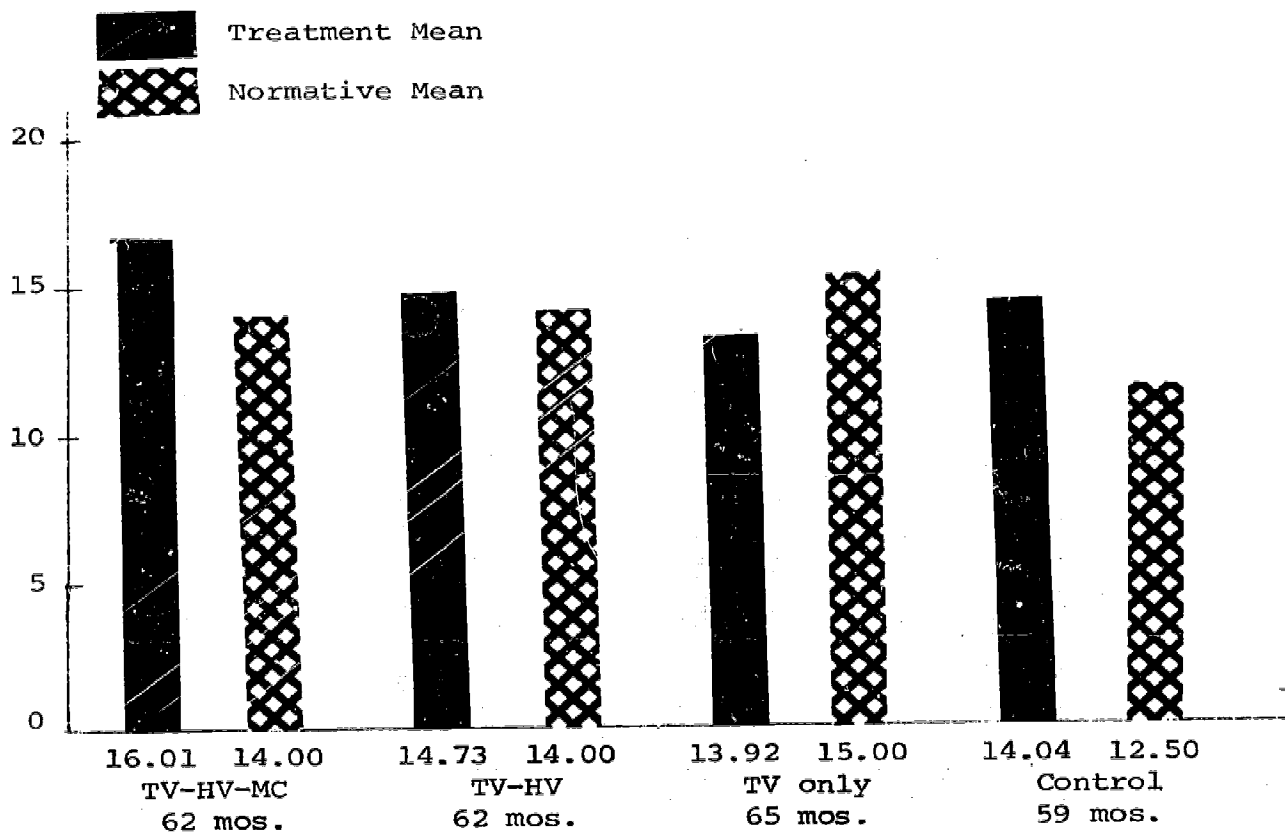


Figure 15.2

Adjusted Overall Group Means and Normative Means for ITPA Subtest 2 (June, 1971)

As the analysis of covariance summary in Table 15.4 shows, the differences between group means are not statistically significant. It is of interest that three of the four groups did score at or above the national norms, continuing the pattern evident for Subtest 1.

Table 15.4

Analysis of Covariance Table for ITPA Subtest 2 (June, 1971)

Source	eta <sup>2</sup>	d. f.	Mean Square	F	p
Trt.	.52	3	34.63	1.40	-
Sex	.00	1	0.61	0.02	-
Trt. by Sex	.00	3	5.76	0.23	-
Covs.		2	42640.40	1729.16	-
Cov. 1		1	183.91	7.46	-
Cov. 2		1	1777.91	72.10	-
Error	.48	386	24.66		

### ITPA Subtest 3 (Auditory-Vocal Association)

Subtest 3 taps the child's ability to relate concepts presented orally. In this test the requirements of the auditory receptive process and the vocal expressive process are minimal, while the organizing process of manipulating linguistic symbols in a meaningful way is tested by verbal analogies of increasing difficulty. A sentence completion technique is used in which one statement is followed by an incomplete analogous statement which the child is to complete. There are 42 orally presented analogies, such as, "I cut with a saw; I pound with a \_\_\_\_\_." "A dog has hair; a fish has \_\_\_\_\_." (Kirk, McCarthy, and Kirk, 1968, p. 10.)

Subtest 3 probably is an overall measure of the child's ability to reason by analogies as well as a measure of his general knowledge of objects and their functions in the environment. Table 15.5 shows mean scores and sample sizes for each age and sex cell for the four groups as well as overall means for each. Data on both pre and post-test are shown.

To provide graphical comparisons between group means and national norms, Figure 15.3 presents post-test means adjusted for age in months and PPVT raw scores, and normative means for comparable age groups.

Table 15.5

Cell Means, Standard Deviations, and Sample Sizes for ITPA Subtest 3

(Auditory-Vocal Association)

Age	Sex	TV-HV-MC		TV-HV		TV only		Control	
		Pretest	Post-test	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test
3	M	$\bar{x}$ = 5.30 N= 10 $\sigma$ = 4.52	$\bar{x}$ = 14.33 N= 12 $\sigma$ = 5.73	$\bar{x}$ = 5.92 N= 11 $\sigma$ = 3.68	$\bar{x}$ = 13.81 N= 16 $\sigma$ = 3.91	$\bar{x}$ = 3.36 N= 11 $\sigma$ = 2.93	$\bar{x}$ = 7.75 N= 8 $\sigma$ = 4.79	$\bar{x}$ = 7.88 N= 8 $\sigma$ = 3.82	$\bar{x}$ = 9.82 N= 17 $\sigma$ = 4.23
	F	$\bar{x}$ = 9.36 N= 11 $\sigma$ = 3.62	$\bar{x}$ = 11.69 N= 13 $\sigma$ = 5.50	$\bar{x}$ = 5.20 N= 10 $\sigma$ = 5.02	$\bar{x}$ = 10.82 N= 18 $\sigma$ = 6.26	$\bar{x}$ = 5.20 N= 5 $\sigma$ = 4.17	$\bar{x}$ = 6.79 N= 5 $\sigma$ = 5.64	$\bar{x}$ = 3.63 N= 8 $\sigma$ = 4.92	$\bar{x}$ = 10.36 N= 19 $\sigma$ = 4.11
4	M	$\bar{x}$ = 14.56 N= 9 $\sigma$ = 5.08	$\bar{x}$ = 17.29 N= 20 $\sigma$ = 5.09	$\bar{x}$ = 12.88 N= 9 $\sigma$ = 6.79	$\bar{x}$ = 15.71 N= 25 $\sigma$ = 7.08	$\bar{x}$ = 12.46 N= 13 $\sigma$ = 6.79	$\bar{x}$ = 18.58 N= 14 $\sigma$ = 4.59	$\bar{x}$ = 11.08 N= 13 $\sigma$ = 6.21	$\bar{x}$ = 15.35 N= 17 $\sigma$ = 6.15
	F	$\bar{x}$ = 13.89 N= 9 $\sigma$ = 4.65	$\bar{x}$ = 20.21 N= 19 $\sigma$ = 4.54	$\bar{x}$ = 15.70 N= 10 $\sigma$ = 6.24	$\bar{x}$ = 18.54 N= 22 $\sigma$ = 5.33	$\bar{x}$ = 11.90 N= 10 $\sigma$ = 4.28	$\bar{x}$ = 13.12 N= 8 $\sigma$ = 6.07	$\bar{x}$ = 11.08 N= 10 $\sigma$ = 5.53	$\bar{x}$ = 13.00 N= 17 $\sigma$ = 5.66
5	M	$\bar{x}$ = 17.92 N= 13 $\sigma$ = 4.82	$\bar{x}$ = 22.44 N= 16 $\sigma$ = 4.90	$\bar{x}$ = 18.25 N= 8 $\sigma$ = 2.82	$\bar{x}$ = 20.00 N= 27 $\sigma$ = 6.68	$\bar{x}$ = 13.76 N= 8 $\sigma$ = 7.63	$\bar{x}$ = 18.50 N= 12 $\sigma$ = 6.60	$\bar{x}$ = 14.78 N= 9 $\sigma$ = 2.73	$\bar{x}$ = 17.83 N= 18 $\sigma$ = 4.25
	F	$\bar{x}$ = 18.50 N= 11 $\sigma$ = 4.50	$\bar{x}$ = 19.77 N= 15 $\sigma$ = 4.26	$\bar{x}$ = 15.50 N= 10 $\sigma$ = 6.69	$\bar{x}$ = 19.77 N= 22 $\sigma$ = 6.03	$\bar{x}$ = 16.54 N= 13 $\sigma$ = 6.60	$\bar{x}$ = 19.84 N= 19 $\sigma$ = 4.61	$\bar{x}$ = 16.60 N= 10 $\sigma$ = 5.19	$\bar{x}$ = 20.87 N= 15 $\sigma$ = 5.80
TOTAL		$\bar{x}$ = 13.47 N= 63 $\sigma$ = 4.54	$\bar{x}$ = 18.00 N= 95 $\sigma$ = 4.98	$\bar{x}$ = 11.91 N= 58 $\sigma$ = 5.44	$\bar{x}$ = 16.85 N= 130 $\sigma$ = 6.10	$\bar{x}$ = 11.15 N= 60 $\sigma$ = 5.77	$\bar{x}$ = 16.05 N= 66 $\sigma$ = 5.31	$\bar{x}$ = 11.79 N= 61 $\sigma$ = 5.03	$\bar{x}$ = 14.34 N= 105 $\sigma$ = 5.13



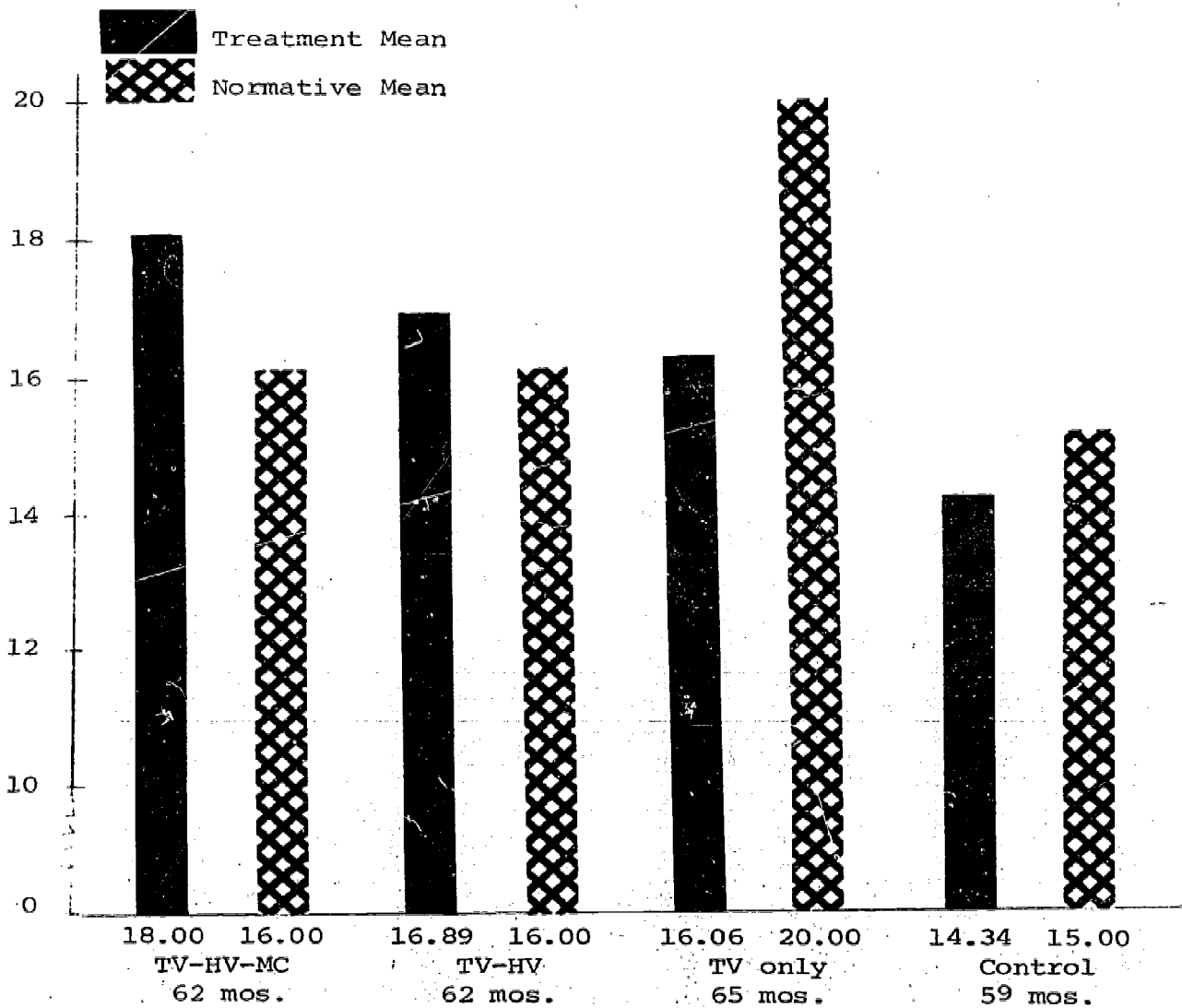


Figure 15.3

Adjusted Overall Group Means and Normative Means for ITPA Subtest 3 (June, 1971)

Although the differences between treatment group means are not significant, as the ANCOVA summary table reveals, a large difference between the normative group and the TV only sample does exist.

Table 15.6

## Analysis of Covariance Table for ITPA Subtest 3 (June, 1971)

Source	eta <sup>2</sup>	d. f.	Mean Square	F	p
Trt.	.01	3	32.05	1.46	-
Sex	.00	1	72.78	3.31	-
Trt. by Sex	.00	3	1.84	0.08	-
Covs.		2	1.84	2457.81	-
Cov. 1		1	44.96	2.05	-
Cov. 2		1	4772.53	217.09	-
Error	.98	386	21.98		

ITPA Subtest 4 (Visual-Motor Association)

Subtest 4 uses a picture association test with which to assess the child's ability to relate concepts presented visually. The child is presented with a single stimulus picture surrounded by four optional pictures, one of which is associated with the stimulus picture. The child is asked, "What goes with this?" (pointing to the stimulus picture) "Which one of these?" (pointing to the four optional pictures). The child is to choose the one picture which is most closely related to the stimulus picture, such as a sock belonging with a shoe, or a hammer with a nail. The test is expanded at the upper level to provide visual analogies comparable to the auditory analogies. "If this goes with this" (pointing to each of a preliminary pair of pictures), "then what goes with this?" (pointing to the central picture as before). The test consists of 20 items of the simpler form and 22 visual analogies (Kirk, McCarthy, and Kirk, 1968, p. 10).

Intuitively, this subtest seems very similar to Auditory Association (Subtest 3) and the relatively high post-test correlation coefficient of .68 between the two measures provides empirical evidence of the similarity. In both cases the child's ability to reason by analogies and previous associations is being tapped.

Table 15.7 presents means, standard deviations, and sample sizes for each age by sex cell within the four treatment groups as well as the total scores for each group for both pre and post-test measures.

Figure 15.4 presents adjusted group means from the analysis of covariance on post-test scores along with the normative means for each corresponding age group for Subtest 4.

Table 15.7

Cell Means, Standard Deviations, and Sample Sizes for ITPA Subtest 4

(Visual-Motor Association)

Age	Sex	TV-HV-MC			TV-HV			TV only			Control		
		Pretest	Post-test		Pretest	Post-test		Pretest	Post-test		Pretest	Post-test	
3	M	$\bar{x}$ = 4.90 N= 10 $\sigma$ = 3.88	$\bar{x}$ = 12.41 N= 12 $\sigma$ = 4.63		$\bar{x}$ = 6.08 N= 11 $\sigma$ = 6.97	$\bar{x}$ = 12.81 N= 16 $\sigma$ = 5.71		$\bar{x}$ = 4.75 N=11 $\sigma$ = 4.05	$\bar{x}$ = 7.87 N= 8 $\sigma$ = 4.57		$\bar{x}$ = 9.88 N= 8 $\sigma$ = 4.54	$\bar{x}$ = 8.70 N= 17 $\sigma$ = 8.33	
	F	$\bar{x}$ = 7.08 N= 11 $\sigma$ = 3.32	$\bar{x}$ = 11.15 N= 13 $\sigma$ = 4.19		$\bar{x}$ = 4.20 N= 10 $\sigma$ = 4.40	$\bar{x}$ = 9.82 N= 18 $\sigma$ = 5.36		$\bar{x}$ = 7.00 N= 5 $\sigma$ = 3.52	$\bar{x}$ = 8.00 N= 5 $\sigma$ = 3.29		$\bar{x}$ = 7.13 N= 8 $\sigma$ = 5.11	$\bar{x}$ = 9.47 N=19 $\sigma$ = 6.71	
4	M	$\bar{x}$ = 13.33 N= 9 $\sigma$ = 3.43	$\bar{x}$ = 17.65 N= 20 $\sigma$ = 5.63		$\bar{x}$ = 11.33 N= 9 $\sigma$ = 8.25	$\bar{x}$ = 14.12 N= 25 $\sigma$ = 6.45		$\bar{x}$ = 11.46 N=13 $\sigma$ = 4.24	$\bar{x}$ = 17.85 N=14 $\sigma$ = 6.63		$\bar{x}$ = 10.69 N=13 $\sigma$ = 7.64	$\bar{x}$ = 13.41 N=17 $\sigma$ = 5.34	
	F	$\bar{x}$ = 13.22 N= 9 $\sigma$ = 6.11	$\bar{x}$ = 15.53 N= 19 $\sigma$ = 6.18		$\bar{x}$ = 12.80 N= 10 $\sigma$ = 6.01	$\bar{x}$ = 19.13 N= 22 $\sigma$ = 4.08		$\bar{x}$ = 11.80 N=10 $\sigma$ = 6.14	$\bar{x}$ = 13.13 N= 8 $\sigma$ = 7.03		$\bar{x}$ = 9.00 N=13 $\sigma$ = 4.28	$\bar{x}$ = 13.21 N=17 $\sigma$ = 4.48	
5	M	$\bar{x}$ = 17.54 N= 13 $\sigma$ = 4.35	$\bar{x}$ = 20.75 N= 16 $\sigma$ = 5.74		$\bar{x}$ = 18.63 N= 8 $\sigma$ = 4.47	$\bar{x}$ = 20.07 N= 27 $\sigma$ = 4.85		$\bar{x}$ = 14.00 N=8 $\sigma$ = 4.78	$\bar{x}$ = 18.00 N=12 $\sigma$ = 4.36		$\bar{x}$ = 15.44 N=9 $\sigma$ = 6.75	$\bar{x}$ = 17.78 N=18 $\sigma$ = 5.47	
	F	$\bar{x}$ = 15.90 N= 11 $\sigma$ = 2.60	$\bar{x}$ = 20.93 N= 15 $\sigma$ = 6.18		$\bar{x}$ = 16.40 N= 10 $\sigma$ = 4.77	$\bar{x}$ = 18.18 N= 22 $\sigma$ = 4.22		$\bar{x}$ = 15.00 N=13 $\sigma$ = 4.49	$\bar{x}$ = 18.26 N=19 $\sigma$ = 4.24		$\bar{x}$ = 15.00 N=10 $\sigma$ = 6.71	$\bar{x}$ = 20.20 N=15 $\sigma$ = 4.42	
TOTAL		$\bar{x}$ = 12.20 N= 63 $\sigma$ = 4.05	$\bar{x}$ = 16.71 N= 95 $\sigma$ = 5.57		$\bar{x}$ = 11.24 N= 58 $\sigma$ = 6.00	$\bar{x}$ = 16.13 N= 130 $\sigma$ = 5.17		$\bar{x}$ = 11.24 N=60 $\sigma$ = 4.65	$\bar{x}$ = 15.47 N=66 $\sigma$ = 5.22		$\bar{x}$ = 11.16 N=61 $\sigma$ = 6.05	$\bar{x}$ = 13.91 N=105 $\sigma$ = 5.99	

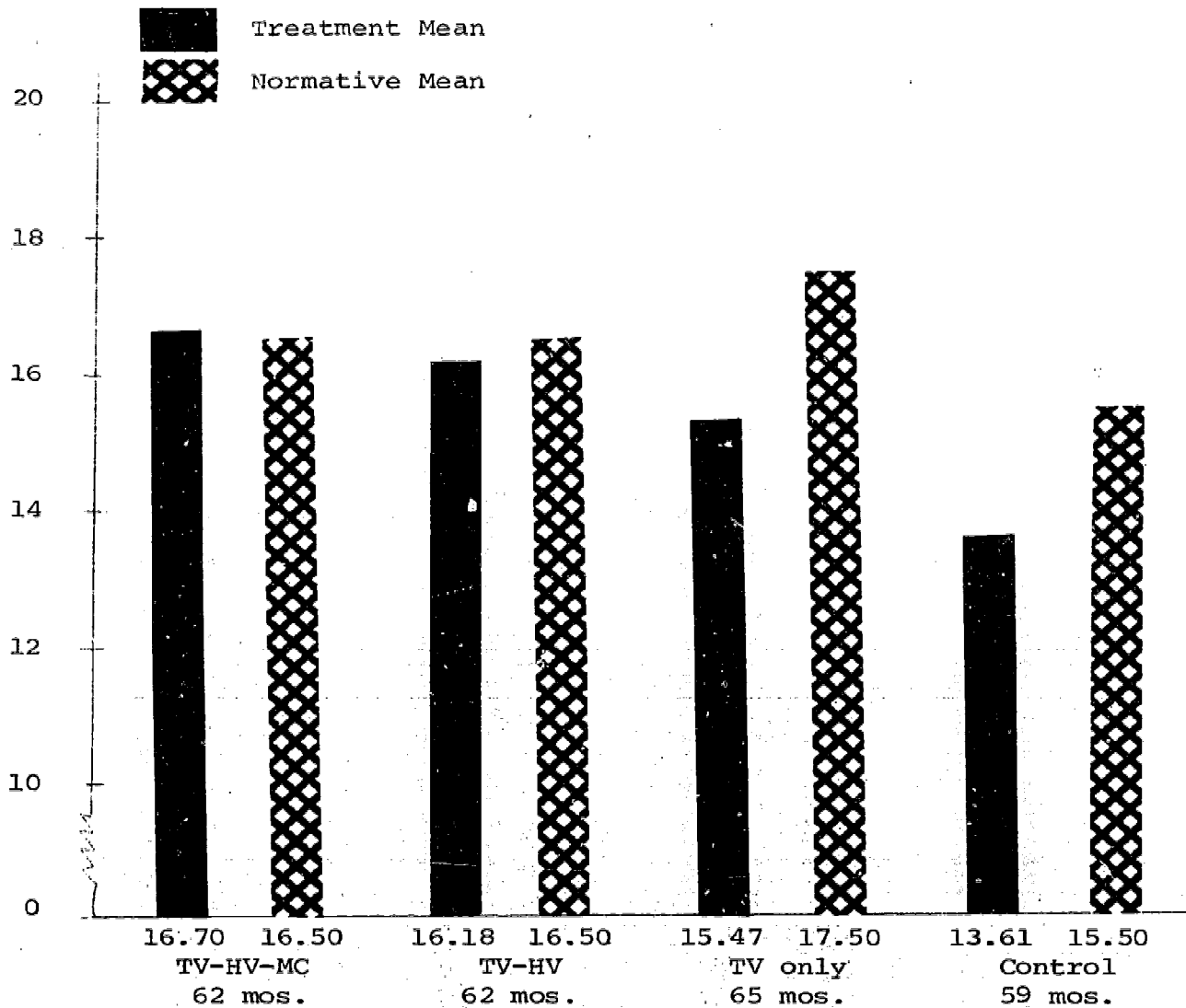


Figure 15.4

Adjusted Overall Group Means and Normative Means for ITPA Subtest 4 (June, 1971)

As the ANCOVA table reproduced in Table 15.8 indicates, differences between group means on Subtest 4 are not statistically significant nor are the effects of sex. It is of interest to note that the groups which did not receive visits from the paraprofessional (TV only and control) scored below the national norm while the remaining groups scored within .50 of a point of the norms.

Table 15.8

Analysis of Covariance Table for ITPA Subtest 4 (June, 1971)

Source	eta <sup>2</sup>	d.f.	Mean Square	F	p
Trt.	.01	3	25.31	1.03	-
Sex	.00	1	39.88	1.62	-
Trt. by Sex	.00	3	12.03	0.49	-
Covs.		2	43594.91	1977.25	-
Cov. 1		1	0.16	0.06	-
Cov. 2		1	3469.29	141.16	-
Error	.98	386	24.58		

ITPA Subtest 5 (Verbal Expression)

The purpose of this test is to assess the ability of the child to express his own concepts vocally. The child is shown four familiar objects one at a time (ball, block, envelope, and a button) and is asked, "Tell me all about this." The score is the number of discrete, relevant, and approximately factual concepts expressed (Kirk, McCarthy, and Kirk, 1968, p. 11).

This subtest undoubtedly reflects several factors other than verbal ability. The rapport with the examiner, the child's motivational level, and the extent of his previous experience with the objects are all highly important in the quantity of verbal response.

Means, standard deviations, and sample sizes for Subtest 5 post-test scores are indicated separately for each age group and sex in Table 15.9 along with overall means for each group on pre and post-test measures.

Figure 15.5 provides a graphical comparison of the overall adjusted group means for Subtest 5 with means from national norms for comparable age groups. Normative means differ because of variations in age among the groups.

Table 15.9

Means, Standard Deviations, and Sample Sizes for ITPA Subtest 5  
(Verbal Expression) Post-test Raw Scores

Age	Sex	TV-HV-MC		TV-HV		TV only		Control	
		Pretest	Post-test	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test
3	M	$\bar{x}$ = 4.90 N= 10 $\sigma$ = 3.05	$\bar{x}$ = 11.33 N= 12 $\sigma$ = 4.87	$\bar{x}$ = 6.50 N= 11 $\sigma$ = 4.48	$\bar{x}$ = 10.19 N= 16 $\sigma$ = 4.19	$\bar{x}$ = 5.18 N= 11 $\sigma$ = 2.21	$\bar{x}$ = 8.00 N= 8 $\sigma$ = 2.78	$\bar{x}$ = 10.88 N= 8 $\sigma$ = 5.11	$\bar{x}$ = 11.17 N= 17 $\sigma$ = 6.43
	F	$\bar{x}$ = 6.45 N= 11 $\sigma$ = 2.38	$\bar{x}$ = 11.30 N= 13 $\sigma$ = 4.58	$\bar{x}$ = 5.90 N= 10 $\sigma$ = 2.79	$\bar{x}$ = 12.00 N= 18 $\sigma$ = 4.97	$\bar{x}$ = 6.80 N= 5 $\sigma$ = 5.07	$\bar{x}$ = 7.60 N= 5 $\sigma$ = 1.74	$\bar{x}$ = 7.60 N= 5 $\sigma$ = 1.74	$\bar{x}$ = 10.75 N= 8 $\sigma$ = 2.68
4	M	$\bar{x}$ = 8.75 N= 9 $\sigma$ = 3.11	$\bar{x}$ = 15.50 N= 20 $\sigma$ = 3.85	$\bar{x}$ = 6.44 N= 9 $\sigma$ = 3.68	$\bar{x}$ = 11.36 N= 25 $\sigma$ = 5.60	$\bar{x}$ = 7.23 N= 13 $\sigma$ = 2.80	$\bar{x}$ = 12.50 N= 14 $\sigma$ = 5.68	$\bar{x}$ = 10.23 N= 13 $\sigma$ = 2.38	$\bar{x}$ = 12.41 N= 17 $\sigma$ = 6.35
	F	$\bar{x}$ = 8.75 N= 9 $\sigma$ = 2.19	$\bar{x}$ = 17.31 N= 19 $\sigma$ = 5.75	$\bar{x}$ = 9.80 N= 10 $\sigma$ = 2.74	$\bar{x}$ = 13.22 N= 22 $\sigma$ = 6.71	$\bar{x}$ = 5.00 N= 10 $\sigma$ = 3.16	$\bar{x}$ = 9.50 N= 8 $\sigma$ = 4.06	$\bar{x}$ = 8.99 N= 13 $\sigma$ = 4.10	$\bar{x}$ = 14.52 N= 17 $\sigma$ = 7.64
5	M	$\bar{x}$ = 10.62 N= 13 $\sigma$ = 3.28	$\bar{x}$ = 15.44 N= 16 $\sigma$ = 3.82	$\bar{x}$ = 11.88 N= 8 $\sigma$ = 6.90	$\bar{x}$ = 15.59 N= 27 $\sigma$ = 4.42	$\bar{x}$ = 9.13 N= 8 $\sigma$ = 3.91	$\bar{x}$ = 13.83 N= 12 $\sigma$ = 4.04	$\bar{x}$ = 9.89 N= 9 $\sigma$ = 2.76	$\bar{x}$ = 19.05 N= 18 $\sigma$ = 5.78
	F	$\bar{x}$ = 9.09 N= 11 $\sigma$ = 4.13	$\bar{x}$ = 16.27 N= 15 $\sigma$ = 4.81	$\bar{x}$ = 9.70 N= 10 $\sigma$ = 3.95	$\bar{x}$ = 15.27 N= 22 $\sigma$ = 5.47	$\bar{x}$ = 9.76 N= 13 $\sigma$ = 3.94	$\bar{x}$ = 14.84 N= 19 $\sigma$ = 3.81	$\bar{x}$ = 17.30 N= 10 $\sigma$ = 9.10	$\bar{x}$ = 19.79 N= 15 $\sigma$ = 7.57
TOTAL		$\bar{x}$ = 8.18 N= 63 $\sigma$ = 3.12	$\bar{x}$ = 14.95 N= 95 $\sigma$ = 4.66	$\bar{x}$ = 8.25 N= 58 $\sigma$ = 4.22	$\bar{x}$ = 13.16 N= 130 $\sigma$ = 5.52	$\bar{x}$ = 7.25 N= 60 $\sigma$ = 3.44	$\bar{x}$ = 12.20 N= 66 $\sigma$ = 4.14	$\bar{x}$ = 11.23 N= 61 $\sigma$ = 4.88	$\bar{x}$ = 14.13 N= 105 $\sigma$ = 6.49

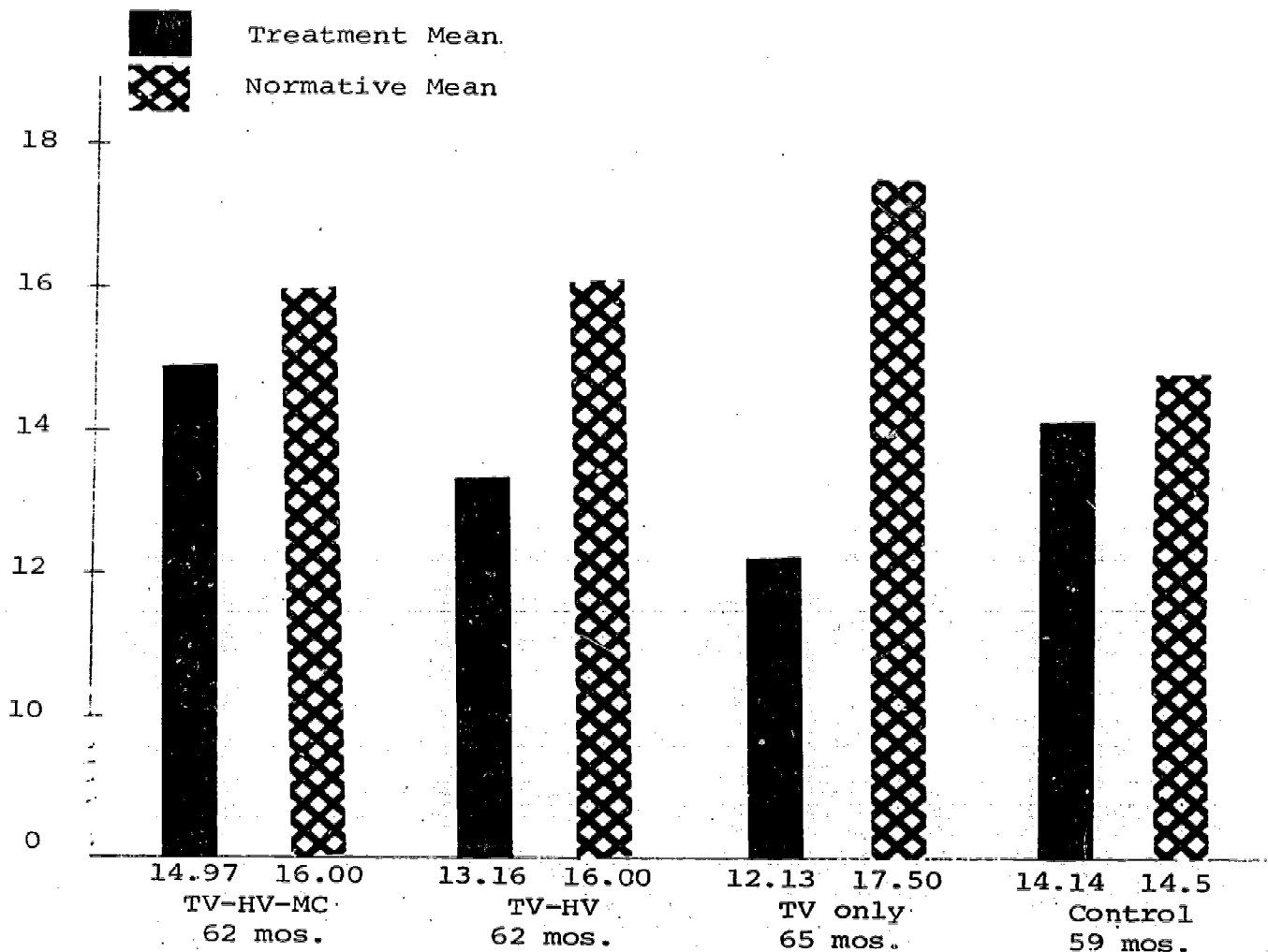


Figure 15.5

Adjusted Overall Group Means and Normative Means for  
ITPA Subtest 5 (June, 1971)

The differences between treatment group mean scores on Subtest 5 are statistically significant as the analysis of covariance summary in Table 15.10 indicates. A Dunnett's post-hoc comparison reveals that the TV only group scored significantly below the TV-HV-MC group, indicating the mobile classroom in combination with the paraprofessional may have had an effect on this area of learning.

Table 15.10

## Analysis of Covariance Table for ITPA Subtest 5 (June, 1971)

Source	eta <sup>2</sup>	d.f.	Mean Square	F	p
Trt.	.05	3	158.49	6.22	<.01
Sex	.01	1	123.82	4.85	<.05
Trt. by Sex	.00	3	7.68	0.30	-
Covs.		2	38739.83	1440.79	-
Cov. 1		1	28.15	1.10	-
Cov. 2		1	2146.89	84.19	-
Error	.94	386	25.50		

Additionally, it is possible that this subtest is sensitive to the socioeconomic differences which exist between the four experimental groups. Technical Report No. 11, which deals with the demographic and sociological differences between groups, shows that the TV only group belonged to a lower socioeconomic class than the other three groups. It is hypothesized that this uncontrolled factor may account for some of the between-group variance evident in the scores on this subtest.

A significant ( $p < .05$ ) difference between the sexes also was evidenced on this subtest. Table 15.11 shows overall means for each sex by treatment cell.

Table 15.11

## Sex by Treatment Means, ITPA Subtest 5 (June, 1971)

	TV-HV-MC	TV-HV	TV only	Control
M	14.60	12.76	11.93	14.30
F	15.31	13.59	12.43	14.36



In every case the females outscored their male counterparts on this subtest, although the difference was greatest for the two groups receiving visits from the paraprofessional. It is possible that girls evolved better rapport with the home visitor and were thus able to use the visitor's expressive language patterns as a model.

#### ITPA Subtest 6 (Manual Expression)

Subtest 6 taps the child's ability to express ideas manually. This ability is assessed by gestural manipulation tests. In this test 15 pictures of common objects are shown to the child one at a time and he is asked, "Show me what to do with a \_\_\_\_." The child is required to pantomime the appropriate action, such as dialing a telephone or playing a guitar (Kirk, McCarthy, and Kirk, 1968, p. 11).

This subtest presumes acquaintance with the object shown to the child, and thus becomes a measure of vocabulary as well as of the ability to communicate nonverbally. Table 15.12 shows means, standard deviations, and numbers of subjects for each age and sex group for ITPA Subtest 6 pre and post-test raw scores as well as combined scores for each group.

Figure 15.6 presents overall group means adjusted for age and PPVT raw score along with normative means for groups of comparable ages.

Table 15.12  
Pre and Post-test Means, Standard Deviations, and Sample Sizes  
for ITPA Subtest 6 Raw Scores

Age	Sex	TV-HV-MC		TV-HV		TV only		Control	
		Pretest	Post-test	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test
3	M	$\bar{x}$ = 14.25 N = 10 $\sigma$ = 5.58	$\bar{x}$ = 22.41 N = 12 $\sigma$ = 5.19	$\bar{x}$ = 13.92 N = 11 $\sigma$ = 8.27	$\bar{x}$ = 15.94 N = 16 $\sigma$ = 6.80	$\bar{x}$ = 12.09 N = 11 $\sigma$ = 7.41	$\bar{x}$ = 14.25 N = 8 $\sigma$ = 4.32	$\bar{x}$ = 11.13 N = 8 $\sigma$ = 5.40	$\bar{x}$ = 16.64 N = 17 $\sigma$ = 6.64
	F	$\bar{x}$ = 10.50 N = 11 $\sigma$ = 7.08	$\bar{x}$ = 19.84 N = 13 $\sigma$ = 4.43	$\bar{x}$ = 8.70 N = 10 $\sigma$ = 7.20	$\bar{x}$ = 19.17 N = 18 $\sigma$ = 8.25	$\bar{x}$ = 13.40 N = 5 $\sigma$ = 5.75	$\bar{x}$ = 14.59 N = 5 $\sigma$ = 4.45	$\bar{x}$ = 8.75 N = 8 $\sigma$ = 6.78	$\bar{x}$ = 15.10 N = 19 $\sigma$ = 7.28
4	M	$\bar{x}$ = 22.22 N = 9 $\sigma$ = 5.87	$\bar{x}$ = 23.20 N = 20 $\sigma$ = 4.46	$\bar{x}$ = 17.78 N = 9 $\sigma$ = 9.74	$\bar{x}$ = 20.91 N = 25 $\sigma$ = 9.77	$\bar{x}$ = 19.62 N = 13 $\sigma$ = 6.06	$\bar{x}$ = 23.00 N = 14 $\sigma$ = 6.34	$\bar{x}$ = 13.84 N = 13 $\sigma$ = 5.42	$\bar{x}$ = 18.05 N = 17 $\sigma$ = 4.50
	F	$\bar{x}$ = 18.89 N = 9 $\sigma$ = 5.37	$\bar{x}$ = 22.00 N = 19 $\sigma$ = 6.28	$\bar{x}$ = 20.40 N = 10 $\sigma$ = 6.00	$\bar{x}$ = 25.31 N = 22 $\sigma$ = 6.24	$\bar{x}$ = 17.40 N = 10 $\sigma$ = 4.48	$\bar{x}$ = 16.75 N = 8 $\sigma$ = 6.70	$\bar{x}$ = 14.23 N = 13 $\sigma$ = 5.05	$\bar{x}$ = 17.94 N = 17 $\sigma$ = 8.57
5	M	$\bar{x}$ = 26.23 N = 13 $\sigma$ = 6.25	$\bar{x}$ = 29.50 N = 16 $\sigma$ = 4.92	$\bar{x}$ = 21.88 N = 8 $\sigma$ = 8.18	$\bar{x}$ = 24.18 N = 21 $\sigma$ = 7.32	$\bar{x}$ = 20.88 N = 8 $\sigma$ = 4.19	$\bar{x}$ = 24.91 N = 12 $\sigma$ = 5.78	$\bar{x}$ = 15.44 N = 9 $\sigma$ = 7.55	$\bar{x}$ = 23.88 N = 18 $\sigma$ = 4.79
	F	$\bar{x}$ = 23.50 N = 11 $\sigma$ = 10.45	$\bar{x}$ = 25.33 N = 15 $\sigma$ = 5.15	$\bar{x}$ = 16.20 N = 10 $\sigma$ = 6.49	$\bar{x}$ = 22.63 N = 22 $\sigma$ = 5.95	$\bar{x}$ = 21.62 N = 13 $\sigma$ = 7.39	$\bar{x}$ = 26.10 N = 19 $\sigma$ = 5.58	$\bar{x}$ = 21.70 N = 10 $\sigma$ = 7.42	$\bar{x}$ = 21.73 N = 15 $\sigma$ = 9.18
TOTAL		$\bar{x}$ = 19.48 N = 63 $\sigma$ = 7.06	$\bar{x}$ = 23.80 N = 95 $\sigma$ = 8.49	$\bar{x}$ = 16.23 N = 58 $\sigma$ = 7.70	$\bar{x}$ = 21.77 N = 130 $\sigma$ = 10.48	$\bar{x}$ = 17.95 N = 60 $\sigma$ = 6.18	$\bar{x}$ = 21.78 N = 66 $\sigma$ = 15.78	$\bar{x}$ = 14.42 N = 61 $\sigma$ = 6.24	$\bar{x}$ = 18.80 N = 105 $\sigma$ = 14.44

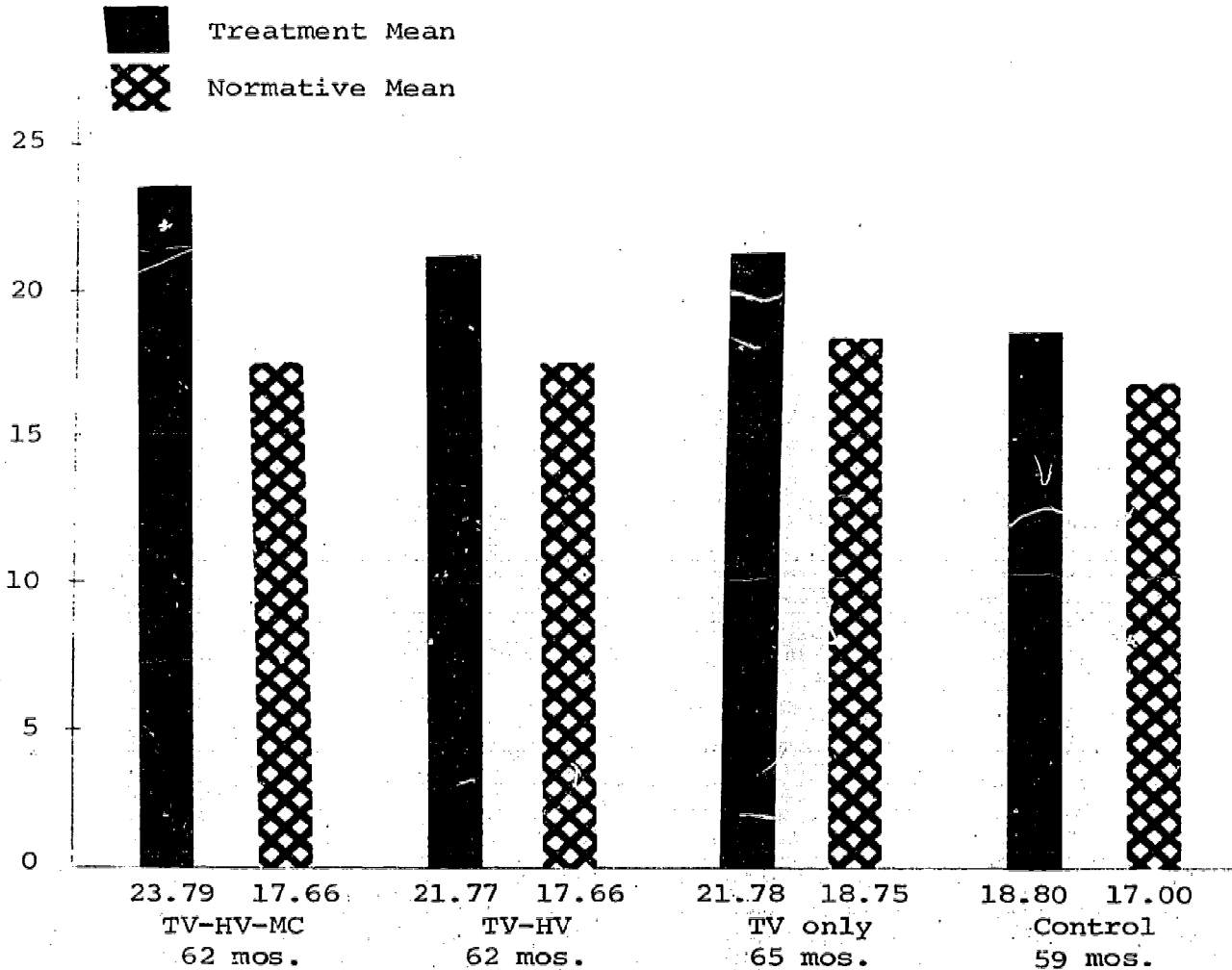


Figure 15.6

Adjusted Overall Group Means and Normative Means for ITPA Subtest 6 (June, 1971)

As the ANCOVA table (15.13) reveals, a significant treatment effect was evident for this subtest.

Table 15.13

Analysis of Covariance Table for ITPA Subtest 6 (June, 1971)

Source	eta <sup>2</sup>	d. f.	Mean Square	F	p
Trt.	.02	3	95.60	2.71	< .05
Sex	.00	1	28.21	0.80	-
Trt. by Sex	.01	3	67.14	1.90	-
Covs.		2	90282.95	2559.21	-
Cov. 1		1	83.69	2.37	-
Cov. 2		1	5157.31	146.19	-
Error	.96	386	35.28		

A Dunnet's post-hoc comparison of means indicates that all three treatment group means were significantly higher than the control group mean, and that the TV-HV-MC group was higher than both the TV-HV and TV only groups. This pattern leads to the hypothesis that the television program encourages learning and participation in nonverbal communication, and the activities on the mobile facility do serve as effective reinforcers for that learning. A similar pattern was evident in the previous year's results.

#### ITPA Subtest 7 (Grammatical Closure)

The subtest assesses the child's ability to make use of:

The redundancies of oral language in acquiring automatic habits for handling syntax and grammatical inflections. In this test the conceptual difficulty is low, but the task elicits the child's ability to respond automatically to often repeated verbal expressions of standard American speech. The child comes to expect or predict grammatical form so that when part of an expression is presented he closes the gap by supplying the missing parts. The test measures the form rather than the content of the missing word, since the content is provided by the examiner.

There are 33 orally presented items accompanied by pictures which portray the content of the verbal expression. The pictures are included to avoid contaminating the test with difficulty in the receptive process. Each verbal item consists of a complete statement followed by an incomplete statement to be finished by the child. The examiner points to the appropriate picture as he reads the given statements; for example: "Here is a dog; here are \_\_\_\_." (Kirk, McCarthy, and Kirk, 1968, p. 11.)

Essentially, Subtest 7 measures the ability to follow the conventional rules of grammar and make single-plural and possessive transformations. Pilot data gathered by Hooper and Marshall indicated that children in Appalachia possessed large defects in this area of functioning as did children in other "deprived" regions (Hooper and Marshall, 1968, p. 89). Such deficits were more in evidence for Subtest 5 than for this measure, however.

Mean pre and post-test scores, standard deviations, and numbers of subjects for each age and sex cell on ITPA Subtest 7 are presented in Table 15.14 as well as overall means for each treatment group. Figure 15.7 presents the adjusted group means and the normative means for each treatment-age group.

Table 15.14

Cell Means, Standard Deviations, and Sample Sizes for  
ITPA Subtest 7 Pre and Post-test Raw Scores

Age	Sex	TV-HV-MC		TV-HV		TV only		Control	
		Pretest	Post-test	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test
3	M	$\bar{x}$ = 5.40 N= 10 $\sigma$ = 3.67	$\bar{x}$ = 11.16 N= 12 $\sigma$ = 5.67	$\bar{x}$ = 5.25 N= 11 $\sigma$ = 2.83	$\bar{x}$ = 9.81 N= 16 $\sigma$ = 3.99	$\bar{x}$ = 3.55 N= 11 $\sigma$ = 2.61	$\bar{x}$ = 7.75 N= 8 $\sigma$ = 2.63	$\bar{x}$ = 6.75 N= 8 $\sigma$ = 5.09	$\bar{x}$ = 9.47 N= 17 $\sigma$ = 4.50
	F	$\bar{x}$ = 6.27 N= 11 $\sigma$ = 3.93	$\bar{x}$ = 11.07 N= 13 $\sigma$ = 5.74	$\bar{x}$ = 4.30 N= 10 $\sigma$ = 2.79	$\bar{x}$ = 12.41 N= 18 $\sigma$ = 6.50	$\bar{x}$ = 5.20 N= 5 $\sigma$ = 2.93	$\bar{x}$ = 6.59 N= 5 $\sigma$ = 2.73	$\bar{x}$ = 7.88 N= 8 $\sigma$ = 5.23	$\bar{x}$ = 8.05 N= 19 $\sigma$ = 3.35
4	M	$\bar{x}$ = 9.11 N= 9 $\sigma$ = 5.11	$\bar{x}$ = 14.75 N= 20 $\sigma$ = 6.64	$\bar{x}$ = 9.56 N= 9 $\sigma$ = 5.27	$\bar{x}$ = 14.36 N= 25 $\sigma$ = 6.54	$\bar{x}$ = 8.00 N= 13 $\sigma$ = 4.28	$\bar{x}$ = 14.14 N= 14 $\sigma$ = 7.35	$\bar{x}$ = 9.62 N= 13 $\sigma$ = 4.03	$\bar{x}$ = 11.88 N= 17 $\sigma$ = 5.30
	F	$\bar{x}$ = 9.44 N= 9 $\sigma$ = 5.75	$\bar{x}$ = 15.68 N= 19 $\sigma$ = 5.57	$\bar{x}$ = 12.20 N= 10 $\sigma$ = 4.66	$\bar{x}$ = 15.13 N= 22 $\sigma$ = 6.95	$\bar{x}$ = 8.60 N= 10 $\sigma$ = 3.37	$\bar{x}$ = 8.75 N= 8 $\sigma$ = 2.28	$\bar{x}$ = 7.69 N= 13 $\sigma$ = 3.77	$\bar{x}$ = 12.84 N= 17 $\sigma$ = 19.44
5	M	$\bar{x}$ = 13.92 N= 13 $\sigma$ = 5.54	$\bar{x}$ = 16.68 N= 16 $\sigma$ = 5.44	$\bar{x}$ = 14.75 N= 8 $\sigma$ = 5.39	$\bar{x}$ = 17.22 N= 27 $\sigma$ = 6.43	$\bar{x}$ = 7.25 N= 8 $\sigma$ = 3.01	$\bar{x}$ = 15.16 N= 12 $\sigma$ = 6.24	$\bar{x}$ = 12.11 N= 9 $\sigma$ = 3.30	$\bar{x}$ = 18.39 N= 15 $\sigma$ = 5.04
	F	$\bar{x}$ = 11.10 N= 11 $\sigma$ = 4.20	$\bar{x}$ = 15.87 N= 15 $\sigma$ = 2.90	$\bar{x}$ = 12.40 N= 10 $\sigma$ = 4.95	$\bar{x}$ = 18.90 N= 22 $\sigma$ = 5.14	$\bar{x}$ = 12.15 N= 13 $\sigma$ = 7.72	$\bar{x}$ = 17.42 N= 19 $\sigma$ = 6.31	$\bar{x}$ = 14.40 N= 10 $\sigma$ = 5.32	$\bar{x}$ = 13.30 N= 105 $\sigma$ = 18.22
TOTAL		$\bar{x}$ = 9.39 N= 63 $\sigma$ = 4.76	$\bar{x}$ = 14.48 N= 95 $\sigma$ = 16.01	$\bar{x}$ = 9.50 N= 58 $\sigma$ = 4.38	$\bar{x}$ = 15.02 N= 130 $\sigma$ = 14.99	$\bar{x}$ = 7.85 N= 60 $\sigma$ = 4.68	$\bar{x}$ = 13.26 N= 66 $\sigma$ = 21.78	$\bar{x}$ = 9.68 N= 61 $\sigma$ = 4.40	



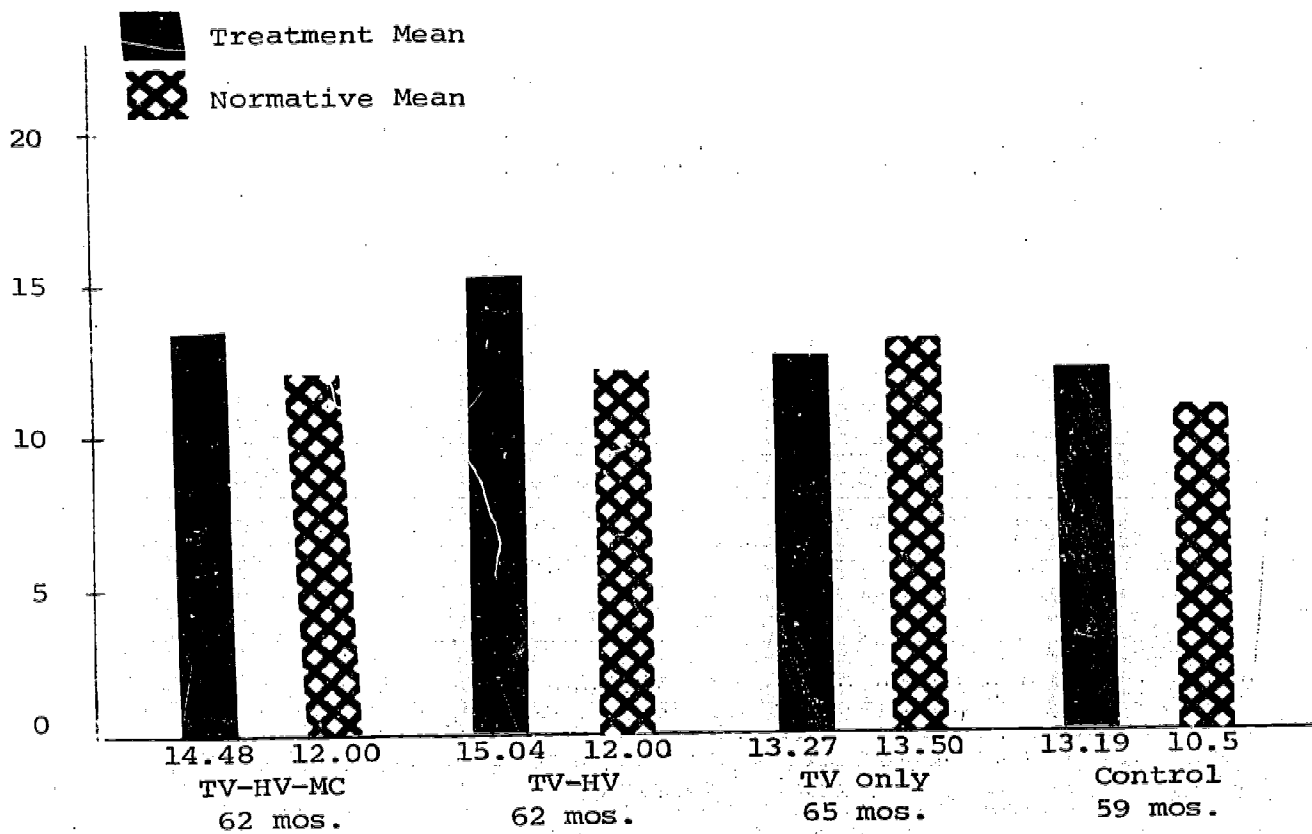


Figure 15.7

Adjusted Overall Group Means and Normative Means for ITPA Subtest 7  
(June, 1971)

It is interesting to note that the pattern of means evident in Figure 15.7 and Table 15.14 is contrary to the earlier study of Hooper and Marshall. In that study, Appalachian children scored significantly below the standardization group mean on a version of Subtest 7 with similar content. Here again we find that Appalachian children are not intrinsically deprived when compared to their peers in other parts of the country.

Although differences among treatment means are obvious from the above figure, the ANCOVA summary table (15.15) does not indicate significance for these differences.

Table 15.15

Analysis of Covariance Table for ITPA Subtest 7  
(June, 1971)

Source	eta <sup>2</sup>	d.f.	Mean Square	F	p
Trt.	.01	3	26.27	0.94	-
Sex	.01	1	95.72	3.42	<.01
Trt. by Sex	.00	3	19.00	0.68	-
Covs.		2	39605.91	1413.30	-
Cov. 1		1	2.04	0.07	-
Cov. 2		1	2716.66	96.94	-
Error	.98	386	28.02		

Table 15.16

Treatment by Sex Means, ITPA Subtest 7

	TV-HV-MC	TV-HV	TV only	Control
M	14.49	14.42	13.81	13.70
F	14.46	15.67	13.56	12.68

Males outscored their female counterparts in every group except TV-HV. However, large (more than 1 point) differences favoring the males occurred only in the control group (Table 15.16). As with the previous subtest, this pattern is difficult to explain. It may well be that here, as in Subtest 6, females visited by a paraprofessional tend to become more involved in language modeling than do their male counterparts, and that the mobile facility tends to offset this initial advantage for girls.

Table 15.17

Pre and Post-test Means, Standard Deviations, and Sample Sizes for ITPA Subtest 8 (Visual Closure)

Age	Sex	TV-HV-MC		TV-HV		TV only		Control	
		Pretest	Post-test	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test
3	M	$\bar{x}$ = 5.50 N = 10 $\sigma$ = 2.80	$\bar{x}$ = 12.08 N = 12 $\sigma$ = 3.99	$\bar{x}$ = 7.73 N = 11 $\sigma$ = 4.27	$\bar{x}$ = 11.31 N = 16 $\sigma$ = 4.98	$\bar{x}$ = 7.72 N = 11 $\sigma$ = 4.15	$\bar{x}$ = 9.00 N = 8 $\sigma$ = 6.75	$\bar{x}$ = 7.75 N = 8 $\sigma$ = 4.99	$\bar{x}$ = 11.29 N = 17 $\sigma$ = 4.35
	F	$\bar{x}$ = 8.09 N = 11 $\sigma$ = 4.19	$\bar{x}$ = 11.07 N = 13 $\sigma$ = 4.70	$\bar{x}$ = 6.10 N = 10 $\sigma$ = 3.73	$\bar{x}$ = 12.35 N = 18 $\sigma$ = 6.06	$\bar{x}$ = 8.60 N = 5 $\sigma$ = 4.22	$\bar{x}$ = 11.00 N = 5 $\sigma$ = 6.16	$\bar{x}$ = 11.38 N = 8 $\sigma$ = 3.71	$\bar{x}$ = 9.89 N = 19 $\sigma$ = 5.42
4	M	$\bar{x}$ = 11.99 N = 9 $\sigma$ = 2.29	$\bar{x}$ = 17.25 N = 20 $\sigma$ = 6.05	$\bar{x}$ = 9.89 N = 9 $\sigma$ = 5.16	$\bar{x}$ = 14.04 N = 25 $\sigma$ = 6.63	$\bar{x}$ = 11.38 N = 13 $\sigma$ = 3.67	$\bar{x}$ = 18.07 N = 14 $\sigma$ = 6.43	$\bar{x}$ = 9.77 N = 13 $\sigma$ = 3.94	$\bar{x}$ = 13.05 N = 17 $\sigma$ = 4.22
	F	$\bar{x}$ = 8.33 N = 9 $\sigma$ = 3.04	$\bar{x}$ = 17.42 N = 19 $\sigma$ = 5.77	$\bar{x}$ = 9.80 N = 10 $\sigma$ = 4.18	$\bar{x}$ = 17.50 N = 22 $\sigma$ = 6.45	$\bar{x}$ = 11.60 N = 10 $\sigma$ = 4.25	$\bar{x}$ = 14.12 N = 8 $\sigma$ = 5.82	$\bar{x}$ = 11.62 N = 13 $\sigma$ = 5.03	$\bar{x}$ = 14.10 N = 17 $\sigma$ = 5.76
5	M	$\bar{x}$ = 14.00 N = 13 $\sigma$ = 4.04	$\bar{x}$ = 19.25 N = 16 $\sigma$ = 5.11	$\bar{x}$ = 13.25 N = 8 $\sigma$ = 4.17	$\bar{x}$ = 20.85 N = 27 $\sigma$ = 5.02	$\bar{x}$ = 13.88 N = 8 $\sigma$ = 3.35	$\bar{x}$ = 18.33 N = 12 $\sigma$ = 4.97	$\bar{x}$ = 15.22 N = 9 $\sigma$ = 9.98	$\bar{x}$ = 16.88 N = 18 $\sigma$ = 6.73
	F	$\bar{x}$ = 15.80 N = 11 $\sigma$ = 2.74	$\bar{x}$ = 20.93 N = 15 $\sigma$ = 5.45	$\bar{x}$ = 14.70 N = 10 $\sigma$ = 7.06	$\bar{x}$ = 20.81 N = 22 $\sigma$ = 7.54	$\bar{x}$ = 14.62 N = 13 $\sigma$ = 5.11	$\bar{x}$ = 17.78 N = 19 $\sigma$ = 6.19	$\bar{x}$ = 20.60 N = 10 $\sigma$ = 7.87	$\bar{x}$ = 17.06 N = 15 $\sigma$ = 4.95
TOTAL		$\bar{x}$ = 10.84 N = 63 $\sigma$ = 3.17	$\bar{x}$ = 16.66 N = 95 $\sigma$ = 5.34	$\bar{x}$ = 10.10 N = 58 $\sigma$ = 4.90	$\bar{x}$ = 16.61 N = 130 $\sigma$ = 6.25	$\bar{x}$ = 11.55 N = 60 $\sigma$ = 4.21	$\bar{x}$ = 15.92 N = 66 $\sigma$ = 6.01	$\bar{x}$ = 12.69 N = 61 $\sigma$ = 6.21	$\bar{x}$ = 13.64 N = 105 $\sigma$ = 5.33



ITPA Subtest 8 (Visual Closure)

This test is designed to measure:

The child's ability to identify a common object from an incomplete visual presentation. There are four scenes, presented separately, each containing 14 or 15 examples of a specified object. The objects are seen in varying degrees of concealment. The child is asked to see how quickly he can point to all examples of a particular object within a time limit of 30 seconds for each scene (Kirk, McCarthy, and Kirk, 1968, p. 12).

This measure probably involves few central mediating processes (cognition) and provides an estimate of the child's motivation and attentiveness as well as his visual acuity.

Table 15.17 lists raw score means, standard deviations, and sample sizes for each age and sex subgrouping on ITPA Subtest 8. Combined score means also are presented in Table 15.17. In Figure 15.8, national norms are compared with the adjusted group means from the analysis of covariance table.

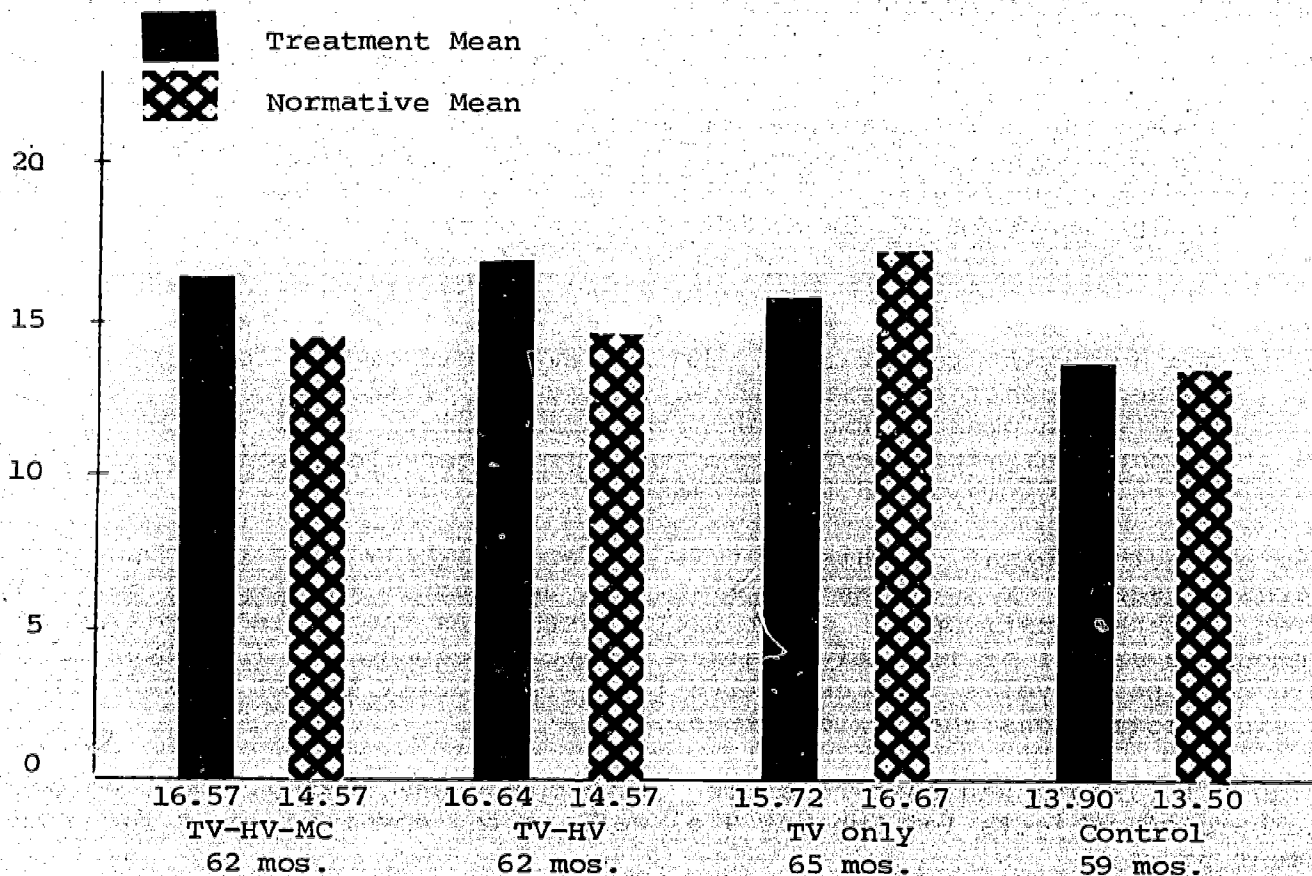


Figure 15.8

(27)

Adjusted Overall Group Means and Normative Means for ITPA Subtest 8

(June, 1971)

As the ANCOVA summary table (15.18) reveals, differences between treatment groups are not statistically significant, nor are the differences between the sexes significant.

Table 15.18

Analysis of Covariance Table for ITPA Subtest 8 (June, 1971)

Source	eta <sup>2</sup>	d.f.	Mean Square	F	p
Trt.	.01	3	52.70	1.55	-
Sex	.00	1	53.01	1.56	-
Trt. by Sex	.01	3	18.60	0.55	-
Covs.		2	48601.32	1427.76	-
Cov. 1		1	1149.08	33.76	-
Cov. 2		1	658.59	19.35	-
Error	.98	386	34.04		

ITPA Subtest 9 (Auditory Sequential Memory)

According to the authors, the purpose of this test is to:

Assess the child's ability to reproduce from memory sequences of digits increasing in length from two to eight digits. The test differs from the digit repetition task of the Stanford-Binet or the WISC in that the digits are presented at the rate of two per second instead of one per second and in that the child is allowed a second trial of each sequence if he fails on the first presentation. He receives more credit for a success on the first than on the second trial. A more rapid presentation makes the task easier, which is necessary for the two- and the three-year-old children (Kirk, McCarthy, and Kirk, 1968, pp. 12-13).

Although the format of this subtest differs slightly from that used on the Wechsler scales or the Stanford-Binet, it duplicates the type of function measured on those instruments. That is, it estimates the child's ability to use immediate recall of recently learned auditory sequences. This type of measure does not involve much cognitive (analytic) activity but is sensitive to outside distractions and anxiety level.

Table 15.19 pre and post-test group presents means, standard deviations, and numbers of subjects for Subtest 9 as well as the combined means for each treatment group.

Table 15.19

Pre and Post-test Means, Standard Deviations, and Sample Sizes for  
ITPA Subtest 9 (Auditory Sequential Memory)

Age	Sex	TV-HV-MC		TV-HV		TV only		Control	
		Pretest	Post-test	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test
3	M	$\bar{x}$ = 11.80 N= 10 $\sigma$ = 6.76	$\bar{x}$ = 16.66 N= 12 $\sigma$ = 7.13	$\bar{x}$ = 11.00 N= 11 $\sigma$ = 4.95	$\bar{x}$ = 12.63 N= 16 $\sigma$ = 4.82	$\bar{x}$ = 11.09 N= 11 $\sigma$ = 6.19	$\bar{x}$ = 14.25 N= 8 $\sigma$ = 5.09	$\bar{x}$ = 12.25 N= 8 $\sigma$ = 5.07	$\bar{x}$ = 13.64 N= 17 $\sigma$ = 5.08
	F	$\bar{x}$ = 11.83 N= 11 $\sigma$ = 5.61	$\bar{x}$ = 15.76 N= 13 $\sigma$ = 4.69	$\bar{x}$ = 11.10 N= 10 $\sigma$ = 6.36	$\bar{x}$ = 15.23 N= 18 $\sigma$ = 5.16	$\bar{x}$ = 14.40 N= 5 $\sigma$ = 3.26	$\bar{x}$ = 16.59 N= 5 $\sigma$ = 5.31	$\bar{x}$ = 8.75 N= 8 $\sigma$ = 4.68	$\bar{x}$ = 12.84 N= 19 $\sigma$ = 5.23
4	M	$\bar{x}$ = 17.78 N= 9 $\sigma$ = 7.69	$\bar{x}$ = 18.75 N= 20 $\sigma$ = 5.65	$\bar{x}$ = 14.89 N= 9 $\sigma$ = 8.11	$\bar{x}$ = 16.83 N= 25 $\sigma$ = 6.11	$\bar{x}$ = 16.92 N= 13 $\sigma$ = 8.39	$\bar{x}$ = 20.92 N= 14 $\sigma$ = 5.71	$\bar{x}$ = 17.46 N= 13 $\sigma$ = 6.58	$\bar{x}$ = 18.00 N= 17 $\sigma$ = 6.58
	F	$\bar{x}$ = 13.44 N= 9 $\sigma$ = 7.75	$\bar{x}$ = 19.10 N= 19 $\sigma$ = 7.25	$\bar{x}$ = 16.90 N= 10 $\sigma$ = 5.51	$\bar{x}$ = 20.09 N= 22 $\sigma$ = 5.40	$\bar{x}$ = 17.40 N= 10 $\sigma$ = 6.95	$\bar{x}$ = 15.13 N= 8 $\sigma$ = 4.94	$\bar{x}$ = 13.85 N= 13 $\sigma$ = 9.67	$\bar{x}$ = 18.26 N= 17 $\sigma$ = 6.16
5	M	$\bar{x}$ = 21.23 N= 13 $\sigma$ = 8.56	$\bar{x}$ = 25.38 N= 16 $\sigma$ = 7.86	$\bar{x}$ = 20.50 N= 8 $\sigma$ = 7.50	$\bar{x}$ = 20.85 N= 27 $\sigma$ = 6.06	$\bar{x}$ = 18.25 N= 8 $\sigma$ = 10.80	$\bar{x}$ = 16.41 N= 12 $\sigma$ = 7.17	$\bar{x}$ = 18.11 N= 9 $\sigma$ = 7.57	$\bar{x}$ = 17.50 N= 18 $\sigma$ = 3.10
	F	$\bar{x}$ = 19.70 N= 11 $\sigma$ = 2.95	$\bar{x}$ = 19.40 N= 15 $\sigma$ = 4.94	$\bar{x}$ = 21.10 N= 10 $\sigma$ = 6.72	$\bar{x}$ = 19.09 N= 22 $\sigma$ = 5.92	$\bar{x}$ = 19.77 N= 13 $\sigma$ = 7.62	$\bar{x}$ = 20.84 N= 19 $\sigma$ = 5.25	$\bar{x}$ = 18.40 N= 10 $\sigma$ = 7.63	$\bar{x}$ = 21.86 N= 15 $\sigma$ = 4.79
TOTAL		$\bar{x}$ = 16.22 N= 63 $\sigma$ = 6.81	$\bar{x}$ = 19.37 N= 95 $\sigma$ = 6.40	$\bar{x}$ = 15.69 N= 58 $\sigma$ = 6.53	$\bar{x}$ = 17.32 N= 130 $\sigma$ = 5.68	$\bar{x}$ = 16.52 N= 60 $\sigma$ = 7.70	$\bar{x}$ = 18.23 N= 66 $\sigma$ = 5.69	$\bar{x}$ = 15.12 N= 61 $\sigma$ = 16.65	$\bar{x}$ = 16.84 N= 105 $\sigma$ = 5.67

Figure 15.9 presents the overall adjusted group means from the analysis of covariance for each treatment group as well as the normative means for each treatment-age equivalent sample.

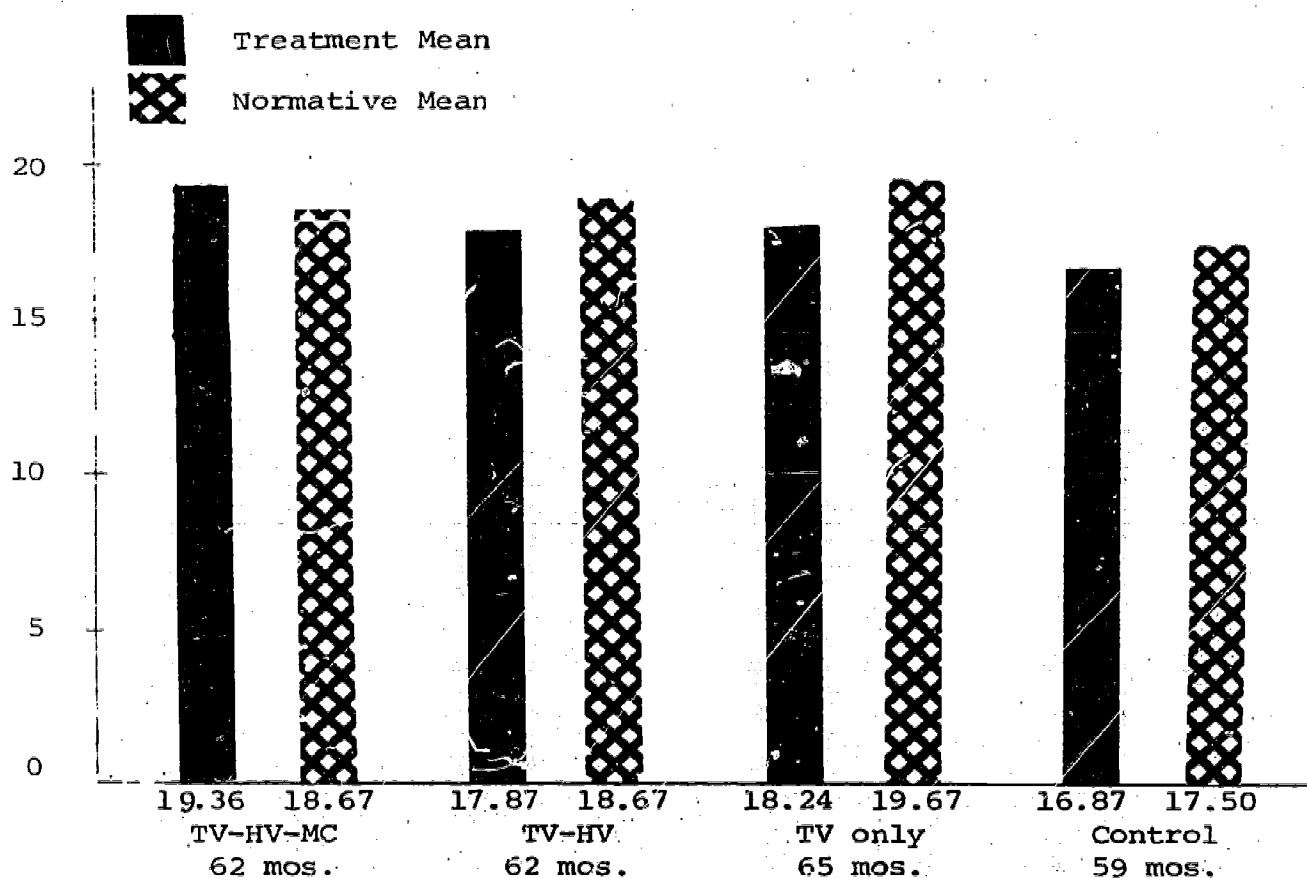


Figure 15.9

Adjusted Overall Group Means and Normative Means for ITPA Subtest 9 (June, 1971)

As the ANCOVA summary in Table 15.20 indicates, the differences among the group means are not statistically significant. It is of interest to note that most of the treatment means do not exceed the normative means for this subtest. It is possible that the fatigue inherent in a lengthy test battery reduced the children's performance on this measure. Again, it is interesting to note that no statistically significant difference between the sexes existed on this subtest.

Table 15.20

Analysis of Covariance Table for ITPA Subtest 9 (June, 1971)

Source	$\eta^2$	d.f.	Mean Square	F	p
Trt.	.11	3	19.85	0.64	-
Sex	.46	1	85.16	2.76	-
Trt. by Sex	.26	3	48.12	1.56	-
Covs.		2	63081.91	2044.15	-
Cov. 1		1	419.01	13.58	-
Cov. 2		1	2241.43	72.63	-
Error	.17	386	30.86		

ITPA Subtest 10 (Visual Sequential Memory)

According to the authors:

This test assesses the child's ability to reproduce sequences of nonmeaningful figures from memory. A child is shown each sequence of figures for five seconds and then is asked to put corresponding chips of figures in the same order. Here again the child is allowed two trials on each sequence when the first attempt is unsuccessful. The sequence increases in length from two to eight figures (Kirk, McCarthy, and Kirk, 196 , p. 13).

Subtest 10 measures the same short-term memory as the previous subtest but does so in terms of visual configurations rather than auditory sequencing. It is subject to the same influences and intervening factors as Subtest 9. Table 15.21 presents pre and post-test age by sex and treatment cell means, standard deviations, and sample sizes for Subtest 10 as well as the overall means for each treatment group.

Figure 15.10 presents the adjusted means on Subtest 10, derived from the ANCOVA, along with the normative means for each comparable age group.

(31)

Table 15.21

Pre and Post-test Means, Standard Deviations, and Sample Sizes for  
ITPA Subtest 10 (Visual Sequential Memory)

Age	Sex	TV-HV-MC		TV-HV		TV only		Control	
		Pretest	Post-test	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test
3	M	$\bar{x}$ = 5.10 N= 10 $\sigma$ = 2.84	$\bar{x}$ = 9.25 N= 12 $\sigma$ = 5.04	$\bar{x}$ = 27.00 N= 11 $\sigma$ = 30.46	$\bar{x}$ = 8.13 N= 16 $\sigma$ = 3.44	$\bar{x}$ = 30.00 N= 11 $\sigma$ = 2.22	$\bar{x}$ = 8.12 N= 8 $\sigma$ = 5.33	$\bar{x}$ = 7.00 N= 8 $\sigma$ = 4.74	$\bar{x}$ = 6.94 N= 17 $\sigma$ = 3.87
	F	$\bar{x}$ = 6.67 N= 11 $\sigma$ = 4.50	$\bar{x}$ = 7.86 N= 13 $\sigma$ = 3.63	$\bar{x}$ = 39.10 N= 10 $\sigma$ = 31.29	$\bar{x}$ = 6.88 N= 18 $\sigma$ = 3.34	$\bar{x}$ = 4.40 N= 5 $\sigma$ = 2.15	$\bar{x}$ = 9.19 N= 5 $\sigma$ = 6.43	$\bar{x}$ = 6.50 N= 8 $\sigma$ = 4.18	$\bar{x}$ = 8.42 N= 19 $\sigma$ = 3.88
4	M	$\bar{x}$ = 7.00 N= 9 $\sigma$ = 3.77	$\bar{x}$ = 9.95 N= 20 $\sigma$ = 4.35	$\bar{x}$ = 7.44 N= 9 $\sigma$ = 3.81	$\bar{x}$ = 7.63 N= 25 $\sigma$ = 3.92	$\bar{x}$ = 6.85 N= 13 $\sigma$ = 3.91	$\bar{x}$ = 12.64 N= 14 $\sigma$ = 5.53	$\bar{x}$ = 4.85 N= 13 $\sigma$ = 3.91	$\bar{x}$ = 11.23 N= 17 $\sigma$ = 4.70
	F	$\bar{x}$ = 8.11 N= 9 $\sigma$ = 4.86	$\bar{x}$ = 10.89 N= 19 $\sigma$ = 3.75	$\bar{x}$ = 10.20 N= 10 $\sigma$ = 4.16	$\bar{x}$ = 10.86 N= 22 $\sigma$ = 3.93	$\bar{x}$ = 6.20 N= 10 $\sigma$ = 4.05	$\bar{x}$ = 10.50 N= 8 $\sigma$ = 5.22	$\bar{x}$ = 8.15 N= 13 $\sigma$ = 6.71	$\bar{x}$ = 10.47 N= 17 $\sigma$ = 4.10
5	M	$\bar{x}$ = 9.54 N= 13 $\sigma$ = 5.04	$\bar{x}$ = 14.69 N= 16 $\sigma$ = 3.39	$\bar{x}$ = 11.50 N= 8 $\sigma$ = 2.67	$\bar{x}$ = 11.88 N= 27 $\sigma$ = 4.83	$\bar{x}$ = 9.13 N= 8 $\sigma$ = 5.49	$\bar{x}$ = 12.66 N= 12 $\sigma$ = 5.45	$\bar{x}$ = 12.11 N= 9 $\sigma$ = 7.74	$\bar{x}$ = 12.06 N= 18 $\sigma$ = 4.73
	F	$\bar{x}$ = 9.40 N= 11 $\sigma$ = 2.67	$\bar{x}$ = 12.13 N= 15 $\sigma$ = 3.69	$\bar{x}$ = 16.10 N= 10 $\sigma$ = 7.46	$\bar{x}$ = 11.13 N= 22 $\sigma$ = 3.62	$\bar{x}$ = 9.92 N= 13 $\sigma$ = 3.73	$\bar{x}$ = 15.57 N= 19 $\sigma$ = 3.96	$\bar{x}$ = 13.30 N= 10 $\sigma$ = 6.36	$\bar{x}$ = 12.06 N= 15 $\sigma$ = 4.63
TOTAL		$\bar{x}$ = 7.74 N= 63 $\sigma$ = 4.09	$\bar{x}$ = 10.91 N= 95 $\sigma$ = 3.99	$\bar{x}$ = 19.14 N= 58 $\sigma$ = 18.99	$\bar{x}$ = 9.61 N= 130 $\sigma$ = 3.95	$\bar{x}$ = 11.75 N= 60 $\sigma$ = 3.79	$\bar{x}$ = 12.40 N= 66 $\sigma$ = 5.14	$\bar{x}$ = 8.51 N= 61 $\sigma$ = 5.79	$\bar{x}$ = 10.14 N= 105 $\sigma$ = 4.32

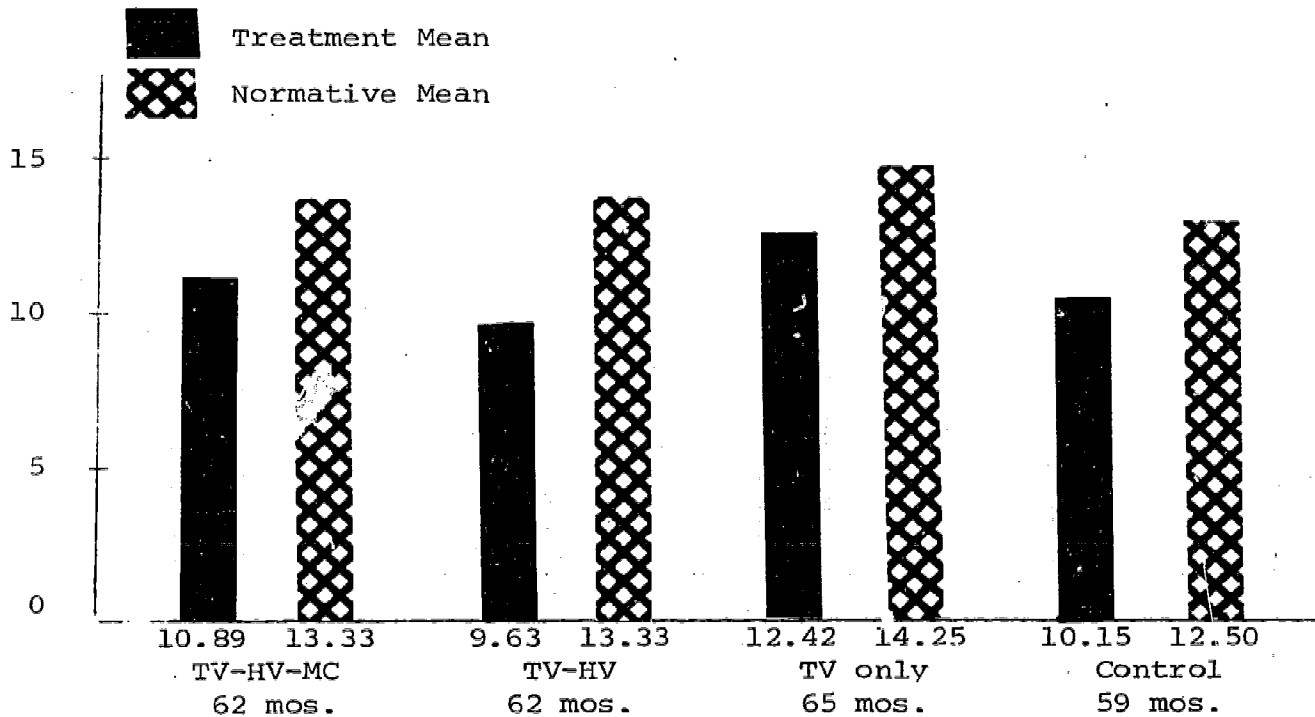


Figure 15.10

Adjusted Overall Group Means and Normative Means for ITPA Subtest 10 (June, 1971)

As the ANCOVA summary table (15.22) reveals, the differences between adjusted means evident in Figure 15.10 are statistically significant.

Table 15.22

Analysis of Covariance Table for ITPA Subtest 10 (June, 1971)

Source	eta <sup>2</sup>	d.f.	Mean Square	F	p
Trt.	.07	3	134.52	7.89	<.01
Sex	.01	1	61.49	3.61	<.01
Trt. by Sex	.01	3	14.73	0.86	-
Covs.		2	22793.26	1336.58	-
Cov. 1		1	122.15	7.16	-
Cov. 2		1	882.16	51.73	-
Error	.91	386	17.05		

A Dunnett's post-hoc comparison revealed the TV only group significantly outscored the TV-HV and control groups. It is hypothesized that Subtest 10 falls into Jensen's "Level I" category of abilities (Jensen, 1969) and that the trend to lower socioeconomic class of the children in the TV only group accounts for their elevated scores in this area. The difference in socioeconomic status also may account for the TV only group's tendency to score slightly lower on Level II or conceptual tasks, such as Subtests 1 and 2.

The significant difference between sexes on this subtest does not result from a consistent pattern of superiority as Table 15.23 reveals.

Table 15.23

Sex by Treatment Means, ITPA Subtest 10 Post-test Raw Scores

	TV-HV-MC	TV-HV	TV only	Control
M	11.35	9.43	11.58	10.10
F	10.44	9.80	13.30	10.17

Females outscored males in three of four cases but only in one case was the difference more than one point. Males outscored females in the TV-HV-MC group by slightly less than one point. It may be that this difference reflects differential fatigue effects or random fluctuations in sampling.

ITPA Total Raw Score

The total mean score and standard deviations for all ten subtests are presented in Table 15.24 along with sample sizes for both pre and post-tests for each age and sex cell of the four treatment groups.

For graphical comparison of group mean totals, Figure 15.11 presents the adjusted overall means from the ANCOVA. National norms are derived from summing the individual subtest scores and are also presented in Figure 15.11.



Table 15.24

Pre and Post-test Means, Standard Deviations, and Sample Sizes for ITPA Total Raw Score

Age	Sex	TV-HV-MC		TV-HV		TV Only		Control	
		Pretest	Post-test	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test
3	M	$\bar{x}$ = 75.50 N = 10 $\sigma$ = 24.27	$\bar{x}$ = 140.91 N = 12 $\sigma$ = 34.8	$\bar{x}$ = 86.33 N = 11 $\sigma$ = 23.85	$\bar{x}$ = 123.13 N = 16 $\sigma$ = 33.3	$\bar{x}$ = 67.27 N = 11 $\sigma$ = 29.44	$\bar{x}$ = 94.63 N = 8 $\sigma$ = 29.9	$\bar{x}$ = 94.75 N = 8 $\sigma$ = 23.79	$\bar{x}$ = 114.06 N = 17 $\sigma$ = 41.4
	F	$\bar{x}$ = 80.00 N = 11 $\sigma$ = 25.55	$\bar{x}$ = 127.92 N = 13 $\sigma$ = 28.1	$\bar{x}$ = 71.40 N = 10 $\sigma$ = 33.37	$\bar{x}$ = 124.00 N = 18 $\sigma$ = 42.8	$\bar{x}$ = 81.40 N = 5 $\sigma$ = 28.46	$\bar{x}$ = 102.00 N = 5 $\sigma$ = 27.8	$\bar{x}$ = 89.88 N = 8 $\sigma$ = 34.73	$\bar{x}$ = 106.47 N = 19 $\sigma$ = 34.3
4	M	$\bar{x}$ = 132.88 N = 9 $\sigma$ = 26.70	$\bar{x}$ = 172.35 N = 20 $\sigma$ = 27.4	$\bar{x}$ = 118.22 N = 9 $\sigma$ = 45.54	$\bar{x}$ = 150.68 N = 25 $\sigma$ = 47.4	$\bar{x}$ = 123.01 N = 13 $\sigma$ = 34.78	$\bar{x}$ = 172.86 N = 14 $\sigma$ = 36.9	$\bar{x}$ = 113.08 N = 13 $\sigma$ = 33.72	$\bar{x}$ = 147.82 N = 17 $\sigma$ = 31.7
	F	$\bar{x}$ = 124.13 N = 9 $\sigma$ = 3.63	$\bar{x}$ = 179.05 N = 19 $\sigma$ = 35.5	$\bar{x}$ = 140.50 N = 10 $\sigma$ = 38.02	$\bar{x}$ = 174.96 N = 22 $\sigma$ = 39.8	$\bar{x}$ = 116.50 N = 10 $\sigma$ = 35.61	$\bar{x}$ = 120.88 N = 8 $\sigma$ = 43.3	$\bar{x}$ = 109.15 N = 13 $\sigma$ = 29.95	$\bar{x}$ = 146.05 N = 17 $\sigma$ = 42.0
5	M	$\bar{x}$ = 172.15 N = 13 $\sigma$ = 27.36	$\bar{x}$ = 211.06 N = 16 $\sigma$ = 31.2	$\bar{x}$ = 167.75 N = 8 $\sigma$ = 39.08	$\bar{x}$ = 195.18 N = 27 $\sigma$ = 39.7	$\bar{x}$ = 141.38 N = 8 $\sigma$ = 38.61	$\bar{x}$ = 180.92 N = 12 $\sigma$ = 45.7	$\bar{x}$ = 143.33 N = 9 $\sigma$ = 35.27	$\bar{x}$ = 184.28 N = 18 $\sigma$ = 29.6
	F	$\bar{x}$ = 160.10 N = 11 $\sigma$ = 23.59	$\bar{x}$ = 193.20 N = 15 $\sigma$ = 29.3	$\bar{x}$ = 155.10 N = 10 $\sigma$ = 38.69	$\bar{x}$ = 185.32 N = 22 $\sigma$ = 38.3	$\bar{x}$ = 153.00 N = 13 $\sigma$ = 34.24	$\bar{x}$ = 191.16 N = 19 $\sigma$ = 31.1	$\bar{x}$ = 176.00 N = 10 $\sigma$ = 51.04	$\bar{x}$ = 195.13 N = 15 $\sigma$ = 40.4
TOTAL		$\bar{x}$ = 126.15 N = 63 $\sigma$ = 22.97	$\bar{x}$ = 173.45 N = 95 $\sigma$ = 29.13	$\bar{x}$ = 121.13 N = 58 $\sigma$ = 38.07	$\bar{x}$ = 163.69 N = 130 $\sigma$ = 40.81	$\bar{x}$ = 117.19 N = 60 $\sigma$ = 33.95	$\bar{x}$ = 158.44 N = 66 $\sigma$ = 35.88	$\bar{x}$ = 121.57 N = 61 $\sigma$ = 35.73	$\bar{x}$ = 147.59 N = 105 $\sigma$ = 36.71

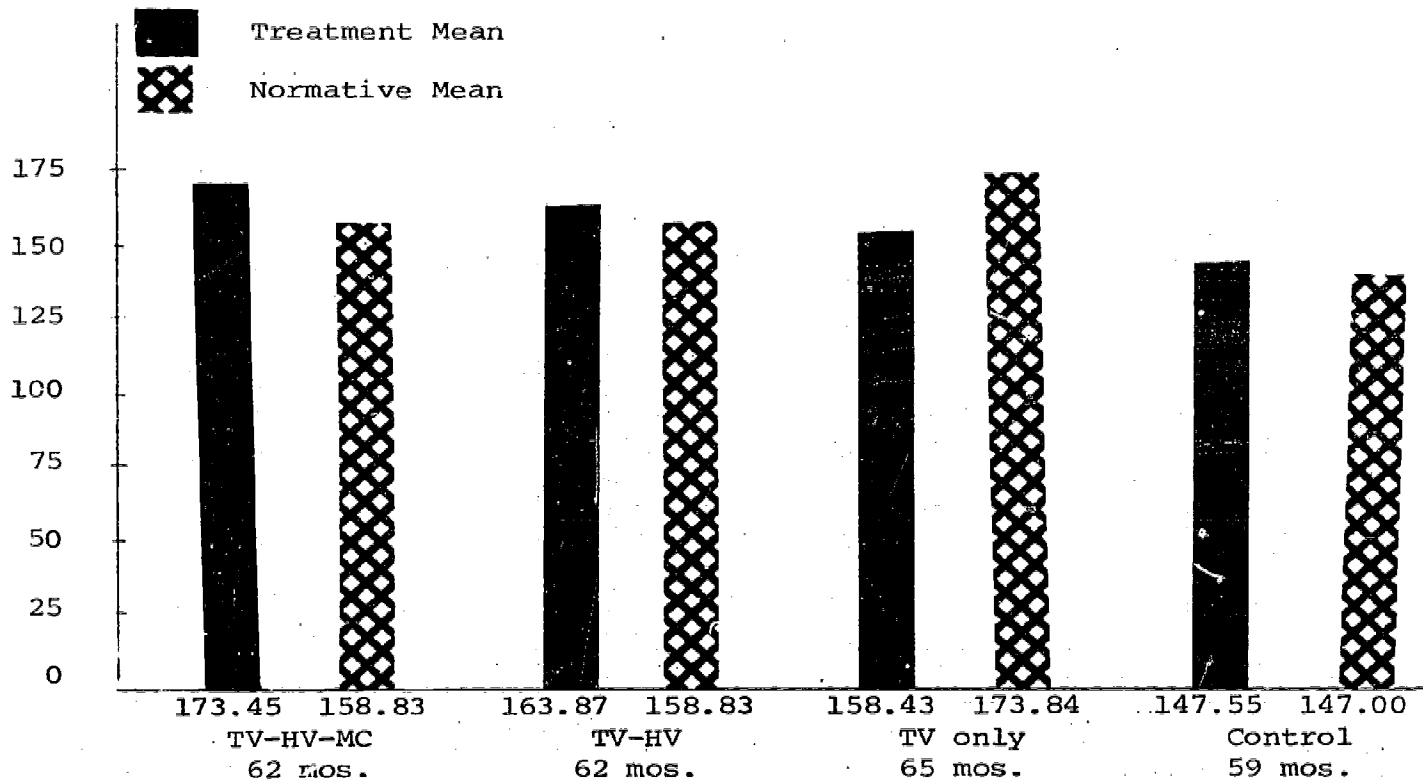


Figure 15.11

Adjusted Group Mean Totals and Derived Normative Totals (June, 1971)

As the ANCOVA summary table (15.25) indicates, the differences between overall means are not significant while a statistically significant difference between the sexes does exist ( $p < .05$ ).

Table 15.25

Analysis of Covariance Table for ITPA Total Raw Scores

Source	eta <sup>2</sup>	d.f.	Mean Square	F	p
Trt.	.01	3	906.95	1.09	-
Sex	.01	1	4315.15	5.20	<.05
Trt. by Sex	.00	3	285.43	0.34	-
Covs.		2	5107512.24	6156.95	-
Cov. 1		1	9317.23	11.23	-
Cov. 2		1	262964.76	317.00	-
Error	.98	386	829.55		

Mean totals by sex for all groups are shown in Table 15.26.

Table 15.26

Treatment by Sex Means - ITPA Total Raw Scores

	TV-HV-MC	TV-HV	TV only	Control
M	177.39	162.10	157.29	145.84
F	169.42	165.61	159.48	145.93

As is evident, neither sex is consistently superior. The males in the TV-HV-MC outscore their female counterparts by eight points, while the TV-HV and TV only females score two to three points above the males in those groups. The control group males and females are essentially equivalent. The most likely explanation for this pattern is that the males in the TV-HV-MC group were more receptive to program effects and learned more in the area of psycholinguistic growth than did the females while the differences in other groups were not indicative of actual differences in ability. If an actual, overall developmental difference in this area did exist, it would be evident throughout all groups, including the control sample, and this was not the case.

### Summary and Conclusions

Although the ITPA did not correspond closely to AEL's Preschool Education Program curriculum objectives, it was decided to use the ITPA as a data gathering instrument which would indirectly measure program effects. Three of the ten subtests administered showed significant treatment effects after covariance, indicating that there was some correspondence between program and test objectives.

As was noted before, the covariance analysis was a conservative measure of program effects, because the unadjusted means for the treatment groups consistently favored the younger sample groups (TV-HV-MC and TV-HV) over the TV only sample. Since all of the raw scores on these instruments are positively correlated with chronological age, adjusting the group means with age as one of the covariates tends to elevate the means score of the TV only and thus obscure actual differences among groups.

For the purposes of comparison, Table 15.27 lists the ranking of each subtest on the ITPA across the four sample groups and includes the results of the ANOVA analysis of age, sex, and treatment effects.

Table 15.27

## Rank of ITPA Post-test Means and Results of ANOVA by Age, Sex, and Treatment

		TV-HV-MC	TV-HV	TV only	Control	ANOVA for Trt.
ITPA Subtest	1	1	2	3	4	p < .01
"	"	1	2	4	3	p < .05
"	"	1	2	3	4	p < .01
"	"	1	2	3	4	p < .01
"	"	1	3	4	2	p < .01
"	"	1	3	2	4	p < .01
"	"	2	1	4	3	p < .01
"	"	1	2	3	4	p < .01
"	"	1	3	2	4	p < .01
"	"	2	4	1	3	p < .01
ITPA Total		1	2	3	4	p < .01

As Table 15.27 shows, the three-way analysis of variance technique revealed significant treatment effects on all ten ITPA subtests and the total score. Additionally, the TV only group ranked below the other samples in terms of mean post-test scores on many of the subtests despite their relatively higher mean age. Thus, it can be assumed that the Appalachia Preschool Education Program was having a broader range of effects in the psycholinguistic area than was evident from the covariance analysis.

Surprisingly, few significant sex effects were evident on the covariance despite the fact that traditional developmental theory places girls of this age (3-5 1/2 years) slightly ahead of their male counterparts in language skills. Also, the majority of the subtests showed three of the sample groups to be scoring near or above national norms. This finding runs contrary to the view that Appalachian children are behind their age peers in the rest of the nation in language development.

One significant exception to the above occurred in the results of Subtest 5 which measures expressive language ability. On that test all groups scored well below the national norms, and the TV only group produced the lowest scores of all the samples. Although no empirical evidence was available to explain this trend, it seems likely that a rural Appalachian environment has a great effect on the child's ability to express himself verbally in a relatively unstructured situation. Since the TV only group tended to come from a more rural environment and differed only in this respect from the other groups in socioeconomic status, this is the most likely explanation for their differing performance.

The TV only group also scored below the national norms on seven of the remaining nine subtests, providing further evidence for general impoverishment in the psycholinguistic area.

Children exposed to AEL's program evidenced increased ability to express themselves nonverbally (by pantomime), one of the frequently taught areas of program curriculum. Additionally, children in the TV-HV-MC group significantly outscored their cohorts in the TV only group in terms of a measure of verbal expression. These findings indicate that a primary area of program effect is that of expressive language. This pattern replicates the results of the second year's evaluation which also found treatment effects in these areas.

## References

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