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ABSTRACT

Results are reported at the end of the second year of a 3-year comparison of four prekindergarten programs: Bereiter-Engelmann, DARCEE, Montessori and Traditional. A number of classes in each program style were used with 246 four-year-olds in Head Start. Children were tested early in the year, at the end of the year, and at the end of kindergarten on a battery of tests and rating scales, including Stanford-Binet, Preschool Inventory, Curiosity Box, Replacement Puzzle, Dog & Bone, Behavior Inventory and Embedded Figures. The kindergarten experience was systematically varied. One replication of the original experiment entered a Follow Through kindergarten, the remainder of the experimental children entered Regular Kindergarten, a non-academic program. A video-tape monitoring procedure developed previously was used to analyze differences among kindergarten programs. Data were examined from several aspects. (1) Did Follow Through and regular kindergarten classes differ in expected dimensions? (2) Did Follow Through produce greater gains than regular kindergarten? (3) Were there interactions between type of Head Start and type of kindergarten? (4) To what extent were Head Start gains maintained irrespective of type of kindergarten? (5) Were there sex effects or sex interactions? Results are discussed in terms of need for finer analysis of program dimensions as related to specific effects. (Author/AJ)

TWO KINDS OF KINDERGARTEN AFTER FOUR TYPES OF HEAD START*

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ABSTRACT

Results are reported at the end of the second year of a three-year comparison of four pre-kindergarten programs: Bereiter-Engelmann, DARCEE, Montessori and Traditional. A number of classes in each program style were used with four-year-olds in Head Start. Children were tested early in the year, at the end of the year, and at the end of kindergarten on a battery of tests and rating scales, including Stanford-Binet, Preschool Inventory, Curiosity Box, Replacement Puzzle, Dog & Bone, Behavior Inventory and Embedded Figures.

Kindergarten experience was systematically varied -- one replication of the original experiment entered a Follow-Through Kindergarten, the remainder of the experimental children entered Regular Kindergarten, a non-academic program. A video-tape monitoring procedure developed previously was used to analyze differences among kindergarten programs. Kindergarten data were examined from several aspects: (1) Did Follow-Through and Regular Kindergarten classes differ in expected dimensions? (2) Did Follow-Through produce greater gains than Regular Kindergarten? (3) Were there interactions between type of Head Start and type of kindergarten? (4) To what extent were Head Start gains maintained irrespective of type of kindergarten? (5) Were there sex effects or sex interactions?

Results are discussed in terms of need for finer analysis of program dimensions as related to specific effects.

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TWO KINDS OF KINDERGARTEN

AFTER FOUR TYPES OF HEAD START

This report presents the results of the second year of a three-year longitudinal study comparing four types of preschool programs for disadvantaged children.

The main goals of the research are: (1) to assess program components (treatment dimensions), (2) to assess program effects on cognitive, motivational, social and perceptual development, and (3) to relate treatment dimensions to treatment effects.

The four programs which were implemented in the pre-kindergarten year (Head Start) were: Bereiter-Engelmann which emphasizes acquisition of linguistic and numerical skills by use of verbal instruction, imitation, and reinforcement, and de-emphasizes sensorial stimulation and manipulation; DARCEE which emphasizes, in addition to verbal and conceptual skills, the acquisition of attitudes and motives related to learning, using verbalization, reinforcement, manipulation of materials and imitation; Montessori which emphasizes development of persistence, independence, and self-discipline, in addition to conceptual skills, using sensorial stimulation, manipulation of materials and self-selection, and de-emphasizes reinforcement and verbalization; Traditional (official Head Start Program) which emphasizes development in social and emotional areas, language skills and curiosity, using manipulation of materials, sensorial stimulation, role-playing and self-selection, and de-emphasizes verbal instruction and reinforcement.

The study was designed to provide appropriate controls for teacher and population variables, and incorporated two control groups -- a non-preschool group similar to the experimental sample and a middle-class group in a private preschool.[1]

Fourteen classes were conducted during the 1968-69 school year -- two Montessori classes and four classes in each of the other program styles. Four-year-olds, randomly assigned within areas to Head Start classes, were tested in the fall after about 8 weeks of school and again in the spring at the end of the school year. A number of instruments designed to assess gains in cognitive, motivational, social and perceptual development were used; five additional tests were administered at the end of the year primarily to assess specific skill-learning.[2] Classes were monitored five times and also video-taped during the year to assess treatment dimensions for both children and teachers. The design of the study in the first year is shown in Table 1.

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[1] The middle-class control group was not obtained until the second year and these results are not reported here.

[2] Tests used in kindergarten are listed in Appendix I.

TABLE 1

Placement of Classes by Programs and Areas in Head Start

Program	#1 California	#2 Jackson	#3 Park DuValle	#4 Russell	Total
Bereiter-Engelmann	13	21	17	13	64
DARCEE	17	13	19	15	64
Montessori	-	-	14	19	33
Traditional	12	14	15	12	53
Controls					32
Total					246

SUMMARY OF RESULTS - PRE-KINDERGARTEN

1. Programs were found to differ significantly in a number of dimensions with respect to behavior of both teachers and children, most of these differences being in predicted directions.

In the Bereiter-Engelmann classes, teachers were significantly high in verbal instruction, exemplification, modeling of academic information, amount of feedback given -- both positive and negative, and in the elicitation of verbal recitation from the children; DARCEE teachers were significantly high in verbal instruction, conversation with children and contingent positive reinforcement; Traditional teachers were significantly high in manipulation of materials, conversation with children and asking for conduct. Bereiter-Engelmann and DARCEE children were significantly high in verbal recitation; Montessori children were significantly high in manipulation; Traditional children were significantly high in role-playing.

2. Programs had significantly different effects on children with respect to a number of the variables measured.

Bereiter-Engelmann and, to some extent, DARCEE significantly affected cognitive functioning as measured by the Stanford-Binet and the Preschool Inventory; DARCEE had considerable impact on children's motivation to achieve, persistence, resistance-to-distraction, initiative, and curiosity; Montessori and Bereiter-Engelmann children were significantly higher than controls on curiosity. Bereiter-Engelmann produced significantly high achievement on sentence production and arithmetic; DARCEE was significantly high on arithmetic. According to teachers' ratings after six months, DARCEE children were significantly high in verbal-social-participation and less timid than children in other programs. Bereiter-Engelmann children were significantly less aggressive.

4

DESIGN - KINDERGARTEN YEAR

The variations in kindergarten for children from the four kinds of Head Start are shown in Table 2.

One replication of the original study entered Follow-Through Kindergarten; that is, one class from each of the four Head Start program styles. The remaining experimental groups entered Regular Kindergarten.

Follow-Through Kindergarten was a highly academic, individualized program structured as a token-economy. The children studied reading (phonics and blends), handwriting and arithmetic. The school day was broken into "Earn" and "Spend" periods. During the "Earn" period the children were reinforced with tokens usually accompanied by verbal praise. They accumulated these tokens and during the "Spend" period they were allowed to buy various kinds of activities and things to play with. The classes were divided into small groups and children worked on the same kind of lesson at a given time, but each child worked on his own and at his own rate. The program, as implemented in Louisville, used the Sullivan reading materials, Addison-Wesley mathematics and Skinner handwriting program. These were supplemented by materials provided from the University of Kansas, including a pre-reader. The program day lasted from 8:30 A.M. to 1:30 P.M. In Follow-Through Kindergarten there were 25 children in a class, one teacher, one teacher assistant and two parent-aides who alternated over 8-week periods.

Regular Kindergarten in the city schools has not been intended as a preparation for first-grade work in any specific sense. Written materials and pre-reading exercises were not formally a part of the program. Officially the program attempted to provide a balance between cognitive and affective development. The Supervisor believed that the key to its success was the teacher's awareness of the level at which each individual child is functioning and the potential for learning which exists in a variety of activities. The program might be described as a model of the type kindergarten after which official Head Start was patterned. The school day lasted 2½ hours, with classes scheduled in both morning and afternoon. In some schools the same teacher taught two classes -- one in the morning and one in the afternoon. Most teachers did not have aides and one teacher might handle more than 30 children in a class, but if the same teacher had 60 or more children in two classes, an aide was provided. Volunteers were utilized as fully as possible. Typically a class contained about 25 children. This program was not federally funded.

TABLE 2

Variations in Kindergarten Year Experience

Pre-Kindergarten Year Experience (1968-69)	Regular Kindergarten (1969-70)	Follow-Through (1969-70)	Total
	N	N	N
Bereiter-Engelmann Head Start	31*	14	45
DARCEE Head Start	40	15	55
Montessori Head Start	20	12	32
Traditional Head Start	31	12	43
No Head Start (Controls)	26	15	41
Total	148	68	216

*An additional 14 experimental subjects from the original Bereiter-Engelmann Head Start class continued with this program in Kindergarten.

METHOD

Procedure

The children from the four different Head Start programs were distributed as equally as possible into four Follow-Through classes in order to control for the teacher variable. Placement of the remainder of the experimental subjects occurred without systematic control and resulted in a wide distribution of subjects into 19 schools and 40 kindergarten classes. Many of the classes contained only one or two experimental children, however, and there was a concentration of subjects in five Regular Kindergarten classes. Table 3 shows the distribution of children from the four Head Start programs into these nine kindergarten classes. These nine classes were video-taped three times during the year and the tapes were monitored with the same instrument used in the first year of the study to monitor Head Start classes. (See Appendix, pages 48 and 49.)

Three groups of testers administered the battery of tests to the children at the end of the kindergarten year. A total of 200 of the original experimental group and 31 of the original controls were retested. An additional control group of 15 was obtained at the end of the kindergarten year. These were children who entered Follow-Through without having had any Head Start experience at all.

As in the first phase of the study, data were obtained in two areas: Treatment Dimensions and Treatment Effects. Specifically, these questions were asked:

A. Treatment Dimensions

(1) Did Follow-Through and Regular Kindergarten classes, as implemented, manifest the expected emphases on certain program components?
(2) Did Follow-Through and Regular Kindergarten classes differ in expected dimensions?

B. Treatment Effects

(1) Did the academic Follow-Through Program produce greater gains in any of the dependent variables than the Regular Kindergarten?
(2) Were there interactions between type of Head Start and type of kindergarten such that certain combinations were superior to others?
(3) To what extent were Head Start gains maintained, irrespective of type of kindergarten?
(4) Were males and females affected differently by type of kindergarten or combinations of Head Start and kindergarten?

TABLE 3

Distribution of Subjects in Monitored Classes in Regular Kindergarten and Follow-Through

	Regular Kindergarten					Follow-Through				
Head Start Program	1	2	3	4	5	6	7	8	9	Totals
	N	N	N	N	N	N	N	N	N	N
Bereiter-Engelmann	1	8	0	0	6	3	5	3	3	29
DARCEE	5	1	7	2	0	3	3	3	4	28
Montessori	0	0	0	17	0	2	1	5	3	28
Traditional	6	1	3	1	0	3	2	2	3	21
Controls	0	2	0	2	3	2	0	5	2	16
Totals	12	12	10	22	9	13	11	18	15	122

Total in other classes 106

Analyses

Video-tape data were subjected to a multivariate analysis of variance. On a number of dimensions the variance for some teachers over three sessions was virtually zero -- that is, the teacher was simply not engaging in a particular behavior at all. This resulted in extreme inhomogeneity of variance, of course, and for this reason, the data were also analyzed by means of the Mann-Whitney U-test. This non-parametric statistic confirmed results from the multivariate analysis and produced some additional rank-order differences between programs.

In order to answer questions about dependent variables, a number of different analyses were made. To compare Follow-Through and Regular Kindergarten, an analysis of covariance on the main battery was made using the end-of-Head Start scores as the covariate. The analysis included Head Start program and sex as variables. This analysis did not include the original control group because all of these children entered Regular Kindergarten rather than Follow-Through. There were 172 experimental children involved in the covariance analysis, 121 in Regular Kindergarten and 51 in Follow-Through.

A similar analysis was made for the three additional tests given to a sample of the Head Start children, again using end-of-Head Start scores as the covariate. This analysis included sex as a variable, but not Head Start program because of the small sample size and the extremely unequal N's from the four Head Start programs in the two kinds of kindergarten. N for this analysis was 77.

Since no previous test scores were available on the new controls in Follow-Through, they could be compared with the original controls (all of whom entered Regular Kindergarten) only by analysis of variance on the end-of-kindergarten scores. As a further check on the possible effects of Follow-Through, this analysis was made on the main battery and also on the additional tests given to the sample of Head Start children. N for this analysis was 39, 15 in Follow-Through and 24 in Regular Kindergarten.

For the purpose of assessing stability of Head Start effects, without regard to type of kindergarten, a repeated measures analysis of variance was made, using all three data points. This analysis included Head Start program, the sex variable, and also included the original control group. The number of subjects in this analysis was 231.

A repeated measures analysis of variance was also made on the sample of subjects who were given three additional tests. N was 84.

Table 4 presents adjusted means for all groups on all measures from the covariance analysis of Follow-Through vs. Regular Kindergarten. Table 5 presents means at the three testing times on the main battery for experimentals and controls. Table 6 shows the means for the sub-sample on additional tests.

TABLE 4

Adjusted Means on all Groups in

Follow-Through and Regular Kindergarten on Main Battery

	Bereiter-Engelmann		DARCEE		Montessori		Traditional		All Ss	
	N=14	N=31	N=15	N=40	N=12	N=20	N=12	N=31	N=53	N=122
	F-T	R	F-T	R	F-T	R	F-T	R	F-T	R
Binet	96.98	92.57	93.40	94.26	94.26	95.53	95.99	94.14	95.18	94.70
Preschool Inventory	49.72	48.53	49.91	48.94	52.08	50.44	53.18	48.19	51.09	48.89
Dog-and-Bone	7.48	6.83	6.46	8.16	11.40	7.97	7.36	6.44	8.05	7.36
Repl. Puzzle A	23.93	23.90	21.82	23.99	22.07	23.90	24.02	23.18	22.93	23.74
Repl. Puzzle B	10.58	13.18	10.58	10.84	12.40	13.54	13.40	12.91	11.63	12.46
Cur.Verbal	1.43	1.12	.74	1.62	1.04	.45	1.12	1.25	1.08	1.20
Cur. Act.	18.57	14.43	15.45	16.40	15.26	18.[illegible]	14.72	12.14	16.07	15.14
Emb. Fig.	11.94	10.89	12.80	10.84	11.53	10.78	11.25	11.32	11.93	10.96
Behavior Inventory Ratings by Teachers										
Ind.	13.23	12.51	11.42	11.26	12.78	11.55	12.06	11.31	12.35	11.62
Tim.	13.53	11.82	12.61	12.57	13 60	12.66	12.78	11.87	13.12	12.23
VSP	12.76	10.53	11.74	11.91	12.66	13.38	12.97	11.96	12.49	11.87
Aggr.	12.28	11.86	11.95	11.67	13.97	13.77	12.70	12.13	12.66	12.21
Ach.	12.70	11.83	11.22	11.92	12.82	13.09	12.26	11.75	12.21	12.06
Face Sheet Ratings[1] - Achievement Factor										
PSI Testers	2.08	2.25	2.31	2.53	1.86	2.67	2.05	2.20	2.09	2.40
Binet Testers	2.66	2.40	2.60	2.33	2.57	2.29	2.62	2.64	2.61	2.42

[1]Low score is optimum.

TABLE 5

Means from Repeated Measures on All Data

	Bereiter-Engelmann			DARCEE			Montessori			Traditional			Controls		
	F	S	K	F	S	K	F	S	K	F	S	K	F	S	K
Binet	93.08	98.94	94.15	94.91	96.67	94.76	91.67	96.45	94.51	89.19	95.48	93.31	89.54	90.77	93.74
PSI	26.45	38.98	48.25	28.13	40.58	50.45	25.40	37.65	50.50	24.00	35.59	47.68	29.16	34.61	48.48
Dog-and-Bone	3.27	4.35	6.44	3.42	6.11	8.21	4.51	5.71	9.40	2.74	3.93	6.51	4.25	5.22	7.70
Repl. Puz.A	21.48	22.27	23.86	20.28	22.70	23.48	19.60	22.00	23.07	20.80	22.59	23.48	17.64	21.16	23.70
Repl. Puz.B	10.10	9.72	12.96	8.41	9.91	11.81	9.53	7.35	11.71	9.04	9.27	12.65	8.29	7.16	11.35
Cur. V.	1.78	.83	.96	1.72	1.67	1.59	1.03	1.12	.62	1.44	.93	1.02	2.61	.87	1.09
Cur. A.	15.56	16.78	15.56	14.22	15.90	15.72	17.65	17.28	17.43	14.29	14.89	12.82	16.00	10.41	15.87
Emb.Fig.	7.85	9.86	11.05	7.11	10.11	11.40	7.78	9.43	10.93	7.42	10.40	11.31	7.58	9.93	11.51
Behavior Inventory Ratings by Teachers															
Independence	11.82	11.96	12.50	10.68	13.06	11.50	12.32	12.77	12.06	12.39	12.82	11.60	-	-	12.32
Timidity	11.94	12.11	12.15	11.38	13.88	12.80	12.87	12.96	13.03	12.24	12.46	12.04	-	-	11.76
V-S-P	10.19	12.11	10.90	11.18	14.40	12.46	10.25	10.80	12.35	11.60	12.73	12.19	-	-	11.44
Aggression	13.36	13.90	12.98	12.78	13.18	11.78	12.77	12.93	13.70	13.21	12.41	11.80	-	-	12.68
Achievement	12.03	11.76	11.92	11.60	13.18	12.16	11.38	11.22	12.64	12.36	12.39	12.00	-	-	12.60
Face Sheet Ratings[1] - PSI Testers															
Factor I	2.74	2.36	2.28	2.87	2.52	2.43	2.98	2.87	2.49	2.68	2.69	2.19	2.81	2.85	2.37
Factor II	2.72	2.27	2.25	2.94	2.52	2.46	2.86	2.73	2.37	2.82	2.83	2.26	2.63	2.89	2.73
Factor III	2.63	2.22	2.26	2.93	2.42	2.41	2.74	2.55	2.48	2.47	2.57	2.34	2.43	2.63	2.84
Face Sheet Ratings[1] - Binet Testers															
Factor I	-	2.05	2.49	-	2.30	2.45	-	2.62	2.54	-	2.31	2.68	-	2.07	2.46
Factor II	-	2.35	2.29	-	2.52	2.47	-	2.72	2.35	-	2.71	2.23	-	2.71	2.36
Factor III	-	2.28	2.31	-	2.42	2.44	-	2.55	2.43	-	2.57	2.31	-	2.55	2.79

[1] Low score is optimum.

TABLE 6

Means from Repeated Measures on Additional Tests Given Sample of Experimental Subjects*

	Bereiter-Engelmann N=24			DARCEE N=24			Montessori N=12			Traditional N=24			Total N=84
	F	S	K	F	S	K	F	S	K	F	S	K	
BCI	-	34.7	28.2	-	38.2	28.7	-	34.2	26.1	-	45.3	36.1	
PSP	-	96.0	108.9	-	92.1	110.0	-	85.1	113.5	-	76.2	109.6	
Arithmetic	-	19.0	27.7	-	13.1	24.5	-	10.7	24.3	-	4.2	19.6	

All Experimental Subjects

													Controls		
													F	S	K
CADI	-	-	31.8	-	-	32.4	-	-	32.9	-	-	31.9	-	-	32.0
Nonsense	-	-	13.9	-	-	15.3	-	-	14.7	-	-	14.3	-	-	14.3
Familiar	-	-	17.9	-	-	18.0	-	-	18.2	-	-	17.6	-	-	17.7
BCI	-	-	33.2	-	-	33.8	-	-	32.5	-	-	34.9	-	-	36.2
PSP	-	-	104.1	-	-	102.2	-	-	103.1	-	-	100.7	-	-	98.0
Arithmetic	-	-	32.1	-	-	33.8	-	-	31.5	-	-	34.9	-	-	36.2

* Sample of six Ss from each class.

RESULTS

1. TREATMENT DIMENSIONS

Video-tape monitoring of the four Follow-Through classes and five of the Regular Kindergarten classes presents an interesting contrast in program characteristics.

Table 9 gives means over three 10-minute samples for categories in which frequencies were high enough for statistical analysis. Table 8 presents similar means for categories which could not be analyzed. The most obvious and pervasive difference between the two kindergarten programs was in the amount of contact with individuals versus contacts with the group (Figure 1). Follow-Through was clearly an individualized program with little group activity. Regular Kindergarten, although philosophically emphasizing the individual, in reality provided relatively little in the way of teacher contact with individual children. Even Requests for Opinion were more often addressed to the group than to the individual.

Figure 2 shows "Feedback" variables for both programs. On Positive Knowledge-of-Results given to individuals, the mean difference was 88 instances more in Follow-Through than in Regular Kindergarten. Positive KOR to the group did not differentiate the two kinds of kindergarten. KOR Negative, feedback for incorrect responses, to the individual was characteristic of Follow-Through. There was virtually no KOR Negative given to the group in either program.

As would be predicted from the nature of the programs, and as shown in Figure 3, Follow-Through was high on Asking for Academic Information from individual children. Asking for Academic Information from the group did not differentiate the two kindergarten programs. Regular Kindergarten was higher in Asking for Opinion from the group.

Figure 4 shows that Giving Academic Information verbally to the group was higher in Regular Kindergarten; Giving Academic Information verbally to the individual was higher in Follow-Through. There was more Giving of Academic Information to the group by Exemplification in Regular Kindergarten than in Follow-Through.

One variable which stands out as descriptive of these Regular Kindergarten classes is Role-Playing - Music with the group. It could not be analyzed because there was none observed in Follow-Through, but Regular Kindergarten teachers devoted much time to it.

In both programs, Reinforcement for Imitation, Role-Playing, Curiosity, Creativity and Initiative are conspicuous by their absence. Follow-Through teachers did provide about 2½ reinforcements per 10-minute period for task persistence.

TABLE 7

Means per 10-Minute Video-Tape Sample

Category	Follow-Through		Regular K	
	Group	Individual	Group	Individual
Asking - Conduct - Request	0.00	0.06	1.29	3.40
Asking - Conduct - Command	0.00	0.00	0.33	0.87
Conduct - Reinforcement+	0.00	1.67	0.02	0.00
Conduct - Reinforcement-	0.00	0.00	0.14	0.38
+Reinforcement for Imitation	0.03	0.25	0.38	0.07
+Reinforcement for Role-Playing	0.00	0.00	0.29	0.00
+Reinforcement for Curiosity	0.00	0.00	0.00	0.00
+Reinforcement for Persistence	0.00	2.56	0.00	0.20
+Reinforcement for Spon.Creativity	0.00	0.00	0.08	0.00
+Reinforcement for Initiative	0.00	0.17	0.00	0.02
+Reinforcement for Help	0.00	0.00	0.00	0.33
Giving - Role-playing - Music	0.00	0.00	10.62	0.00
Giving - Role-playing - Imag.	0.00	0.00	1.60	0.36
Giving - Manp. - Help	0.00	0.47	0.00	2.16
Giving - Opinion - Verbal	0.05	0.78	1.44	0.87
Total	0.08	5.96	16.19	8.66
Giving - Setting Standards - Ver.	0.08	0.33	0.58	0.38
Conversation[1]	-	0.08	-	1.33
Out of Contact[1]	-	0.28	-	0.94
Other[1]	-	0.44	-	2.07
In Contact but not Interacting[1]	-	6.49	-	4.99

[1]These categories were coded only for individual.

TABLE 8

Means per 10-Minute Video-Tape Sample

	Follow-Through		Regular K	
Category	Group	Individual	Group	Individual
Asking - Academic	1.29	87.91	31.93	21.86
Asking - Imitation	2.16	6.41	5.19	1.52
Asking - Opinion	0.33	2.25	4.06	2.59
Giving - Academic - Verbal	2.66	20.41	15.19	1.66
Giving - Academic - Modeling	4.66	7.33	6.53	1.73
Giving - Procedural Information	5.24	15.58	12.19	5.59
Giving - Exemplification	1.33	0.00	7.99	0.00
Feedback - KCR+	5.41	102.66	10.93	14.46
Feedback - KCR-	0.00	7.74	0.00	1.86
Total	23.08	250.29	94.01	51.27

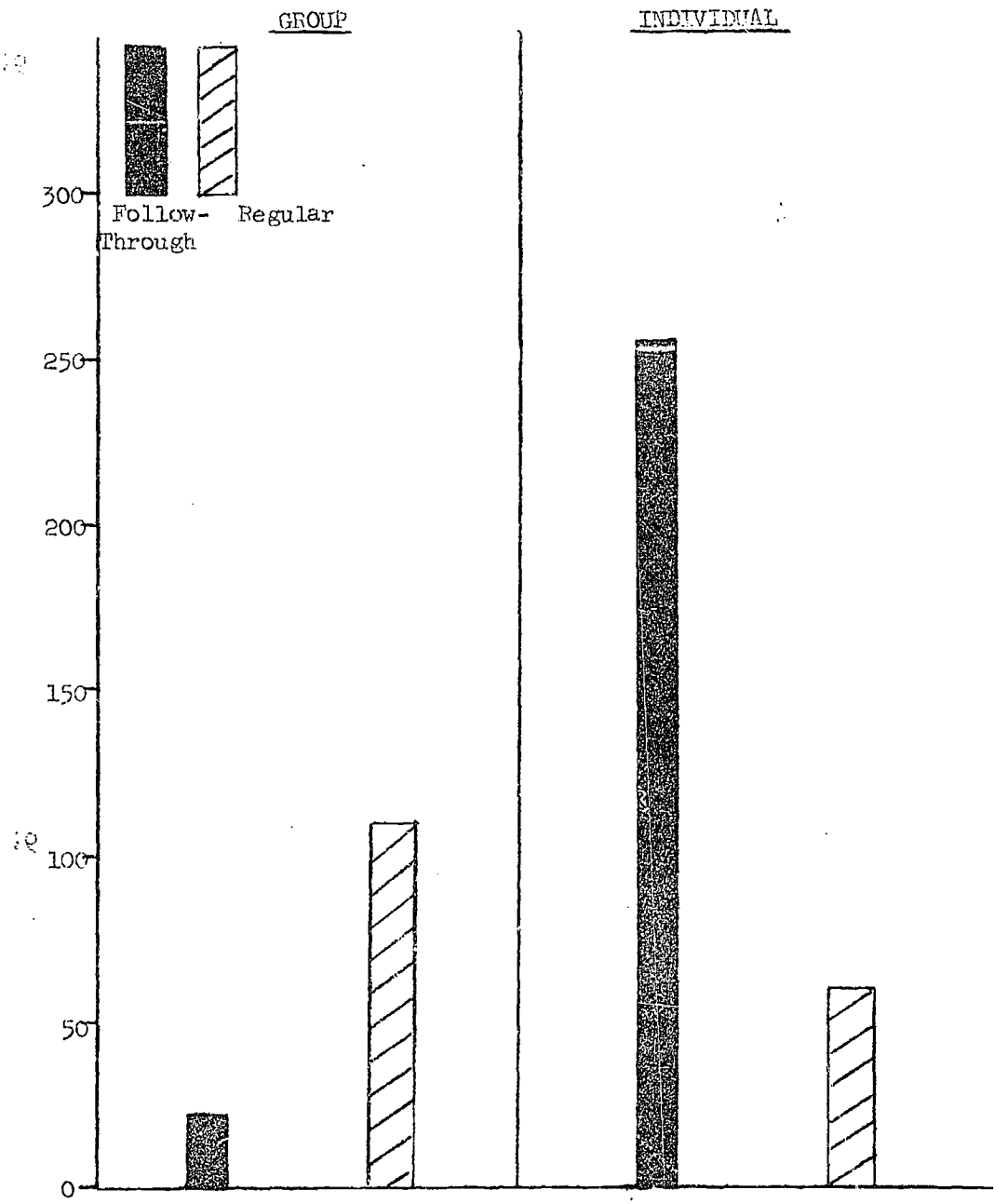

Fig. 1. Total Contacts to Group vs. Individuals, Follow-Through vs. Regular Kindergarten Teachers. Means per 10-minute video-tape sample.

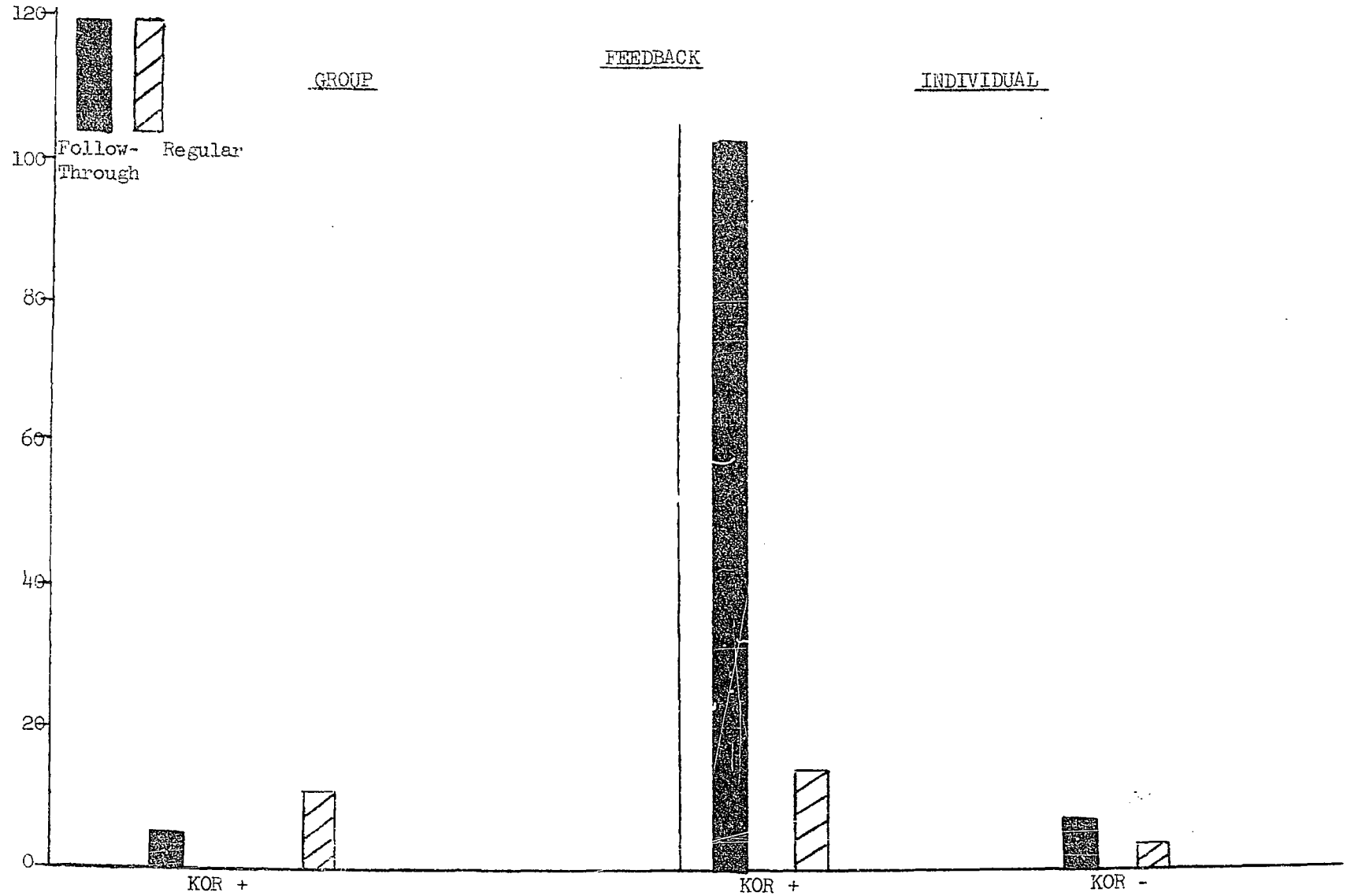

Fig. 2. Informational Feedback (KOR+ and KOR-) Follow-Through vs. Regular Kindergarten Teachers. Means per 10-minute video-tape sample. (There was no KOR- to the Group.)

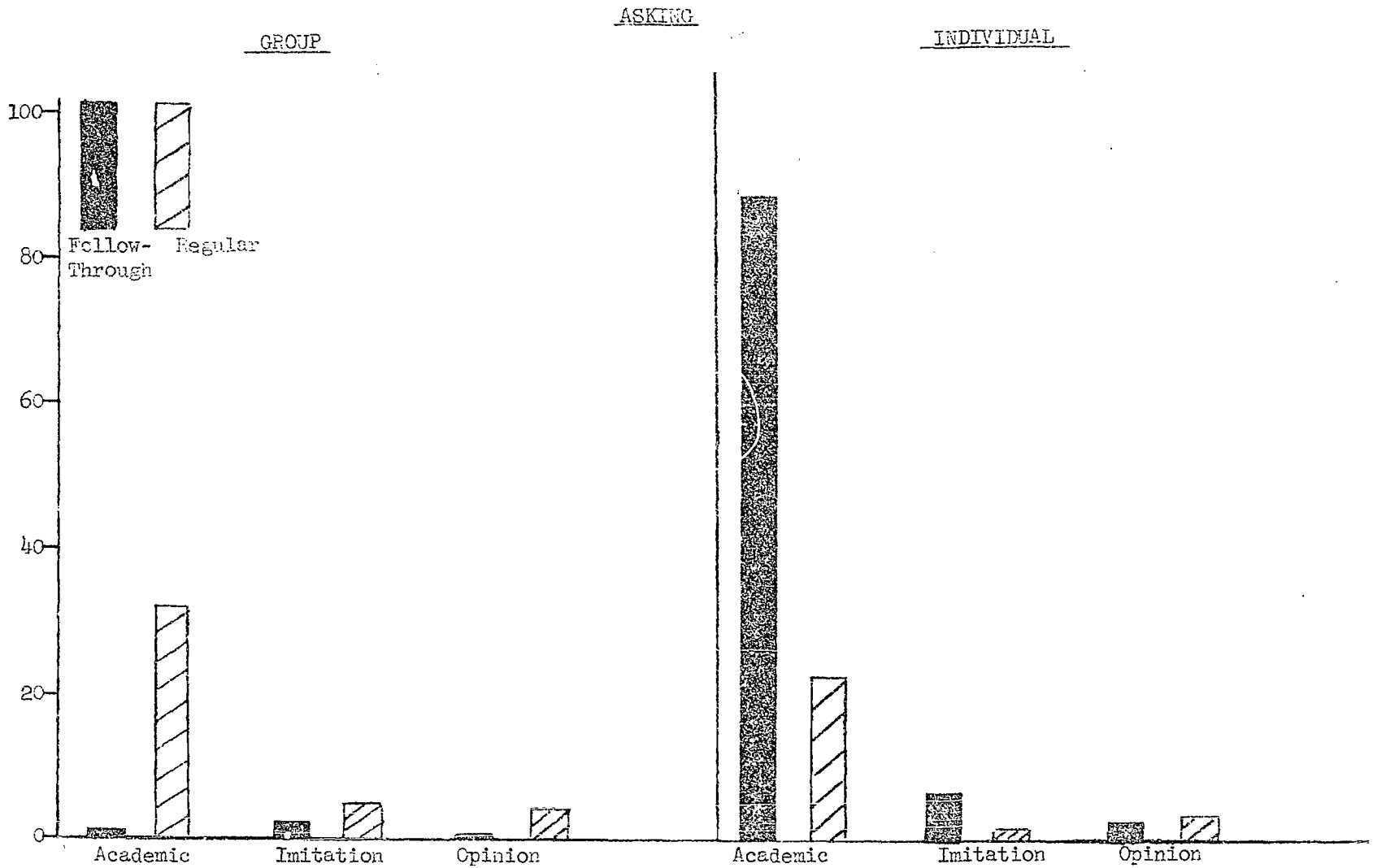

Fig. 3. "Asking" variables, Follow-Through vs. Regular Kindergarten Teachers. Means per 10-minute video-tape sample.

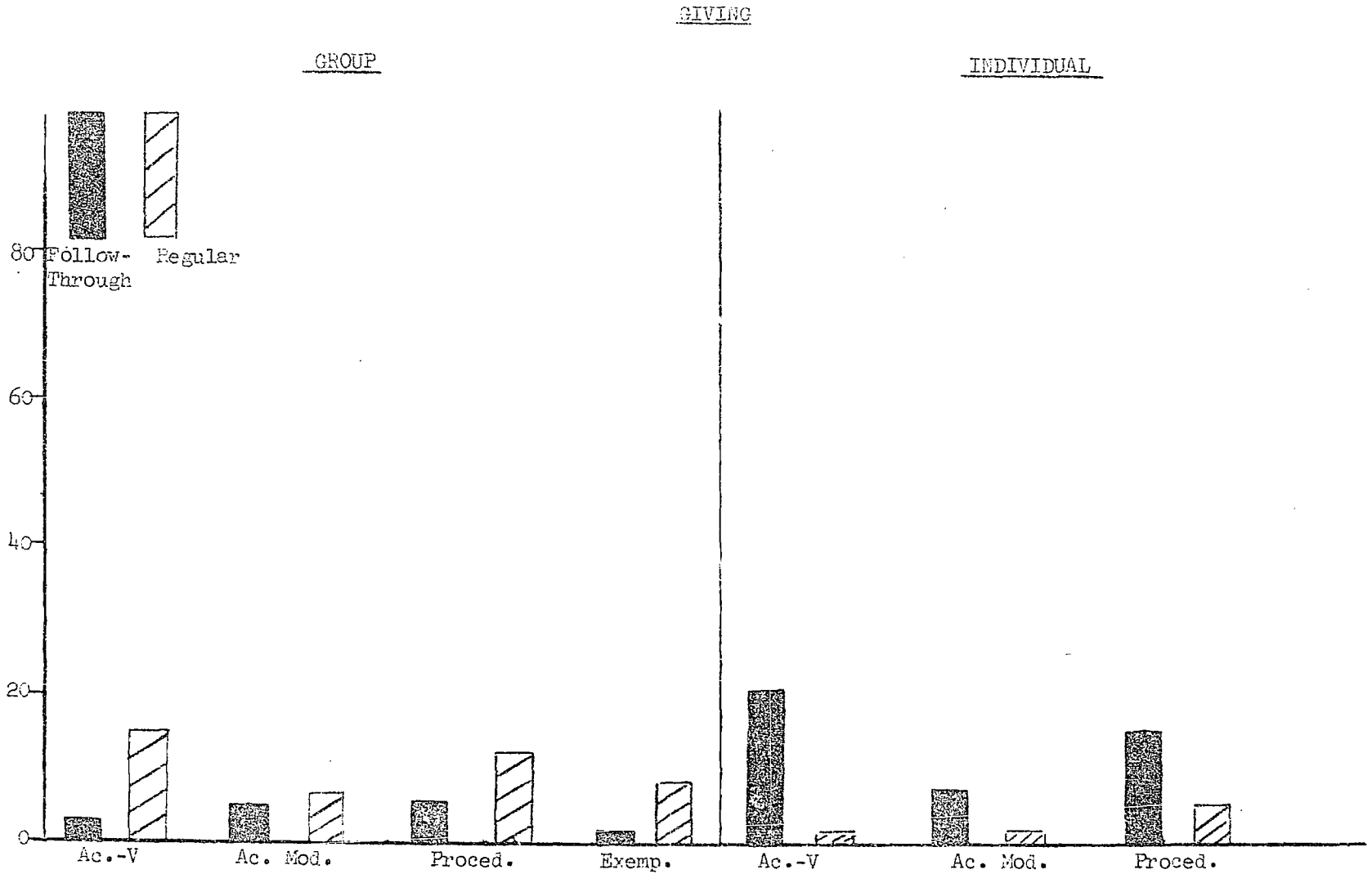

Fig. 4 "Giving" variables, Follow-Through vs. Regular Kindergarten Teachers. Means per 10-minute video-tape sample.

Summary

The most outstanding difference between Follow-Through and Regular Kindergarten was in the greater amount of contact with the individual in Follow-Through. Follow-Through Kindergarten was also characterized by giving and asking of academic information, positive KOR and negative KOR -- all to the individual. In Regular Kindergarten, there was more asking for opinion, giving of academic information verbally and by exemplification to the group, and role-playing, especially music. In both programs there was virtually no reinforcement for imitation, role-playing, curiosity, creativity, or initiative.

2. TREATMENT EFFECTS

Follow-Through Vs. Regular Kindergarten

Means for Follow-Through and Regular Kindergarten are compared in Figures 5 and 6. Means for the control groups on these variables are shown in Figure 7. Significantly high means are starred. Figure 5 shows that on Stanford-Binet IQ, Inventiveness (Dog & Bone), Resistance-to-Distraction (Replacement Puzzle B) and Curiosity, there were no main effects of type of kindergarten.

On the Preschool Inventory experimental children in Follow-Through were significantly higher than children in Regular Kindergarten. This difference, however, did not obtain for controls in the two kinds of kindergarten.

On Persistence (Replacement Puzzle A), Regular Kindergarten children were higher than Follow-Through children. This is not the case for controls however. A Head Start-by-Kindergarten interaction on this measure, to be discussed later, is more interesting than the main effect.

On Embedded Figures there was a main effect of kindergarten in that experimental children in Follow-Through were higher. This superiority of Follow-Through children was consistent in three of the programs but did not obtain for controls. Again, a Head Start-by-Kindergarten interaction, discussed later, is more interesting than this main effect.

Scores were available on three additional tests over two testing times for a sample of experimental children. These tests were the Basic Concept Inventory, Parallel Sentence Production and Arithmetic. There were no significant effects on the Basic Concept Inventory or Parallel Sentence Production. On Arithmetic, however, Follow-Through children were significantly higher than those in Regular Kindergarten. This difference is substantial, consisting of an 18-point advantage.

Figure 6 shows that there were no main effects of type of kindergarten on Behavior Inventory ratings on Independence, Verbal-Social-Participation, Aggression, Achievement or Timidity.

On Achievement Motivation as measured by the Binet Face Sheet ratings, Preschool Inventory testers rated Follow-Through children significantly higher than Regular Kindergarten. Ratings on the Face Sheet by Binet testers did not produce this main effect of kindergarten however.

Figure 7 shows a comparison of original controls who went into Regular Kindergarten and new controls who entered Follow-Through without any previous Head Start experience. For these subjects there were two differences between Follow-Through and Regular Kindergarten both of which favored Follow-Through. These were Parallel Sentence Production and Arithmetic, confirming results on the sample of

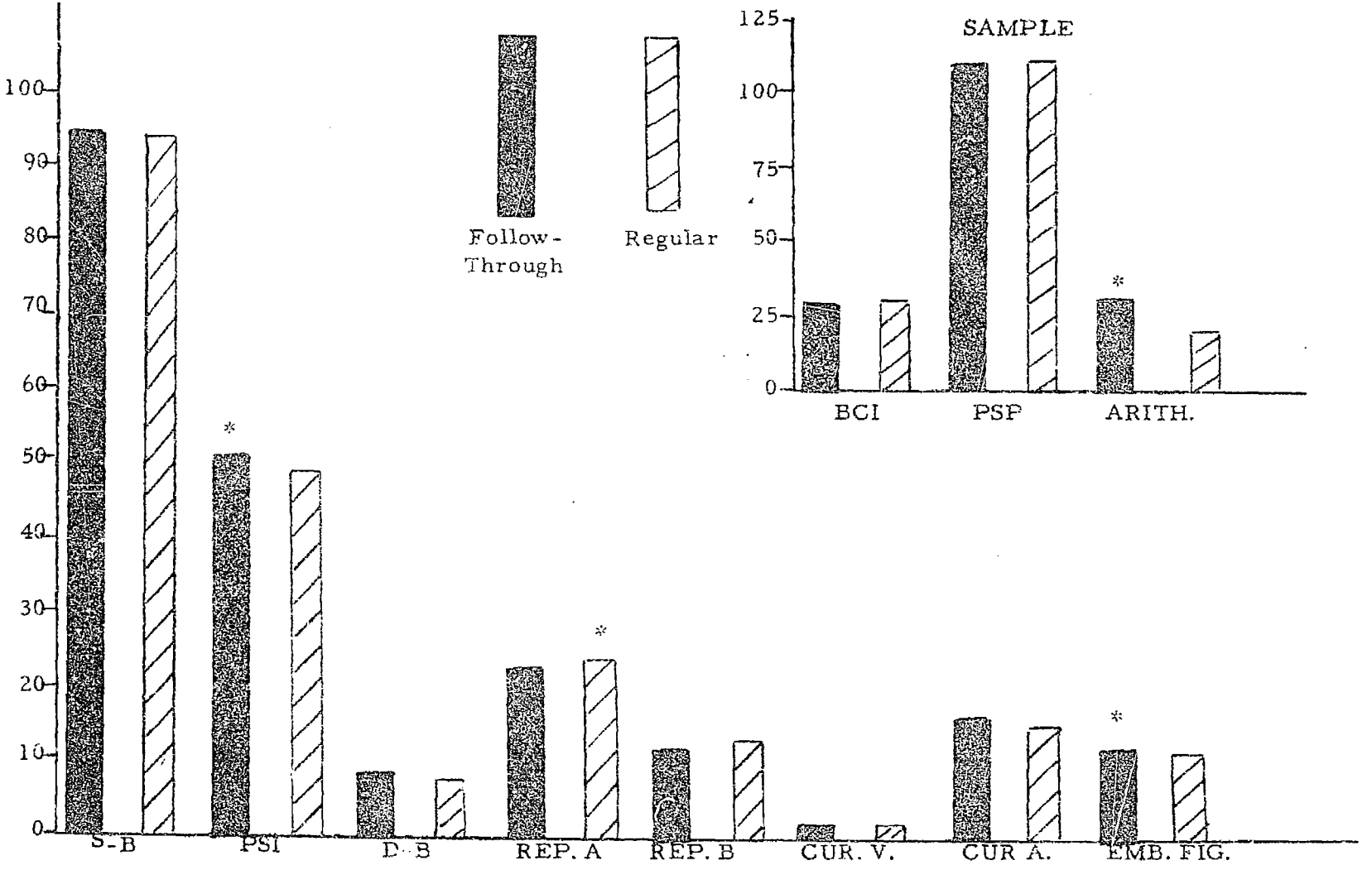

Fig. 5. Main Battery, Follow-Through vs. Regular Kindergarten, adjusted means, all experimental subjects.
*Denotes significantly higher program.

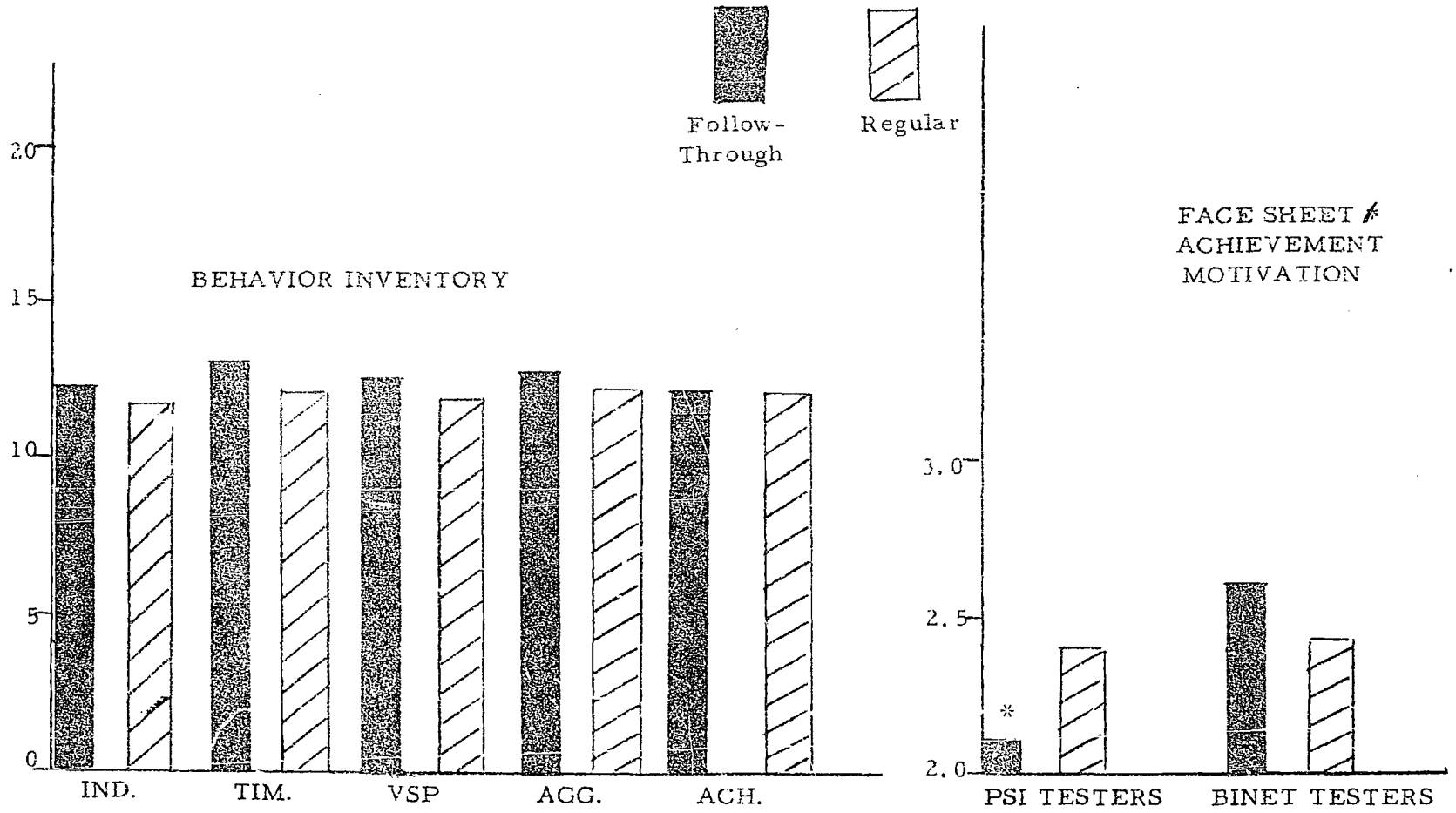

Fig. 6. Behavior Inventory Factors and Binet Face Sheet Ratings on Achievement, Follow-Through vs. Regular Kindergarten, adjusted means, all experimental subjects.

*Denotes significantly higher program.

≠Low score is optimum.

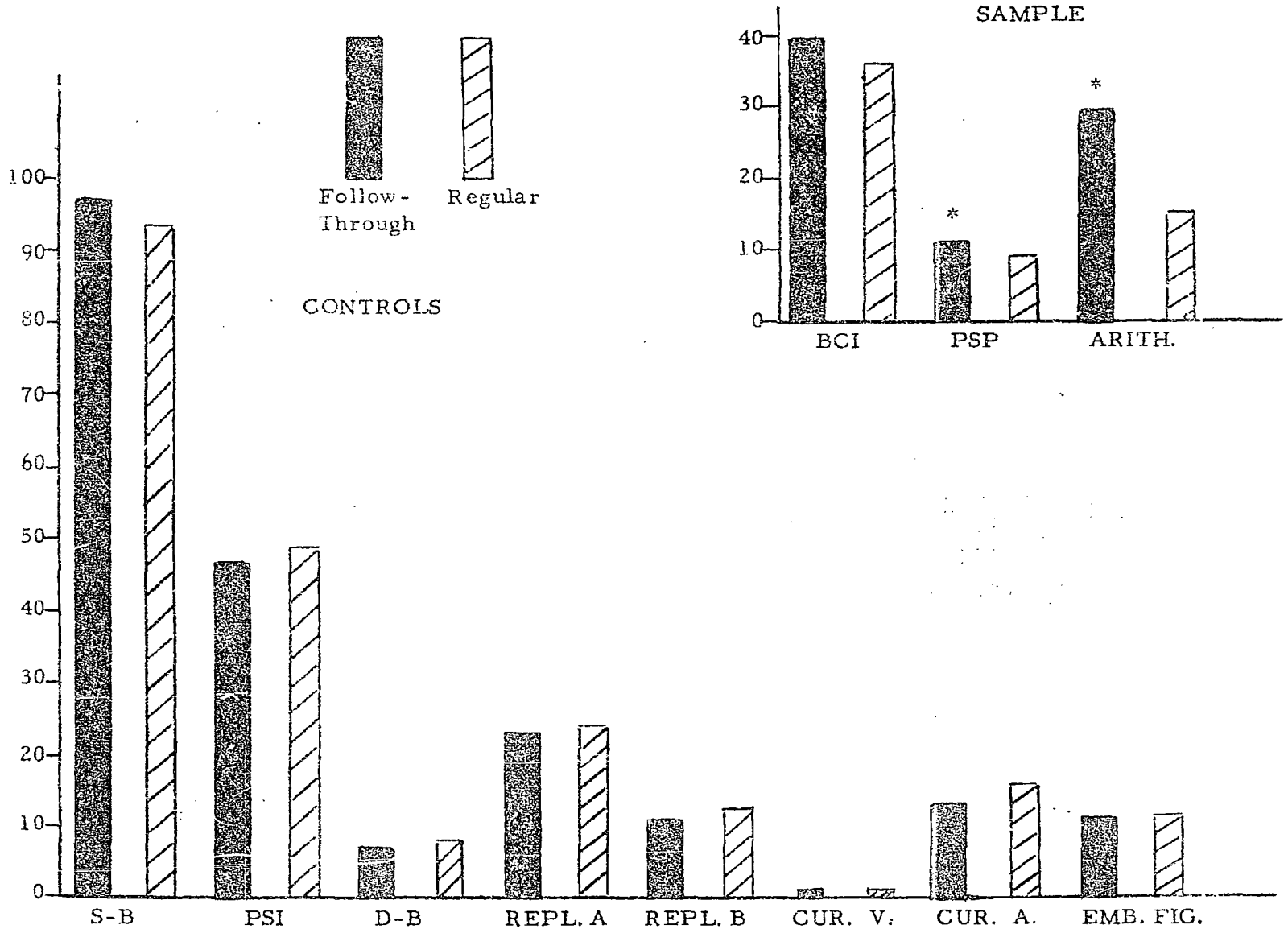

Fig. 7. Main Battery and Additional Tests, Follow-Through vs. Regular Kindergarten, unadjusted means, Controls only.

* Denotes significantly higher program.

experimental children for Arithmetic in respect to the superiority of the Follow-Through Program.

Summary

As shown in Figure 8, when scores are adjusted for initial level, it appears that, regardless of the type of Head Start previously experienced, the Follow-Through Kindergarten Program was superior to the Regular Kindergarten Program in three areas: the Preschool Inventory, one measure of Achievement Motivation and Arithmetic. For control children without Head Start, Follow-Through was superior in Parallel Sentence Production and Arithmetic. Follow-Through was inferior to Regular Kindergarten in Persistence and superior on Embedded Figures but both of these main effects were complicated by interactions with previous Head Start programs.

Interactions of Kindergarten with Head Start Program

Although there were no statistically significant interactions on the Stanford-Binet, Figure 9 shows an interesting result. The slight decrease of one or two points in Binet IQ was remarkably similar for all classes, with the exception of the Bereiter-Engelmann Head Start children who entered Regular Kindergarten. This group of Bereiter-Engelmann children dropped from a mean IQ of 100 to a little less than 95. In contrast, the Bereiter-Engelmann children who entered Follow-Through were the highest in IQ initially and remained so at the end of kindergarten. There were no interactions of Kindergarten with Head Start Program on the Preschool Inventory.

There was a Head Start-by-Kindergarten interaction in Persistence. The reason for this can be seen in Figure 10, which indicates that for children from Bereiter-Engelmann and Traditional Head Start, there was no difference between Follow-Through and Regular Kindergarten. The main effect of higher Persistence in Regular Kindergarten can be attributed to lower Persistence for children from DARCEE and Montessori Head Start who entered Follow-Through Kindergarten. In fact there was a decrease in Persistence from the end of Head Start to the end of kindergarten for the DARCEE and Montessori groups.

The interaction between Head Start and kindergarten on Embedded Figures is shown in Figure 11. Children from Traditional Head Start did not differ as a function of type of kindergarten but Follow-Through produced an increasing amount of superiority for children from Montessori, Bereiter-Engelmann and DARCEE Head Start programs, in that order.

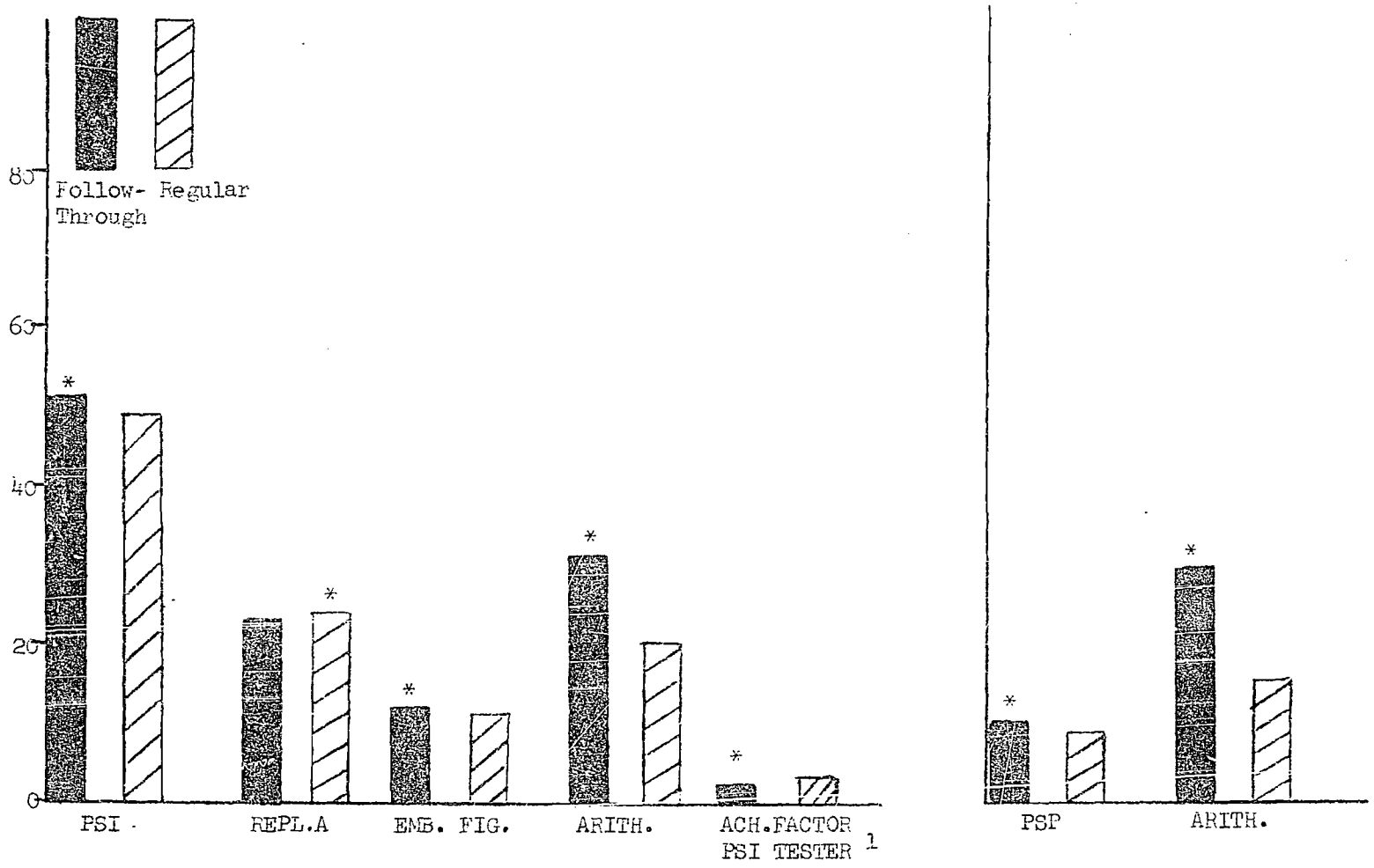

Fig. 8. Measures which differentiated Follow-Through and Regular Kindergarten children, adjusted means, all experimental subjects.

Controls only, unadjusted means.

1 Low score is optimum.

* Denotes significantly higher program.

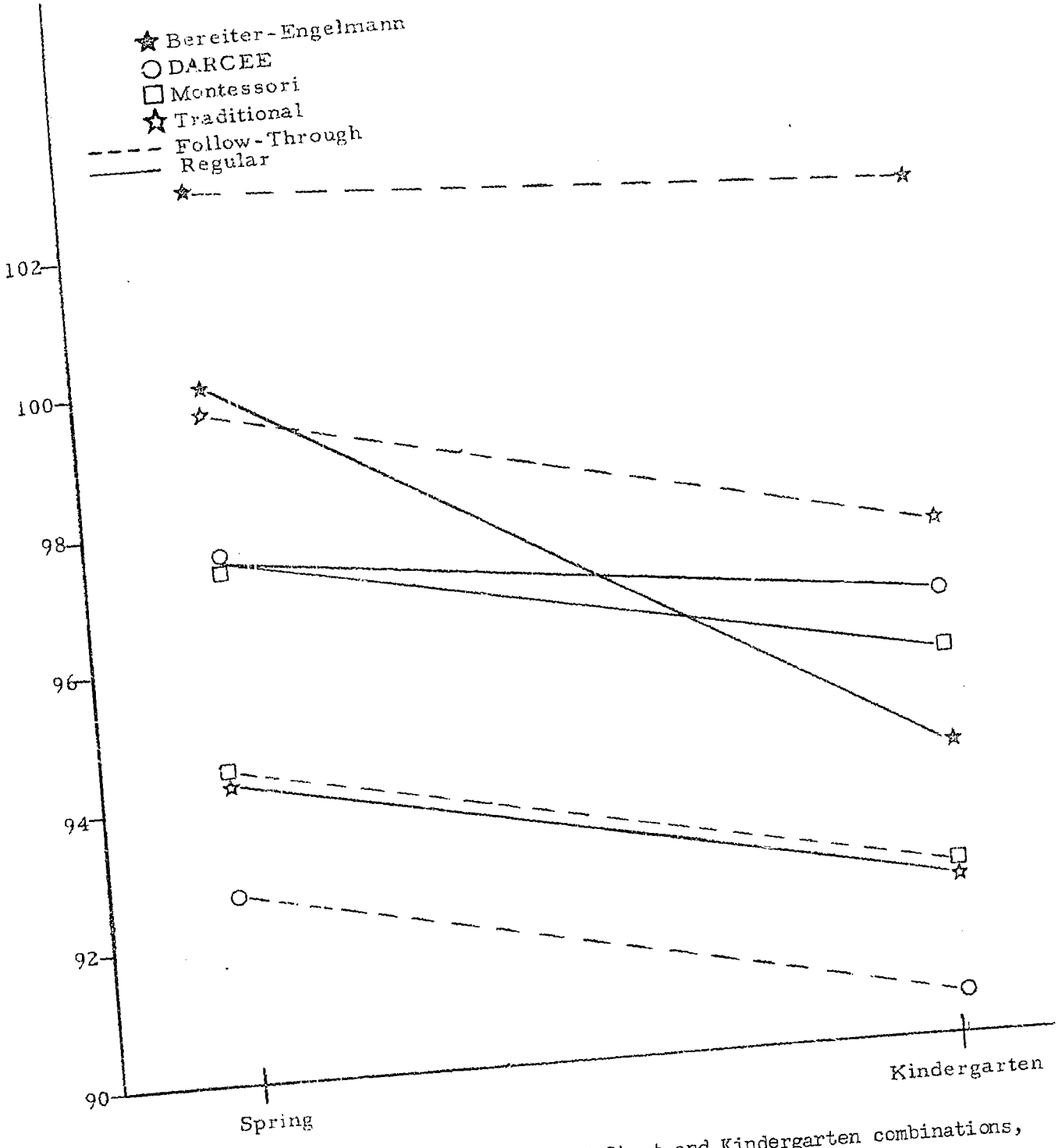

Fig. 9. Stanford-Binet I.Q., Head Start and Kindergarten combinations, unadjusted means, all subjects.

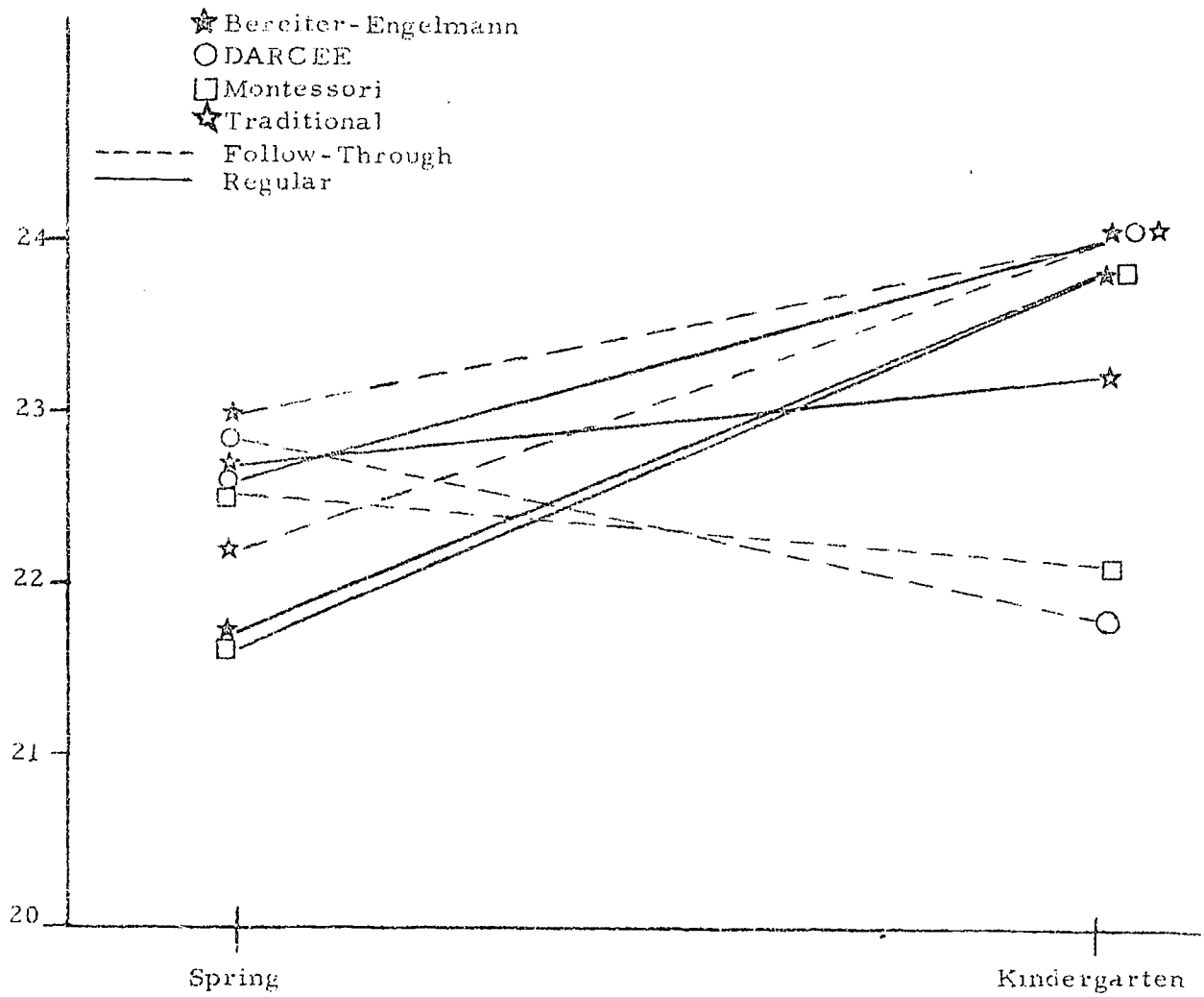

Fig. 10. Persistence, Replacement Puzzle A, Head Start and Kindergarten combinations, unadjusted means, all subjects.

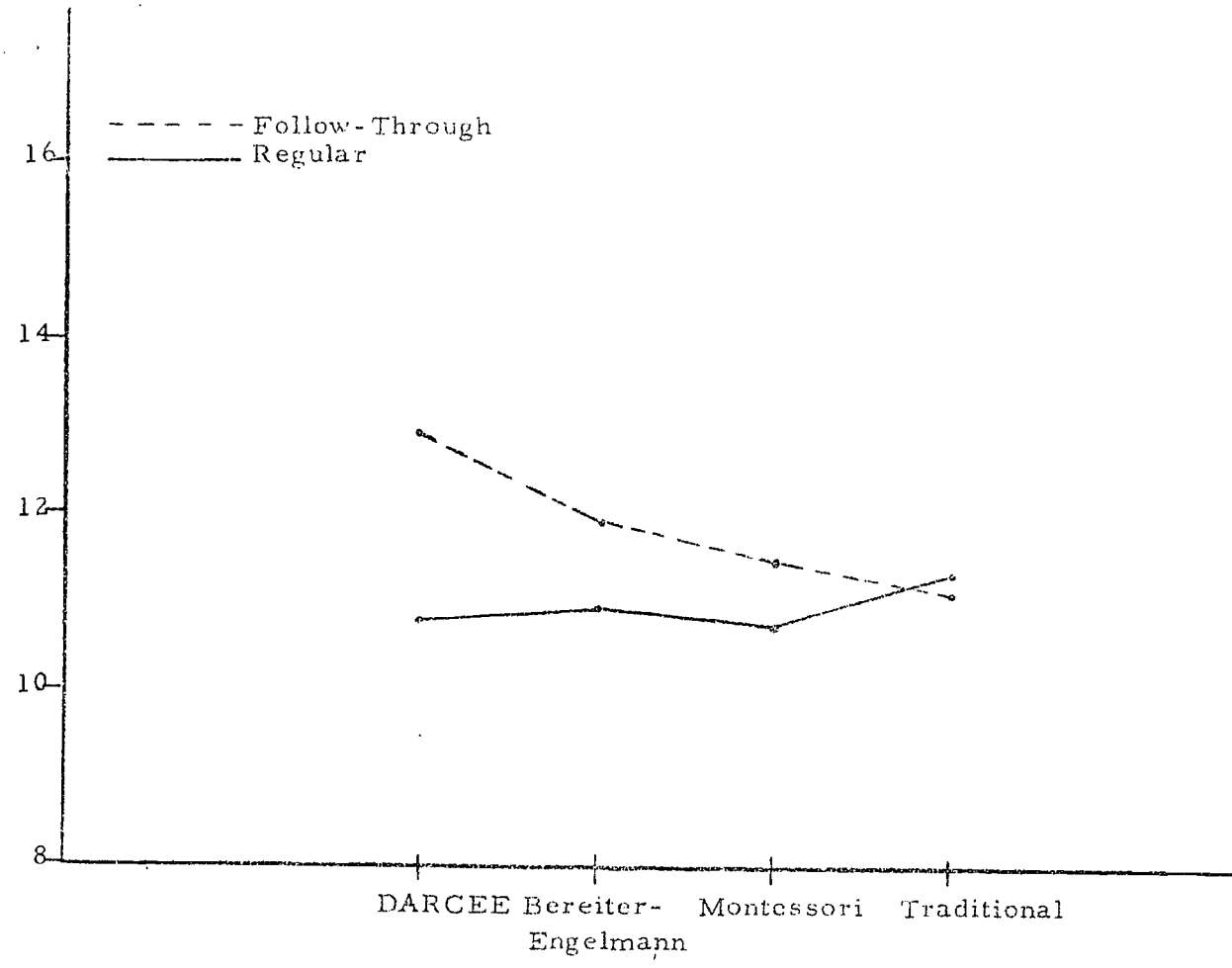

Fig. 11. Embedded Figures, Interaction between Head Start and Kindergarten Programs, adjusted means, all experimental subjects.

Summary

There were two interactions of Head Start with kindergarten program. One, the combination of DARCEE and Montessori Head Start with Follow-Through Kindergarten appears to have produced detrimental effects on Persistence as measured by the Replacement Puzzle. Second, Follow-Through, in combination with DARCEE and to some extent Bereiter-Engelmann Head Start, appears to have produced higher scores on Embedded Figures, whereas there was little difference between kindergarten programs for children from the other two Head Start programs.

Head Start Program Stability

From the covariance analysis there were three main effects of Head Start program. On Curiosity-Activity children who had Traditional Head Start were low regardless of which kind of kindergarten they had. This is summarized in Figure 12. Figure 13 shows that children from Montessori Head Start were rated less aggressive regardless of which program they had in kindergarten.

On Arithmetic, repeated measures analysis over two tests for the sample revealed a main effect of Head Start Program. Program order remained the same as it was at the end of Head Start. This is shown in Figure 14 where we see that programs ordered from high to low as follows: Bereiter-Engelmann, DARCEE, Montessori and Traditional. This was the case regardless of kindergarten experience.

Combining children in both kinds of kindergarten, a repeated measures analysis over three testing times -- 8 weeks of Head Start, end of Head Start, and end of kindergarten -- revealed some further Head Start Program effects. In Inventiveness, Figure 15 shows DARCEE and Montessori children were high, Bereiter-Engelmann and Traditional children low, with controls in between. This is probably the most consistent Head Start Program effect that we have found. It is consistent over three data points for both males and females.

In Resistance-to-Distraction controls were low, Bereiter-Engelmann children high. This is shown in Figure 16.

In Verbal-Social-Participation, DARCEE was rated higher than Bereiter-Engelmann over the three points (Figure 17).

There were no other main effects of Head Start programs.

Summary

Head Start Program effects which persisted through the kindergarten year regardless of kindergarten program were as follows:

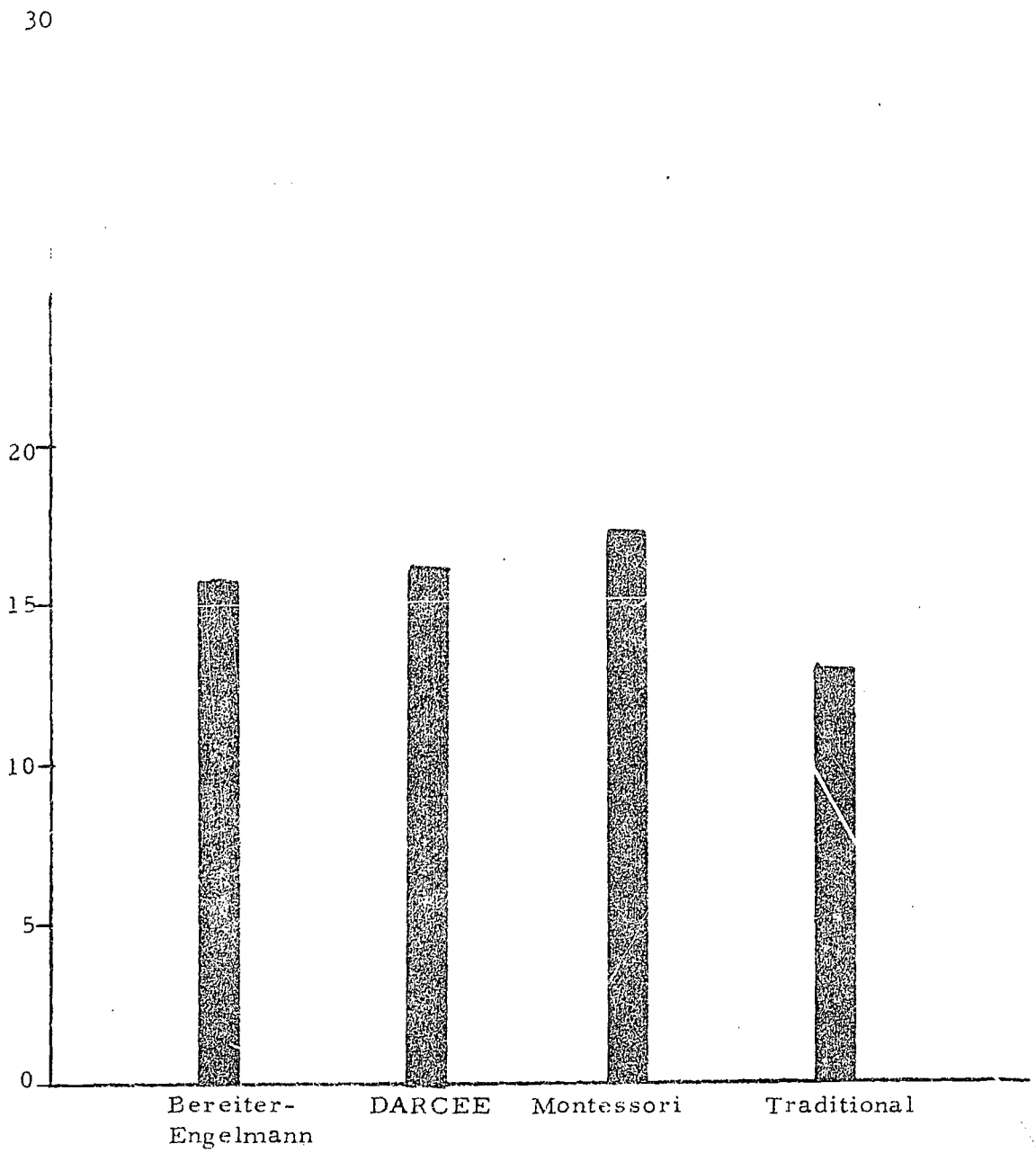

Fig. 12. Curiosity-Activity, Head Start Program effect over both types of Kindergarten, adjusted means, all experimental subjects.

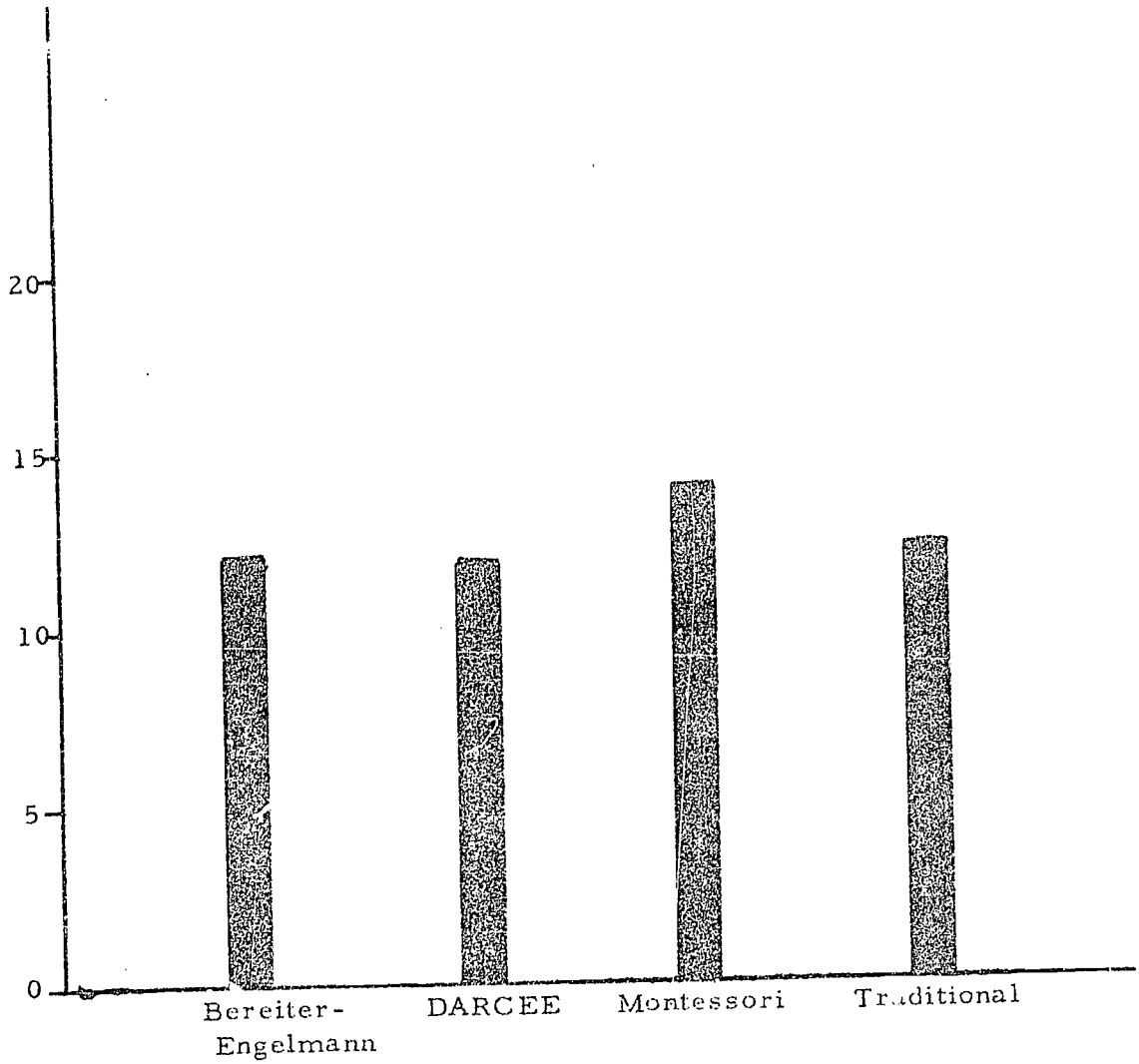

Fig. 13. Aggression* (Behavior Inventory) Head Start Program effect over both types of Kindergarten, adjusted means, all experimental subjects.

*High score means less aggression.

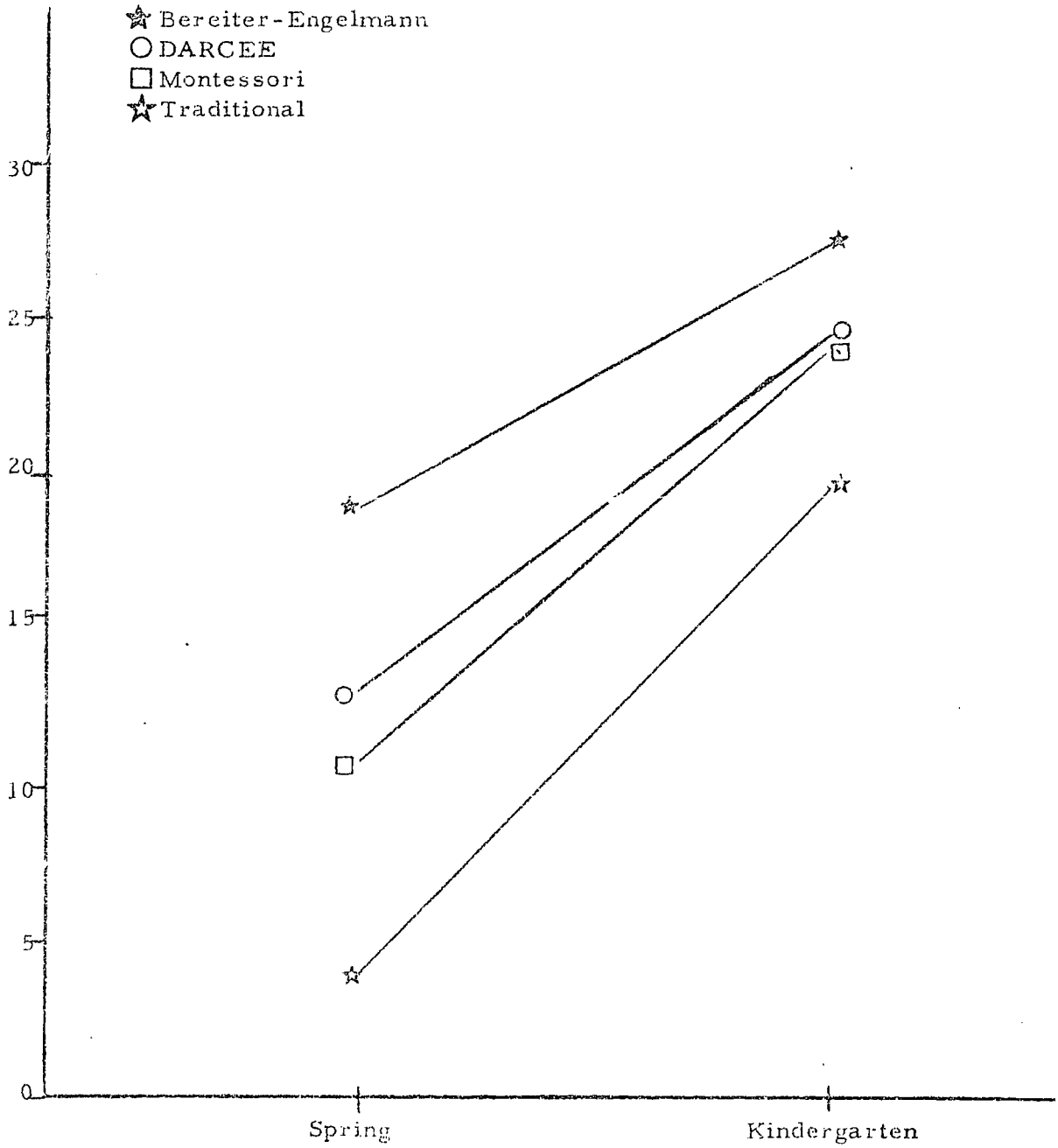

Fig. 14. Arithmetic, Head Start Program stability after Kindergarten, sample of experimental subjects.

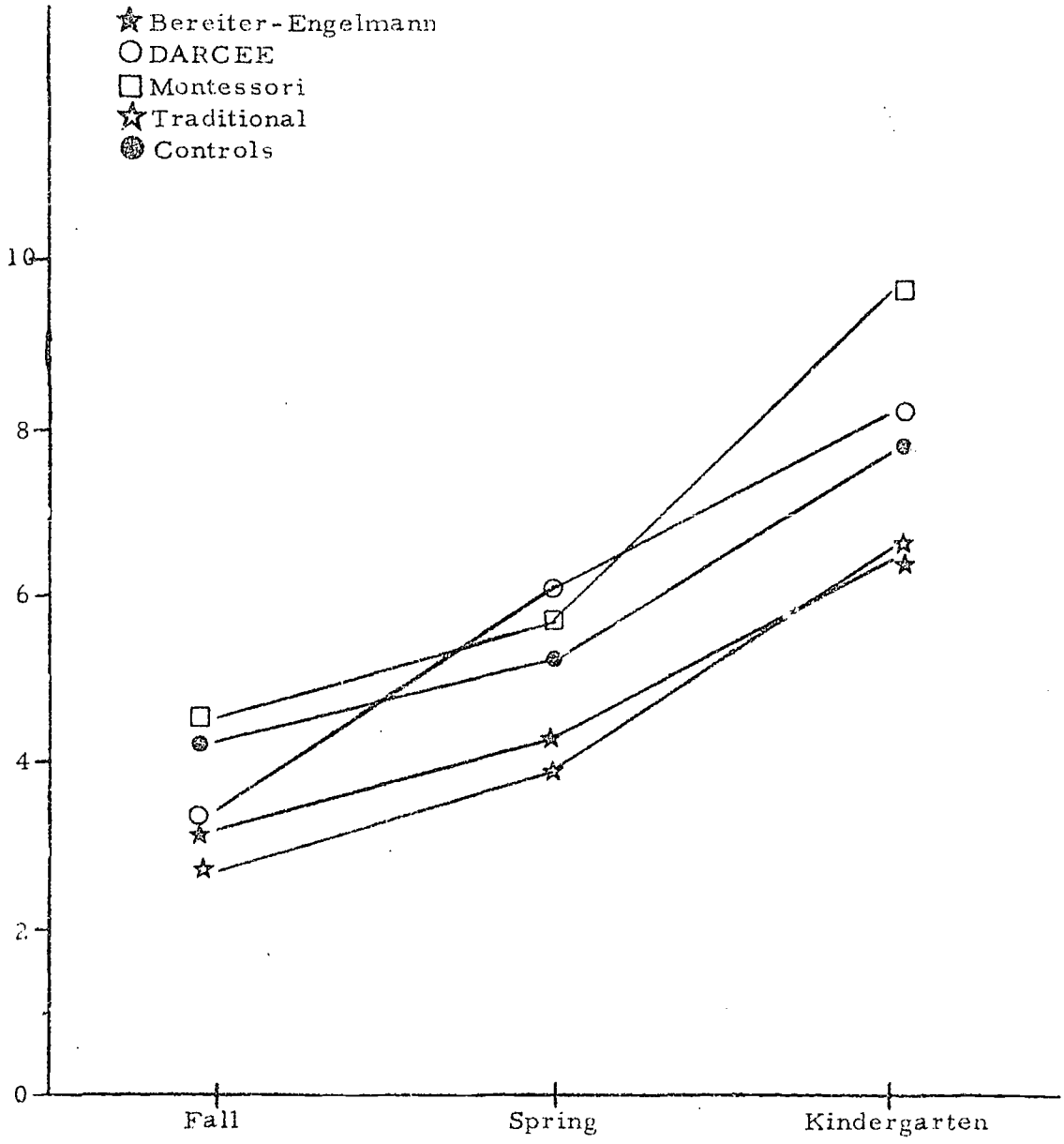

Fig. 15. Inventiveness (Dog-and-Bone), Head Start Program stability after Kindergarten, all subjects.

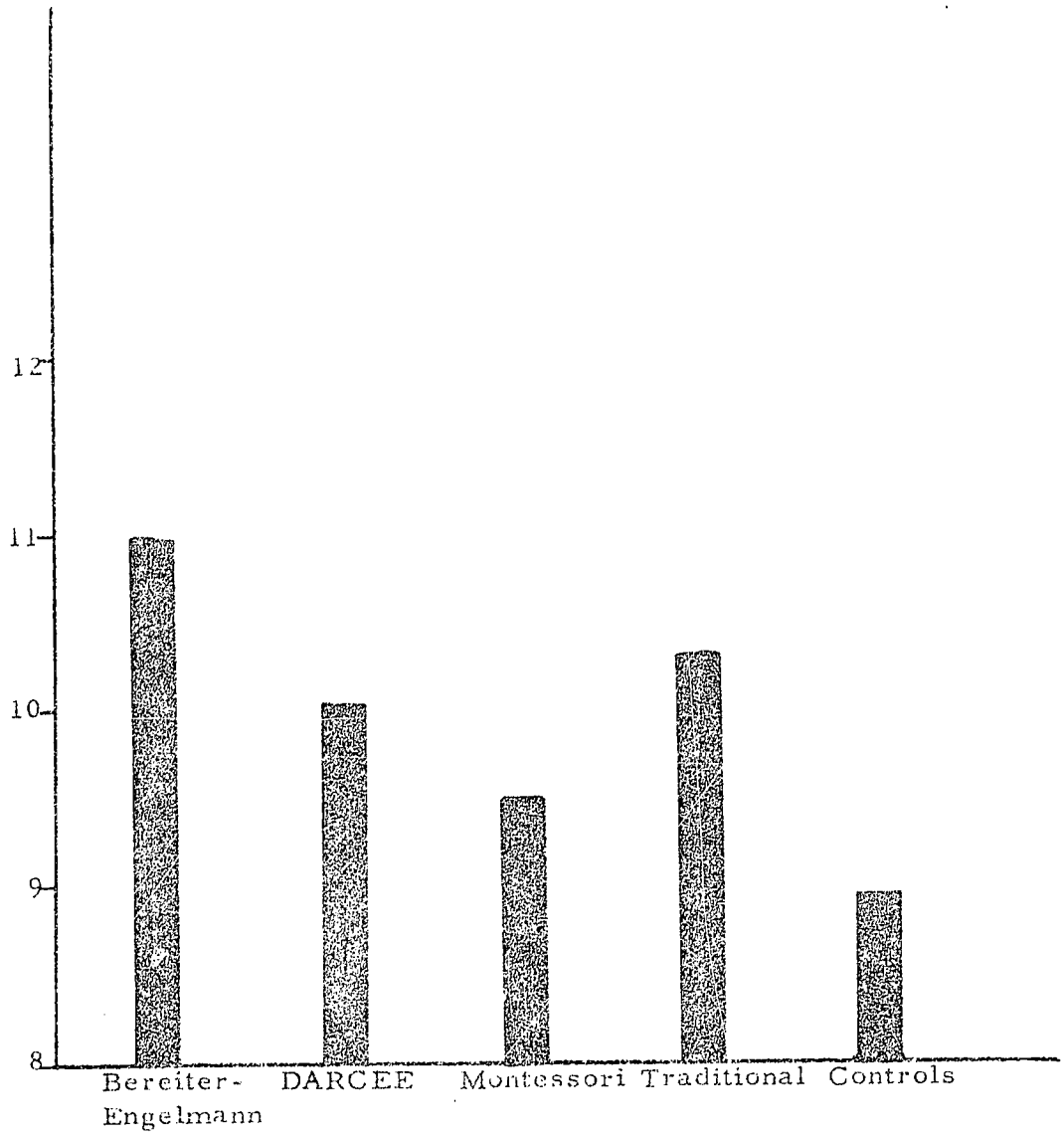

Fig. 16. Resistance-to-Distraction (Replacement Puzzle B), Main effect of Head Start Program over three testing points.

Fig. 17. Verbal-Social-Participation (Behavior Inventory), Head Start Program effect over both types of Kindergarten, combined means for three testing times, all experimental subjects.

Bereiter-Engelmann: Low Inventiveness, high Resistance-to-Distraction, high Arithmetic.
DARCEE: High Inventiveness, high Verbal-Social-Participation, second highest in Arithmetic.
Montessori: Low Aggression, high Inventiveness, third in Arithmetic.
Traditional: Low Curiosity, lowest in Arithmetic.

Sex Effects

On Curiosity-Activity, there was a sex effect in that males were higher than females. This is shown in Figure 18.

A main effect of sex was found on the Stanford-Binet also. This is shown in Figure 19 which shows that females scored higher than males over all three points. Although the sex-by-program interaction on the repeated measures analysis was not statistically significant over the three data points, an interesting reversal of program order for the two sexes occurred on final level. This is shown in Figure 20. The highest mean for females was the Bereiter-Engelmann Head Start group, next highest Montessori, then DARCEE, then Traditional. In contrast, the lowest mean for males was in Bereiter-Engelmann, next highest Montessori, then DARCEE, and the highest, Traditional.

In Parallel Sentence Production, there was a program-by-sex interaction. As shown in Figure 21, there was no sex difference in Bereiter-Engelmann and Montessori, in DARCEE females were high, and in Traditional males were high.

Covariance analysis revealed an interaction of sex with kindergarten program on Timidity. Figure 22 shows that Follow-Through males were rated better than males in Regular Kindergarten. For females, there was no difference between the two types of kindergarten.

Summary

There were two main effects of sex -- females were high on Stanford-Binet IQ, and males were high in Curiosity-Activity. There was a reversal of program order for males and females on the Binet final level, suggesting that Bereiter-Engelmann may be better for females and Traditional for males. Two program-by-sex interactions occurred: on Parallel Sentence Production DARCEE was best for females, Traditional for males; males were rated less timid in Follow-Through than in Regular Kindergarten.

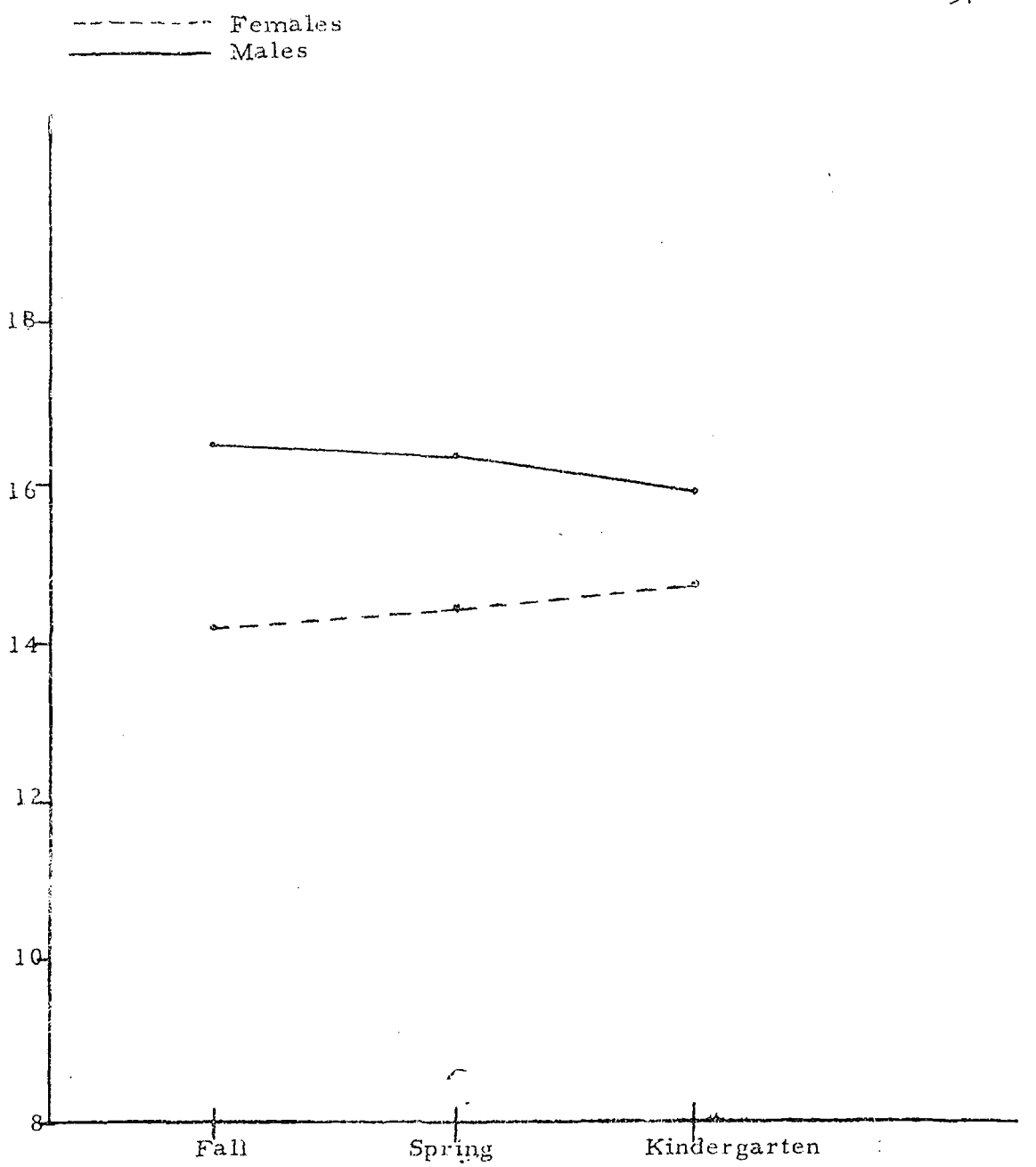

Fig. 18. Curiosity - Activity, Sex effect over all Head Start Programs and both kinds of Kindergarten, means for three testing times, all subjects.

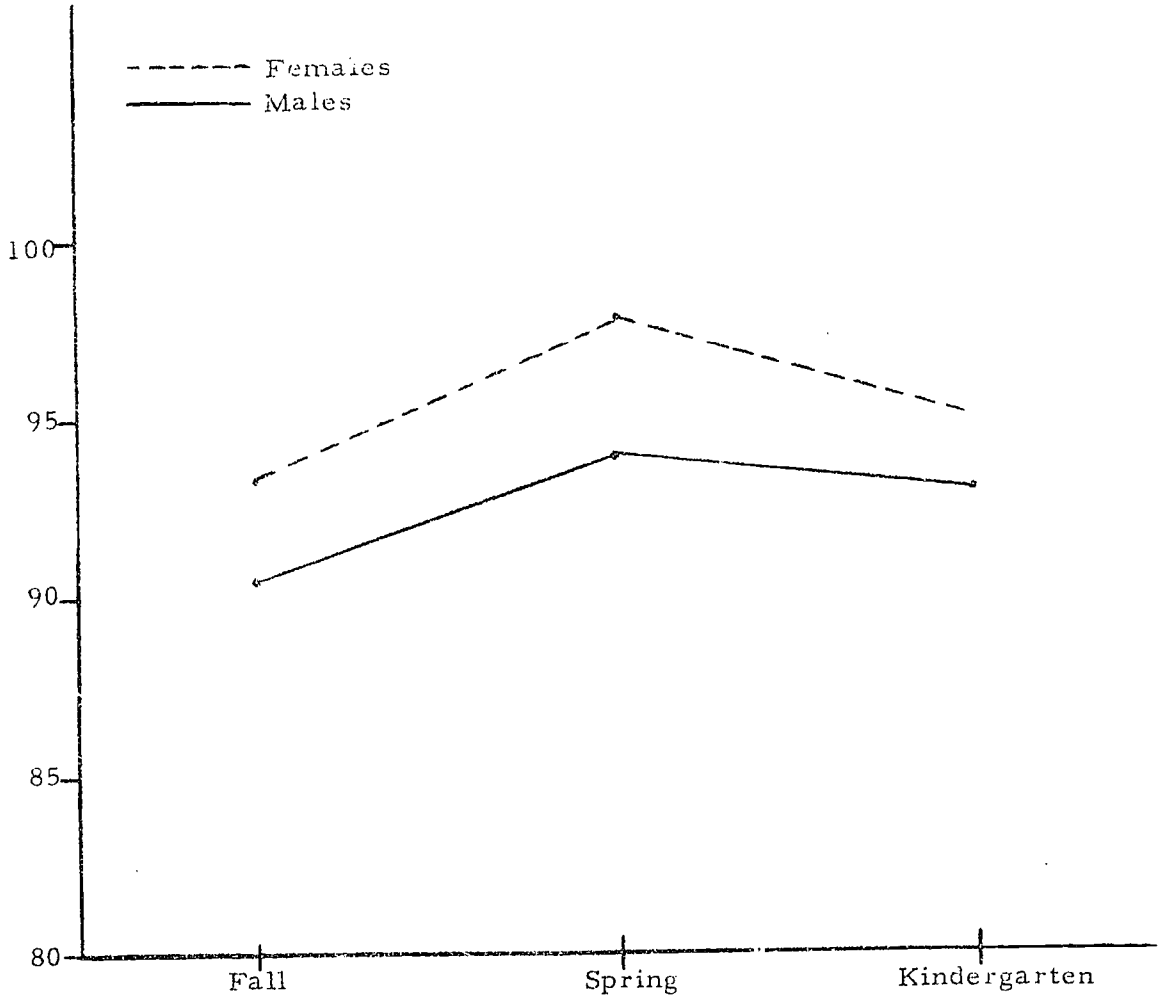

Fig. 19. Stanford-Binet I.Q., Sex effect over all Head Start Programs and both kinds of Kindergarten, means for three testing times, all subjects.

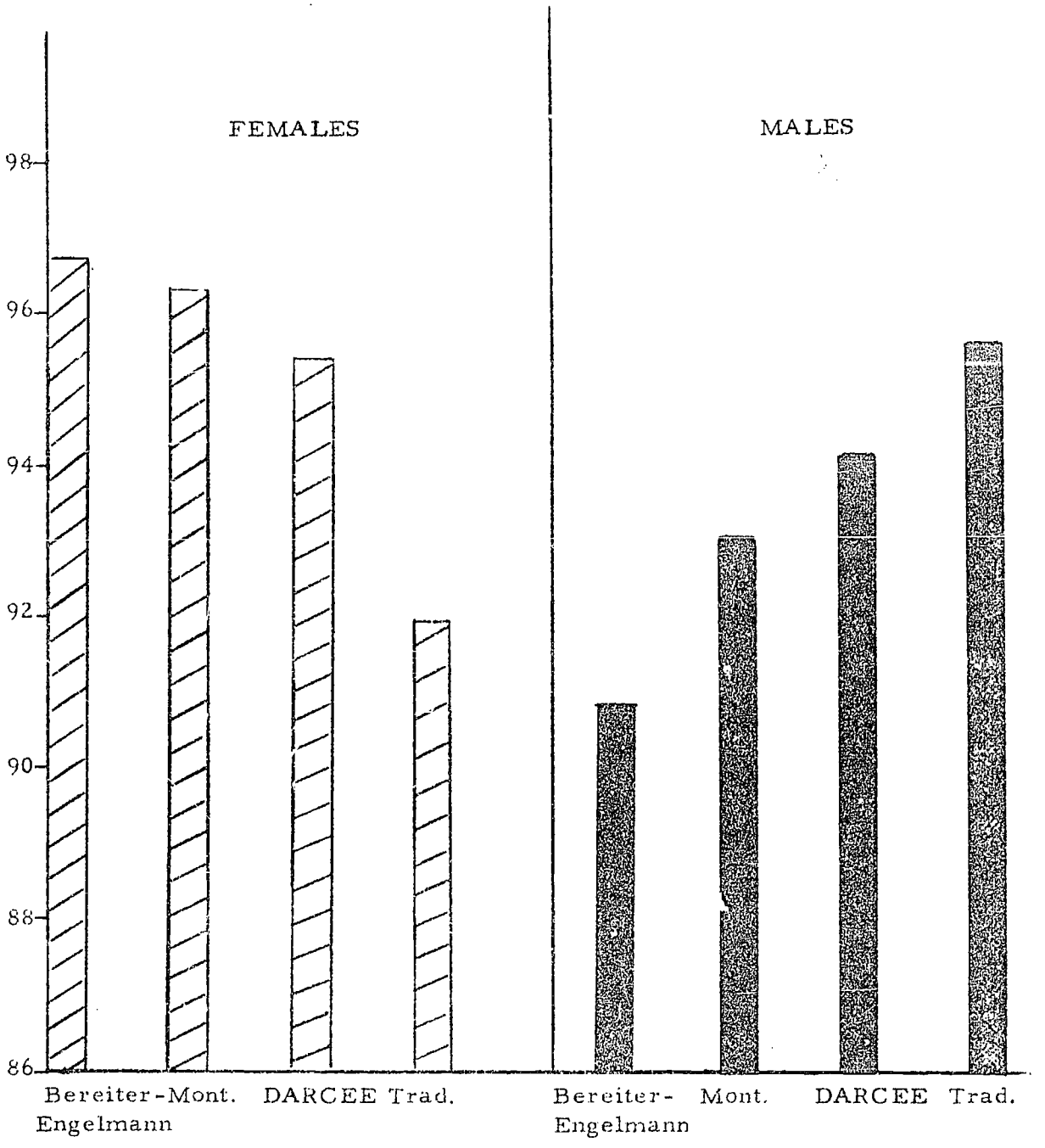

Fig. 20. Stanford-Binet reverse Head Start Program order for Males and Females at end of Kindergarten.

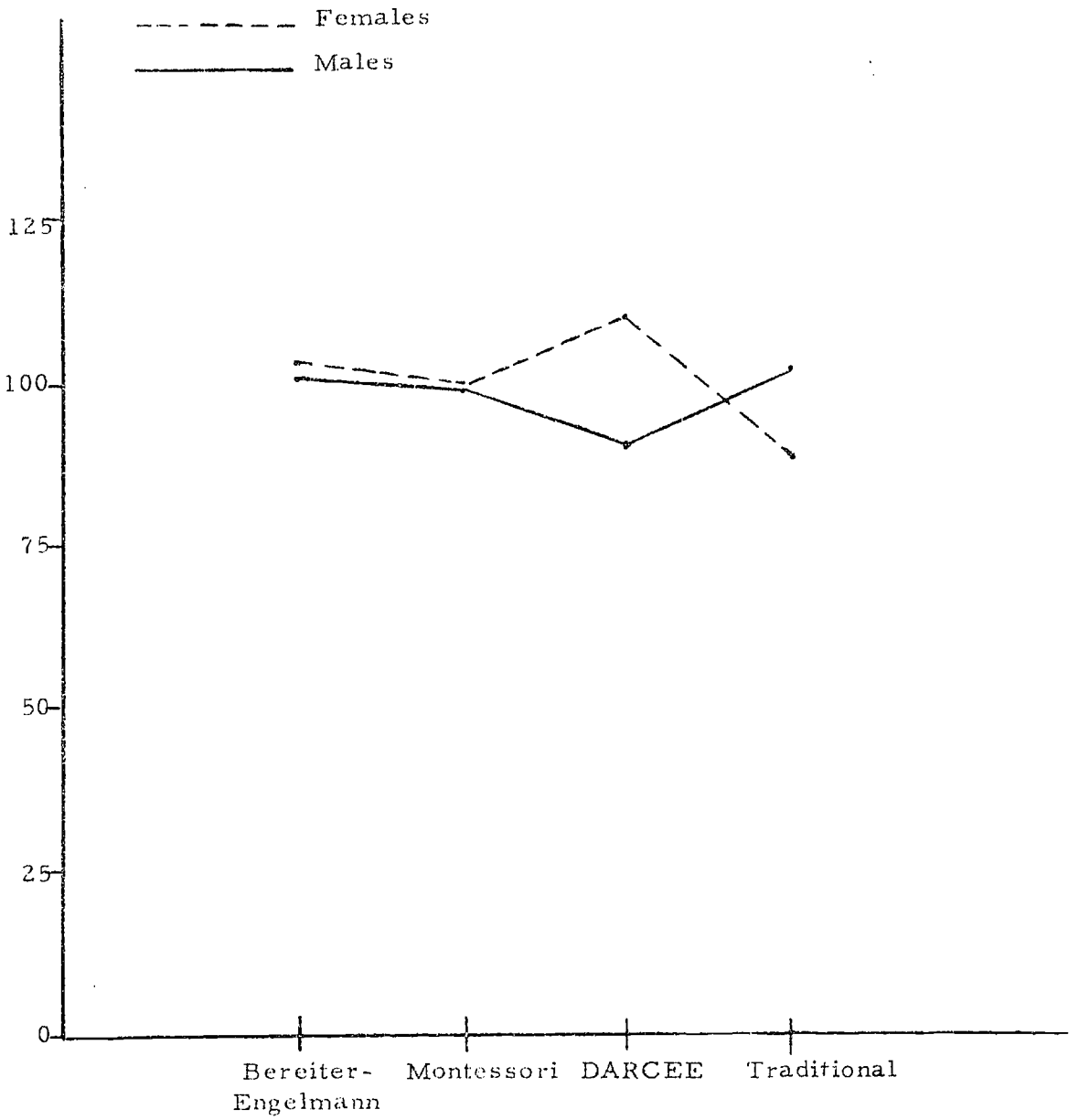

Fig. 21. Parallel Sentence Production, Interaction of Sex with Head Start Programs over both kinds of Kindergarten, combined means for three testing times, sample of subjects.

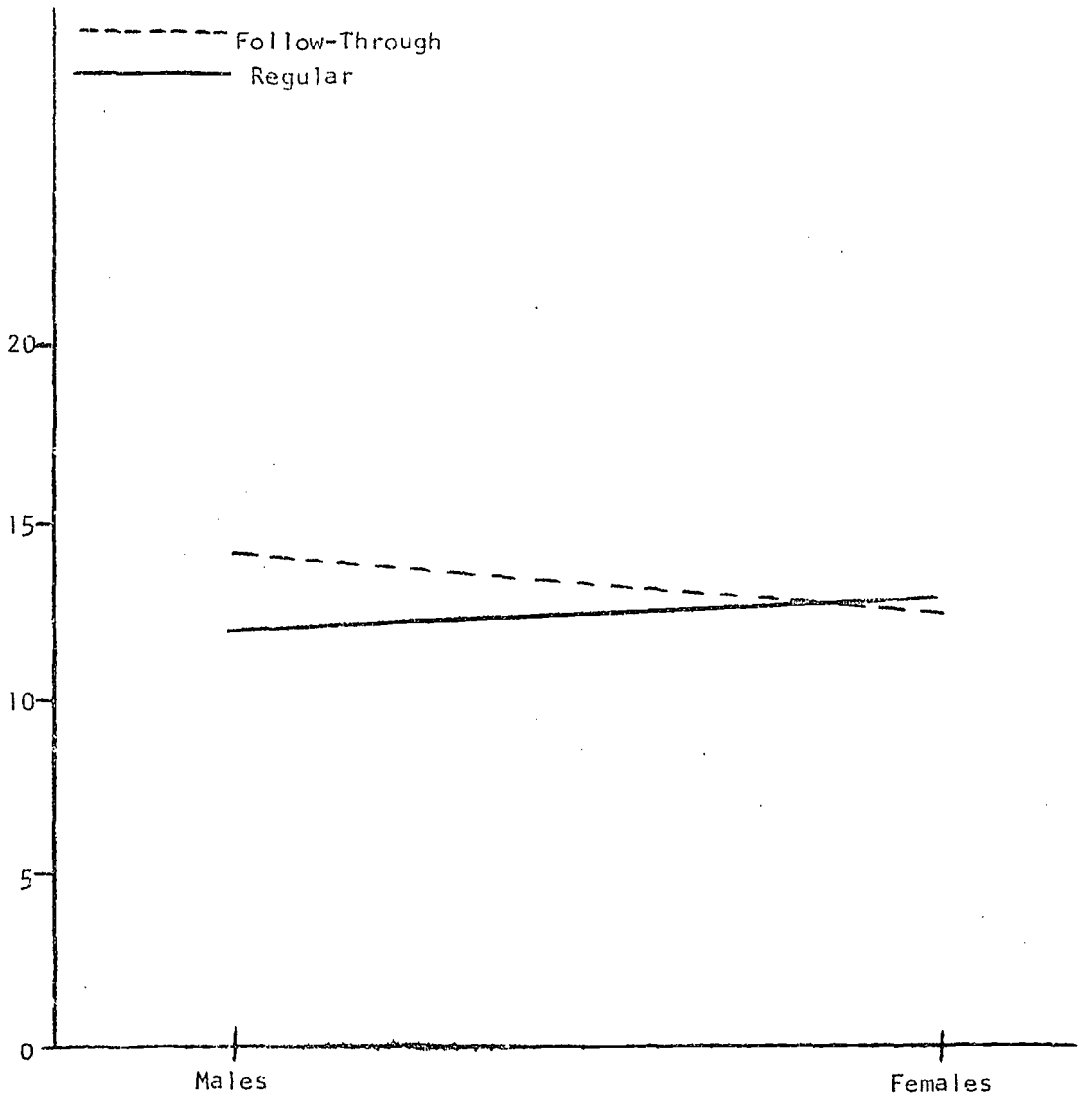

Fig. 22. Timidity (Behavior Inventory) Interaction of Sex with Follow-Through or Regular Kindergarten, adjusted means, all experimental subjects.

DISCUSSION

Results from the second year of the study are complex enough to prohibit simple interpretation or confident generalizations.

It is clear that, despite much variability among individual teachers, the two kindergarten programs did differ significantly in many of the ways which could be predicted. Follow-Through was indeed an academic program, individualized and utilizing large amounts of feedback. In the light of these differences among the two programs, one might predict that Follow-Through would augment the differential gains made in Head Start. But Follow-Through effects on outcome variables, with initial level controlled for, are fewer and of less magnitude than hoped for.

Although the difference between the means for Follow-Through and Regular Kindergarten on the Preschool Inventory is a statistically significant one, it is only a difference of about 2 points, and one might question the psychological significance of this small difference.

The advantage in Parallel Sentence Production which Follow-Through produced for five-year-old controls without Head Start was not paralleled by greater gains on this measure for experimental subjects with Head Start experience. The two experimental programs which gained most on Parallel Sentence Production in Follow-Through were the two who were lowest at the end of Head Start -- Montessori and Traditional. It could be tentatively concluded that for children without Head Start or those who have not had a Head Start program which emphasizes language training, Follow-Through Kindergarten would be an advantage in respect to this ability.

On one measure, Arithmetic, Follow-Through did substantially amplify the differential gains obtained in the Head Start year. This result suggests that the benefits of Follow-Through are more likely to be found in achievement measures, such as readiness and school achievement tests. Results from these tests are not yet available, but will be reported in a few months.

The interactions of kindergarten and various Head Start experiences are intriguing. For example, it is difficult to explain the result of decreased Persistence for DARCEE and Montessori children who experienced the Follow-Through Kindergarten, in view of the fact that Follow-Through teachers were clearly reinforcing persistence. One might hypothesize that this is an example of faster extinction of learned responses after continuous reinforcement since in the test situation children receive no reinforcement. The Supervisor of Follow-Through commented that they had observed their children in other test situations "waiting for reinforcement before proceeding". But why should this result occur only for children from DARCEE and Montessori Head Start?

The fact that the highest scores on Embedded Figures were obtained by children who had DARCEE Head Start followed by Follow-Through Kindergarten is especially interesting because there were no program

differences on this variable at the end of Head Start. This suggests that there may have been Head Start program effects which were not measured, despite the fairly large battery used.

Stable Head Start program effects, regardless of type of kindergarten, are of particular importance, because they may represent modifications at the four-year-old level which continue to influence behavior despite wide variations in subsequent educational experience.

Regardless of the type of kindergarten, children from Bereiter-Engelmann Head Start were still manifesting a decided tendency to resist distraction at a task and controls were low. Traditional children remained low in Curiosity. Both Bereiter-Engelmann and Traditional Head Start children remained below the level of controls who had not had any Head Start in devising alternative solutions to a problem, as shown by scores on Inventiveness. Montessori and DARCEE children remained high in Inventiveness, regardless of kindergarten. This measure appears similar to Guilford's definition of divergent thinking. One might speculate that Bereiter-Engelmann children, having been drilled to give the correct answer, thereby lost a certain flexibility in providing alternative solutions; but if this explanation is correct, there must be some other reason why children from Traditional Head Start were also very poor in divergent thinking. All of these results should be investigated in greater depth.

Finally, the interactions of programs with sex, combined with frequent (though not statistically significant) differences within programs and across various program combinations, suggest that for this population it may be desirable to provide somewhat different programs or program components for boys and girls. In view of the main effect of sex on the Binet, sex differences could be due to differences in intellectual maturity. However, it is also possible that temperamental or experiential differences may account for different reactions of the two sexes. Our impression from monitoring video-tapes and observing classes is that females in general are more attentive at this age. Additional monitoring of the Head Start video-tapes indicated that more teacher attention was directed toward females in most classes in the Head Start year. This may, though, simply be a function of the fact that the little boys were participating less.

Further interpretation of the kindergarten data probably should be deferred until scores are available at the end of the first-grade year. Some trends which at this point appear important may become dissipated, others may become strengthened. Attempts will be made to relate program components to outcome variables be means of regression analyses. It is obvious now, however, that selectivity is essential, both in regard to prediction variables and with respect to the sub-groupings about which predictions are made. We are convinced that such statistical relationships will be useful primarily to suggest directions for further experimental comparisons focusing on specific treatment dimensions.

APPENDIX I

INSTRUMENTS USED TO ASSESS TREATMENT EFFECTS[1]

Name of Test	Characteristic Measured
1. Stanford-Binet[2], Revised Form L-M, 1967.	IQ
2. Preschool Inventory[3], 1968 Experimental, Total score - 64.	Achievement - Preschool
3. Curiosity Box[4] - Cincinnati Autonomy Battery; A box containing a variety of items inside and outside which can be visually or manually explored. Five minute time limit. Ceiling, Verbalization - 20; Activity - 50.	Curiosity-Verbal (Cur-V), and Curiosity-Activity (Cur-A), a measure of actual exploration of items on the box.
4. Replacement Puzzle[5] - Cincinnati Autonomy Battery. A board containing a number of non-removable shapes and four which can be lifted out. The four can be replaced in only one way so that they lie flat without overlapping. Time limit of 2 minutes, distractor presented, one additional minute allowed. Ceiling, A - 24; B - 18.	Persistence (Rep-A) - Task orientation in first 2 minutes; and Resistance-to-Distraction (Rep-B) Task orientation after distraction.
5. Dog and Bone[6] - Cincinnati Autonomy Battery. Consists of a small board on which are four wooden houses, one at each corner, a small dog at one end, and a bone at the other. Task is to devise a variety of paths over which the dog can travel in order to reach the bone. Ceiling - 30.	Initiative. Score is based on the number and quality of different paths which the child is able to produce.
6. Embedded Figures[7] - Cincinnati Autonomy Battery. Task is to locate a cone embedded in each of 14 line drawings, some geometric and some realistic. Ceiling - 14.	Complex perceptual skill. Field dependence (author)

[1] Tests used during the first year but eliminated in kindergarten, or those on which results are not reported herein, are not listed.

[2] Houghton Mifflin Company, 666 Miami Circle, N.E., Atlanta, Ga., 30324

[3] Educational Testing Services, Princeton, New Jersey 08540

[4] Cincinnati Autonomy Battery, Dr. Thomas Banta, University of Cincinnati, Cincinnnati, Ohio

[5] Ibid.

[6] Ibid.

[7] Ibid.

APPENDIX I (Cont.)

Name of Test	Characteristic Measured
7. Behavior Inventory[1] - Office of Economic Opportunity. A 4-point rating scale, 20 items; sets of 4 items loading on five factors. Completed by teachers. Scores range from 4 to 16 on each factor.	Aggression (High score means low aggression) Verbal-Social-Participation Timidity (High score means less timid) Independence Achievement Motivation
8. Parallel Sentence Production[2] - UCLA Preschool Research Projects; Requires the child to produce a complete sentence about a drawing which is on the same page.	Modeling syntactical structure
9. Basic Concept Inventory[3] - Engelmann. Requires picture selection. Involves listening, vocabulary, particular attention to words which change the meaning of sentences and also reasoning. Total error score, low score optimum.	Language understanding and logical inference.
10. Arithmetic - Portions of an arithmetic test devised for use with children in Bereiter-Engelmann classes were combined and used as a test. Ceiling - 39.	Counting, addition, subtraction.

[1] Hess, R.D., Kramer, D., Slaughter, D., Torney, J., Berry, D., and Hull, E. "Techniques for Assessing Cognitive and Social Abilities of Children and Parents in Project Head Start: Report on Research Contract OEO-519 with Office of Economic Opportunity, University of Chicago, July, 1966.

[2] UCLA Preschool Research Projects, Dr. Carolyn Stern, Director 1019 Gayley Ave., Los Angeles, California 90024

[3] Follet Educational Corp., 1010 West Washington Blvd., Chicago, Ill. 60607

APPENDIX II

INSTRUMENT USED TO ASSESS TREATMENT DIMENSIONS

1. Dimensional Analysis by Tape Tallying - Preschool and Elementary. (DATA-TAPE). Child Development Laboratory, University of Louisville. A method of monitoring video-tapes of teachers. Sample tally sheets attached, pages 48 and 49.

APPENDIX II

VIDEO TAPE TALLY SHEET

A S K I N G

TEACHER'S ACTIVITIES	REQUEST	COMMAND	KOR-G	KOR-I	REINF-G	REINF-I
ACADEMIC						
GENERALIZATION						
IMITATION						
ROLE-PLAYING						
CURIOSITY						
PERSISTENCE						
SPONTANEOUS CREATIVITY						
INITIATIVE						
HELP (Surrogate mother)						
OPINION						
CONDUCT						
PROCEDURAL INFORMATION						
OTHER						

Teacher_____ Monitor_____

Session _____

APPENDIX II

VIDEO TAPE TALLY SHEET

G I V I N G

TEACHER'S ACTIVITIES	VERBAL	EXEMP.	MANP.	MODEL.	ROLE-PLAY.	OTHER
ACADEMIC INFORMATION						
GENERALIZATION						
OPINION						
HELP (Surrogate mother)						
DRAMA						
MUSIC						
IMAGIN.						
TABLE GAMES						
PROCEDURAL						
CONDUCT						
SETTING STANDARDS						
CONVERSATION						
CONT. N-I						
OUT CONTACT						
OTHER						

Teacher_____ Monitor_____

Session_____