DOCUMENT RESUME

ED 110 520 TM 004 795

AUTHOR Shepard, Lorrie
TITLE Development of the California Entry Level Test: Construct Validity of the Subtests.
PUB DATE [74]
NOTE 18p.

EDRS PRICE MF-$0.76 HC-$1.58 PLUS POSTAGE
DESCRIPTORS *Educational Assessment; Factor Analysis; Grade 1; Item Analysis; Predictive Validity; Primary Education; *Reading Readiness; *Standardized Tests; *State Programs; Test Construction; *Test Validity
IDENTIFIERS California; California Assessment Program; *Entry Level Test

ABSTRACT

This study examined the construct validity of the subtests in the California Entry Level Test (ELT). The ELT is administered to every first grade pupil in California as part of the California Assessment Program and is used as a baseline measure of the prereading skills of beginning first graders. The discriminant validity of the subtests was demonstrated by a factor analysis of item scores from 3,010 pupils (a one per cent random sample of all first graders tested). A Principal components analysis, followed by varimax rotation, yielded a factor structure analogous to the test structure. Items from each of the five subtests loaded only on their own factor except for a few language development items which had secondary loadings with other factors. Multitrait-multimethod correlation matrices were used to determine the agreement of ELT subtests with corresponding subtests in four popular readiness tests. Findings were mixed. Subtests had convergent validity with other measures of the same construct, but only the subtest with the greatest variance had discriminant validity consistently. (Author)

DEVELOPMENT OF THE CALIFORNIA ENTRY LEVEL TEST: CONSTRUCT VALIDITY OF THE SUBTESTS

Lorrie Shepard

University of Colorado

The purpose of this paper is to examine the construct validity of the subtests in the California Entry Level Test (ELT). The ELT is administered to every first-grade pupil in California as part of the California Assessment Program and is used as a baseline measure of pre-reading skills for children at the start of first grade. ELT scores are used with demographic variables to predict differences among schools on subsequent reading achievement tests. The predictive validity of the ELT depends on how well the test measures the constructs it was intended to measure, as well as the relationship between those constructs and later success in learning to read. The purpose of the study is to address the first issue; how well do the ELT subtests measure what they are supposed to measure?

The focus of the study is the discriminant validity of the subtests. Are they each measuring a distinct skill or ability corresponding to the subtest name: Immediate Recall, Letter Recognition, Auditory Discrimination, Visual Discrimination, and Language Development? The skills assessed by the subtests are expected to be correlated, but if they are measuring what they are supposed to measure, they should also be distinguishable as separate constructs. The discriminant validity of the subtests is practically as well as theoretically significant because the subtests will enhance the total-variance-accounted-for (and hence the predictive

validity), if each contributes some unique portion to the total variance over and above the variance common to all subtests.

A secondary aspect of the study is the convergent validity of the subtests. Are each of the subtests correlated with measures of the same skills in other pre-reading instruments?

METHOD

Subjects

The ELT was administered to 301,000 first graders in California during the third week of October, 1973. A one percent random sample was taken from the total pupil file for the analysis reported here.

Classroom teachers coded each test booklet indicating the pupil's ethnic group, bilingualism (level of fluency in English + other language spoken), and socio-economic status (SES). In addition, districts that routinely administered readiness tests in October were asked to supply subtest scores for each pupil, to be correlated with ELT scores for use in the convergent validity study. Each of the other readiness measures was administered in one or two districts. The smallest number of first graders tested with any one of the readiness tests was 550.

Test Construction

The ELT was developed by the California Department of Education as part of its State Assessment Program. The ELT was not designed as an achievement measure; its purpose is to identify initial differences among schools that might predict reading success. An advisory committee of reading experts selected those pre-reading skills that were related to reading performance and were amenable to group testing. The final list of skills reflected a balance between the need to represent

the widest possible range of relevant skills and the need to keep the test short and avoid frequent changing of the response mode.

Before developing specific items, rules were formulated which characterized the type of item appropriate for each subtest and which clarified the distinctions among the subtests. For example, distractors for Letter Recognition items were selected from near the correct letter in the alphabet rather than relying on distractors that looked or sounded like the correct response. The common p, q, and b, d confusion was, therefore, reserved for the Visual Discrimination subtest. In an effort to distinguish auditory discrimination from language development, Auditory Discrimination items were screened to eliminate unfamiliar nouns; then test administrators named each stimulus and all the response choices so that vocabulary would not interfere with the auditory task. The Immediate Recall subtest is a paired-associates task in which two familiar but unrelated nouns are pictured together. Children are taught six pairs and then asked immediately to mark the pictures that go together. The pairing of nouns that are not normally associated makes the subtest more clearly a measure of immediate memory, uncontaminated by language development. These efforts to enhance the separateness of the subtests were made to obtain greater face validity and to maximize the total variance accounted for by the composite score.

The ELT was designed to be a very easy test. Because it would be used to discriminate among schools with respect to the average level of pupil skill and not to discriminate among pupils, large between-pupil variability was not essential. The pupil distribution could be markedly skewed and yet one would obtain a nearly normal distribution of school

means. ELT scores are not reported for individual pupils; school and district mean scores are used in multiple regression analyses of school and district mean achievement scores.

Procedure

The responses to the 36 items (four subtests of six items, Language Development with 12), the five subtests, and the total ELT score were intercorrelated and factor analyzed using the SPSS factor analysis program (subroutine PA2, principal-axis factoring with iteration). The program computes a principal components solution. Factors with eigenvalues of .95 or above were retained for a varimax rotation. Several additional factor analyses were done in which different variables were added or deleted. The simplest analysis included only the 36 item responses. The most inclusive analysis had pupil SES, bilingualism, and ethnicity as variables in addition to item and subtest scores.

The principal factor matrix from the SPSS output was entered into the Harris-Kaiser "ortho-blique" transformation program to obtain an oblique solution. The routine was repeated using both the independent clusters and A'A proportional to L options.

Multitrait-multimethod correlation matrices were constructed with the ELT subtest and total scores and the subtests from the Metropolitan Achievement Test and each of three popular reading readiness tests: McHugh-McParland, CTBS, and Clymer-Barrett. Data were obtained for eight tests other than the ELT; four tests were not analyzed, however, because neither the districts nor the scoring agencies could provide subtest scores.

RESULTS AND DISCUSSION

Pupil Level of Analysis

Construct validity at the pupil level is essential for construct validity at higher levels of aggregation. It is unlikely that discriminations among schools could be construct valid without evidence of construct validity at the pupil level. This is the rationale, then, for analyzing pupil level data to judge the construct validity of an instrument that will be used at the school and district level. This is a first step. Subsequent evaluations of the ELT will include, obviously, its correlation with subsequent reading scores and a study analagous to this conducted at the school level.

Difficulty Level

The ELT was very easy for most first graders. The percent passing each item is reported in Table 1. The extreme simplicity of most of the items and subtests will influence the interpretation of results reported in later sections. Very simple items or very difficult items have low variability which will attenuate correlations.

TABLE 1

Entry Level Test
Item Means

N=3010 pupils (1% of 301,000)

Imm. Recall		Letter Recog.		Aud. Discrim.		Vis. Discrim.		Lang. Dev.			
Item #	% Correct	Item #	% Correct	Item #	% Correct	Item #	% Correct	Item #	% Correct	Item #	% Correct
1	.52	7	.93	13	.83	19	.94	25	.93	31	.86
2	.60	8	.91	14	.84	20	.93	26	.88	32	.89
3	.74	9	.91	15	.71	21	.85	27	.86	33	.77
4	.56	10	.90	16	.61	22	.93	28	.96	34	.45
5	.67	11	.90	17	.72	23	.80	29	.97	35	.85
6	.63	12	.84	18	.66	24	.88	30	.76	36	.61

Item and Subtest Intercorrelations

The ELT subtests are correlated with one another. The Immediate Recall subtest correlates with the other four subtests on the order of .22. The other subtests correlate with each other on the order of .51. When school means are correlated for the 4686 schools in California the magnitude of the relationship of Immediate Recall with the other subtests stays about the same but the relationship among the others increases to an average of .57. These correlations are consistent with the hypothesized relationship among the constructs. Immediate Recall is the least influenced by background experience and therefore should not be highly correlated with the other four subtests. The correlations among Letter Recognition, Auditory

Discrimination , Visual Discrimination, and Language Development are substantial given the easiness of their constituent items. On the basis of this data one would conclude that the constructs are either highly related or redundant.

TABLE 2

Entry Level Test
Subtest Correlations

N=3010 pupils (1% of 301,000)
(N=4686 school means without pupil sampling)

	IR	LR	AD	VD	LD	Total
Imm. Recall	1.00	.22 (.17)	.16 (.19)	.24 (.24)	.23 (.22)	.53 (.45)
Letter Rec.		1.00	.51 (.54)	.50 (.60)	.57 (.54)	.75 (.75)
Aud. Disc.			1.00	.41 (.51)	.52 (.70)	.73 (.84)
Vis. Disc.				1.00	.54 (.57)	.72 (.78)
Lang. Dev.					1.00	.83 (.82)
TOTAL						1.00

There is some evidence for the separateness of the constructs in the item intercorrelation matrix (Appendix A). Items are on the average more highly correlated with other items in their own subtest (triangles along the diagonal) than with items in other subtests. When a weaker item appears in a subtest, such as item 18 in Auditory Discrimination, other items measuring the same construct may have low correlations with it that

are equaled by cross-test correlations; but even in the weakest cases the cross-test correlations do not exceed the within-test correlations.

Factor Analysis

Both the orthogonal and oblique factor solutions (appendices B and C) provide striking evidence for the discriminant validity of the ELT subtests. Despite the relatively high intercorrelation of four of the five subtests, each of the five subtests had sufficient unique variance to be distinguishable as its own factor. In the orthogonally rotated matrix, factors one through five can be identified as auditory discrimination, visual discrimination, letter recognition, immediate recall, and language development respectively. The total test score, which is the simple sum of the 36 items, is dispersed across these five factors. Items from Immediate Recall, Letter Recognition, Auditory Discrimination, and Visual Discrimination had high loadings with their own factor on the order of .50 to .65, and did not load with any other subtest factor. Three Immediate Recall items had secondary loadings with two unidentifiable factors, two with factor seven and one with factor nine. One Visual Discrimination item also had a minor loading on factor nine. Even with these imperfections it is apparent that the factor structure is the same as the conceptualized test structure.

Language Development was conceptualized as a much broader construct than those measured in the other four subtests. Characteristically, it is the subtest with the weakest discriminant validity. Although it is distinct, its average factor loadings are only .33 with its own factor; five of the 12 Language Development items had cross-factor loadings of

the same magnitude as the within-factor loadings.

Factors six and eight are associated with pupil's ethnic group membership. Factor six has high loadings from bilingualism and the Spanish surnamed category. Factor eight can be called the Black factor, but the factor loading is not as strong.

Additional analyses, in which demographic variables were deleted or in which subtest scores and total score were omitted, did not alter the factor structure. When the rotated matrix was collapsed to six factors, the structure was the same; the five subtests remained distinct but there were more cross-factor secondary loadings from Language Development items.

The oblique pattern matrix is essentially the same as that obtained from the orthogonal rotation. Each subtest still has its own factor with very few items loading on other than their own factor. When nine factors were rotated, four of the six Immediate Recall items loaded with the last two factors as well as with the Immediate Recall factor. Two Language Development items appear with factor eight and have only minor loadings on their own factor; this may be an artifact of item difficulty since these two items are much more difficult than other questions in the same subtest.

The various factor analyses confirm that the constructs measured by the ELT are correlated, but provide additional evidence that they are not redundant. The following intercorrelations among the factors were obtained from the A'A∝ L oblique solution.

TABLE 3

Factor Correlations
A'A & L

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9
Factor 1 Aud. Discrim.		-.07	-.20	.27	.14	-.30	-.08	-.10	.05
Factor 2 Imm. Recall			.11	-.12	.02	.18	-.02	-.07	-.33
Factor 3 Visual Discrim.				-.27	-.07	.34	-.01	.05	-.06
Factor 4 Letter Recog.					.15	-.36	.04	-.06	.03
Factor 5 Spanish						-.20	-.03	-.03	-.01
Factor 6 Lang. Dev.							-.05	.19	-.08
Factor 7								.00	-.04
Factor 8									.05

The five pre-reading skills measured by the ELT are expected to be correlated but distinguishable as separate constructs. The factor correlations and the factor matrix together support this conclusion. From the correlations between factors one may infer that the constructs are not orthogonal; from the factor matrix it is apparent that the measures of the constructs are sufficiently discrete as to warrant separate factors.

ELT Correlations with Other Readiness Measures

Findings from the multitrait-multimethod matrices were mixed. The attenuation created by the easiness of the ELT is observable in each of the matrices. (Appendix D) The subtests of the other tests are much more highly intercorrelated than are the ELT subtests. Subtests within the CTBS are sometimes correlated as high as .70. (Values of .8 or .9 were also obtained but these were due to items from one subtest being combined in other subtest scores; e.g., Auditory Discrimination in the Clymer-Barrett is a combination of Beginning Sounds and Ending Sounds.) The highest intercorrelation of ELT subtests in all four samples was .48.

Ordinarily, in evaluating multitrait-multimethod matrices, one looks first for evidence of convergent validity. Different measures of the same construct should be correlated. In order to satisfy the criteria for discriminant validity, however, the correlation between different measures of the same construct should be greater than the correlation between different constructs using the same or different measures. Because of the marked difference in the variance of the ELT compared to the other tests, and hence the difference in the levels of the correlations, it was impossible to observe this stair-step evidence of discriminant validity.

The Auditory Discrimination subtest had the greatest variance and consistently had discriminant validity from other subtests as well as convergent validity with other measures of auditory discrimination. For example, in the Clymer-Barrett test Beginning Sounds correlates .55 with ELT Auditory Discrimination. This coefficient is greater than the correl-

ation of Beginning Sounds with other ELT subtests or the correlation of Auditory Discrimination with other Clymer-Barrett subtests. The Letter Recognition and Visual Discrimination subtests had convergent validity, but in some tests their correlations with different skills were as high as the same-construct correlations. The Language Development subtests had convergent validity with other language subtests but only weak discriminant validity.

CONCLUSIONS

The results are encouraging for using the ELT in the California Assessment Program or in other large-scale assessments. The evidence for convergent validity of the subtests (item intercorrelations and subtests correlations with other measures of the same construct) meets the basic requirement for construct validity. The additional evidence of discriminant validity suggests that the subtests, even in a very short and easy test, contribute uniquely to the total variance; the test is likely to be a useful predictor.

Because the ELT subtests are factorially discrete, the rules devised for constructing ELT items should be of interest to the authors of other pre-reading instruments. For example, the decision to eliminate auditorially and visually similar distractors from the Letter Recognition subtest may have helped to differentiate that subtest from the other two. Further examples of the procedures followed to try to develop "factor pure" subtests were the efforts made to distinguish auditory discrimination and immediate recall from language development. Auditory Discrimination and Immediate Recall items were screened to eliminate unfamiliar objects;

for example, birds, trees, and balloons were used but hats and roller skates were not. In addition, in the auditory test teachers named each stimulus and all the response choices so that vocabulary would not interfere with the skill being measured. For all subtests the number of response choices was never more than four so that children would not forget the stimulus as they worked across a row.

The ELT was not designed to make decisions about individual children; the subtests are too short and too easy to give accurate information about every child's strengths and weaknesses. Even at the school or district level where the results are very stable, the intercorrelation of the subtests overshadows their unique variance, and makes it unlikely that differential information will be obtained from the subtests for use in program diagnosis.

Appendix A

ENTRY LEVEL TEST
Item Correlations

N=3010 pupils (1% of 301,000)

	Imm. Recall						Letter Recog.						Aud. Discrim.						Vis. Discrim.						Language Development											
Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	1.00	.14	.19	.37	.19	.32	.09	.08	.05	.08	.05	.05	.09	.06	.07	.06	.08	.08	.09	.10	.11	.09	.09	.09	.10	.07	.09	.06	.11	.08	.06	.07	.05	.01	.07	.04
2		1.00	.17	.24	.33	.30	.14	.13	.11	.11	.09	.09	.09	.10	.07	.06	.06	.06	.16	.17	.11	.13	.09	.12	.11	.11	.11	.13	.13	.09	.07	.10	.10	.03	.06	.04
3			1.00	.16	.18	.22	.13	.12	.14	.11	.11	.07	.04	.07	.04	.04	.06	.03	.12	.12	.06	.12	.07	.12	.12	.06	.08	.12	.17	.06	.06	.09	.04	.01	.05	.05
4				1.00	.35	.21	.10	.05	.06	.08	.08	.05	.05	.07	.03	.05	.04	.04	.08	.10	.07	.08	.08	.09	.09	.08	.07	.09	.11	.08	.07	.09	.04	.01	.07	.05
5					1.00	.21	.14	.11	.12	.10	.11	.08	.11	.11	.06	.06	.05	.06	.13	.15	.10	.14	.09	.13	.12	.11	.11	.14	.14	.16	.09	.07	.09	.01	.08	.03
6						1.00	.12	.10	.11	.10	.07	.06	.06	.07	.05	.07	.06	.09	.12	.12	.10	.11	.06	.11	.09	.07	.12	.13	.14	.06	.10	.07	.09	.00	.07	.00
7							1.00	.43	.42	.47	.34	.37	.30	.30	.22	.18	.21	.18	.32	.32	.24	.28	.21	.25	.29	.23	.25	.34	.36	.21	.23	.26	.17	.05	.18	.14
8								1.00	.38	.36	.30	.38	.29	.23	.19	.19	.19	.14	.27	.29	.23	.21	.17	.24	.27	.23	.24	.31	.35	.20	.21	.23	.18	.07	.20	.13
9									1.00	.44	.39	.31	.29	.32	.20	.19	.22	.17	.31	.28	.24	.28	.20	.29	.30	.24	.28	.30	.37	.21	.19	.27	.20	.04	.20	.11
10										1.00	.44	.39	.35	.32	.23	.23	.25	.19	.33	.34	.24	.26	.23	.27	.30	.27	.30	.35	.35	.22	.22	.25	.21	.06	.21	.14
11											1.00	.32	.27	.27	.19	.18	.19	.15	.31	.30	.22	.24	.22	.28	.28	.23	.28	.30	.35	.23	.19	.22	.21	.01	.21	.12
12												1.00	.31	.27	.23	.23	.24	.17	.23	.26	.23	.25	.20	.24	.21	.22	.28	.25	.27	.20	.20	.22	.19	.02	.16	.13
13													1.00	.39	.35	.32	.33	.25	.29	.30	.28	.25	.22	.28	.27	.27	.30	.23	.25	.28	.25	.25	.20	.04	.17	.17
14														1.00	.31	.28	.33	.21	.26	.27	.23	.23	.19	.24	.27	.25	.26	.27	.27	.24	.21	.25	.20	.04	.21	.15
15															1.00	.36	.31	.25	.20	.19	.20	.18	.15	.19	.21	.20	.23	.16	.18	.22	.15	.18	.16	.05	.17	.14
16																1.00	.35	.21	.17	.15	.17	.16	.16	.17	.19	.21	.21	.15	.15	.25	.18	.15	.18	.03	.15	.15
17																	1.00	.19	.16	.18	.16	.17	.12	.19	.17	.17	.17	.17	.19	.18	.15	.18	.12	.03	.12	.13
18																		1.00	.18	.17	.15	.18	.14	.15	.16	.17	.16	.13	.14	.16	.14	.18	.12	.05	.14	.14
19																			1.00	.62	.40	.47	.33	.42	.31	.27	.27	.38	.42	.22	.20	.27	.21	.02	.23	.14
20																				1.00	.41	.49	.30	.44	.30	.30	.27	.36	.45	.23	.18	.26	.21	.03	.23	.14
21																					1.00	.43	.35	.45	.24	.25	.27	.26	.27	.22	.19	.20	.20	.03	.19	.14
22																						1.00	.34	.51	.26	.29	.23	.31	.42	.22	.21	.24	.18	.05	.21	.12
23																							1.00	.39	.23	.21	.22	.22	.24	.17	.16	.19	.17	.04	.16	.07
24																								1.00	.27	.26	.27	.28	.34	.22	.18	.24	.19	.04	.20	.14
25																									1.00	.35	.24	.35	.44	.24	.21	.32	.21	.04	.22	.15
26																										1.00	.24	.31	.34	.27	.23	.28	.20	.03	.20	.17
27																											1.00	.32	.31	.23	.21	.24	.21	.00	.17	.15
28																												1.00	.55	.20	.27	.28	.18	.09	.24	.13
29																													1.00	.24	.29	.32	.23	.09	.31	.14
30																														1.00	.26	.21	.22	.04	.19	.13
31																															1.00	.17	.17	.04	.17	.12
32																																1.00	.19	.03	.19	.21
33																																	1.00	.05	.19	.10
34																																		1.00	.07	.15
35																																			1.00	.22
36																																				1.00

Appendix B

VARIMAX ROTATED FACTOR MATRIX

		FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6	FACTOR 7	FACTOR 8	FACTOR 9
SES		-0.07160	-0.09436	-0.06101	0.00045	-0.00089	-0.09982	-0.00690	-0.21221	-0.04885
BILINGUALISM		-0.13287	-0.13301	-0.23550	-0.03343	-0.10154	-0.73002	-0.05999	0.14537	0.01490
BLACK		-0.09520	-0.03576	0.00847	-0.02022	-0.11251	0.04096	-0.03409	-0.41115	0.05142
SPANISH SUR		-0.11637	-0.05378	-0.15973	0.01180	-0.02830	[illegible]	0.02898	0.01553	-0.01601
WHITE		0.14785	0.07111	0.09951	-0.00610	0.12078	[illegible]	0.01260	0.29303	-0.04012
SUB:IMM REC		0.06284	0.13715	0.02450	0.92263	0.04303	0.09502	0.13020	0.01494	0.05311
SUB:LET REC		0.23349	0.23140	0.87592	0.03821	0.15125	0.14344	0.04801	0.05480	0.01820
SUB:AUD DIS		0.89257	0.17729	0.23254	0.05539	0.15072	0.12653	0.04114	0.07297	0.00410
SUB:VIS DIS		0.17398	[illegible]	0.23211	0.09773	0.14024	0.09860	0.04730	0.08453	0.05775
SUB:LANG DEV		0.26223	[illegible]	0.30755	0.09403	[illegible]	0.21004	0.25805	0.01126	0.01452
TOTAL TEST		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.17245	0.16345	0.06277	0.04137
ITEM 1	Imm. Recall	0.07[illegible]	[illegible]	0.00[illegible]	[illegible]	0.13542	-0.01114	-0.22036	0.00002	0.21404
ITEM 2		0.04022	0.08825	0.07951	0.51033	-0.06876	-0.00063	0.35163	0.11906	-0.17472
ITEM 3		0.00598	0.07927	0.11320	0.45318	0.05344	0.04080	-0.09473	-0.07719	-0.11725
ITEM 4		0.01832	0.02810	0.02474	0.59558	0.05760	-0.00498	0.08847	-0.09232	0.35971
ITEM 5		0.03957	0.08259	0.03194	0.51481	-0.05950	0.00091	0.34051	0.01590	0.13152
ITEM 6		0.04734	0.05234	[illegible]	0.46016	0.03551	0.00898	-0.02469	0.08259	-0.19921
ITEM 7	Letter Recog.	0.15476	0.17737	0.62777	0.12771	0.10560	0.12230	-0.03015	0.00040	-0.07685
ITEM 8		0.10324	0.12259	0.59287	0.04573	0.15810	0.10804	0.01058	0.13319	-0.14226
ITEM 9		0.17513	0.13659	0.60189	0.06969	0.11046	0.06509	0.03716	-0.05642	-0.02061
ITEM 10		0.21713	0.17777	0.64998	0.05819	0.11441	0.09270	0.02048	-0.04508	0.05780
ITEM 11		0.13061	0.19452	0.55385	0.03246	0.09200	0.14888	0.11532	-0.08608	0.14322
ITEM 12		0.14977	0.12699	0.59549	0.00072	0.07142	0.07379	0.04342	0.22326	0.07454
ITEM 13	Aud. Discrim.	[illegible]	0.20572	0.25651	0.01666	0.11480	0.11962	0.10391	0.06979	0.04563
ITEM 14		0.49144	0.15376	0.25135	0.03574	0.11464	0.11040	0.14185	-0.01166	0.00312
ITEM 15		0.62407	0.10122	0.11474	0.01555	0.10154	0.04527	0.04800	0.05318	-0.00205
ITEM 16		0.60779	0.05985	0.09422	0.03225	0.08610	0.11885	0.09246	0.13684	0.04702
ITEM 17		0.61214	0.07187	0.16091	0.03978	0.05085	-0.00612	-0.01953	0.03960	-0.03996
ITEM 18		0.45426	0.11157	0.07000	0.07891	0.12574	0.11217	-0.14312	-0.01872	-0.02271
ITEM 19	Vis. Discrim.	0.14[illegible]	0.6[illegible]	0.22919	0.09758	0.11405	0.08056	0.07062	-0.09029	-0.19051
ITEM 20		0.13710	0.64424	0.23768	0.11320	0.13521	0.04093	0.08176	-0.05782	-0.19241
ITEM 21		0.12402	0.63683	0.12933	0.04905	0.11035	0.07347	0.02651	0.21341	0.03419
ITEM 22		0.17536	0.65073	0.14765	0.09417	0.11838	0.07278	0.01969	-0.01105	-0.07499
ITEM 23		0.10795	0.56794	0.13168	0.02961	0.05492	0.04928	0.02760	0.08847	0.21344
ITEM 24		0.12200	0.57[illegible]	0.16960	0.07443	0.10755	0.05895	0.00181	0.11293	0.08411
ITEM 25	Lang. Dev.	0.17790	0.25[illegible]	0.24516	0.09753	0.31[illegible]	0.19777	0.16264	-0.23278	-0.03240
ITEM 26		0.19437	0.25058	0.16205	0.04060	0.22308	0.16366	0.23429	-0.07288	0.00330
ITEM 27		0.20674	0.22312	0.27708	0.05749	0.23516	0.05258	0.21999	0.04451	0.06553
ITEM 28		0.39476	0.29952	0.31851	0.09203	0.32769	0.04402	0.21014	-0.15814	-0.15015
ITEM 29		0.09792	0.36946	0.36036	0.12743	0.36116	0.05196	0.18958	-0.24572	-0.14528
ITEM 30		0.21377	0.15540	0.11506	0.04236	0.26266	0.35032	0.19952	0.05293	0.17911
ITEM 31		0.15597	0.12714	0.16778	0.05361	0.27902	0.19005	0.19043	0.02142	0.00357
ITEM 32		0.18343	0.19716	0.21293	0.06058	0.35038	0.12965	0.07787	-0.15907	-0.01375
ITEM 33		0.11969	0.14700	0.14941	0.02819	0.26874	0.13824	0.26915	0.13976	0.03936
ITEM 34		0.00727	-0.00777	0.01825	-0.00349	0.36097	-0.06451	-0.09779	-0.03967	0.01696
ITEM 35		0.10225	0.16415	0.13735	0.04997	0.41943	0.11377	0.07061	0.04370	-0.01645
ITEM 36		0.12659	0.04874	0.05432	0.02255	0.51127	0.04314	-0.07928	0.15418	0.00588

ppendix C

ARRIS-KAISER OBLIQUE ROTATION
ATTERN MATRIX A' A∝L

		FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOP 5	FACTOR 6	FACTOR 7	FACTOR 8	FACTOR 9
SES		.04435	.01903	-.09534	.05353	.07351	-.00376	-.20966	-.00221	.02008
BILINGUALISM		.04038	-.01412	-.03756	.12669	.68424	-.19170	.13275	.06298	-.00024
BLACK		.06959	-.06640	-.03379	-.01052	-.0[illegible]	-.07994	-.39669	-.09895	-.09155
SPANISH SUR		.04041	.01093	-.00725	.08701	.79732	-.08659	.06271	.03128	.00783
WHITE		-.07063	.05502	.03253	-.03209	-.54026	.13044	.29174	.05568	.00024
SUB:IMM REC		-.01300	.79213	.03212	-.03182	.02364	.11254	.01638	-.10349	-.37196
SUB:LET REC		-.09503	.01770	.07963	-.84898	-.04059	.11681	.02985	.00274	-.00958
SUB AUD DIS		-.86662	.01402	.06256	-.09316	-.04024	.09654	.01314	.02381	-.00260
SUB:VIS DIS		-.06279	-.01144	.86214	-.09554	-.01501	.12106	.03931	-.00354	-.06089
SUB:LANG DEV		-.07236	.01192	.0[illegible]111	-.09308	-.04608	.77155	-.00691	.30794	-.02040
TOTAL TEST		-.32097	.23[illegible]	.27351	-.27930	-.03112	.38[illegible]	.02295	.02383	-.14337
ITEM 1		-.05842	.36105	.05660	-.01336	-.02284	-.14208	-.03254	.27363	-.44503
ITEM 2		-.00023	.59165	.00768	.00476	.08119	.25432	.14304	-.31707	.02714
ITEM 3	Imm.	.01468	.45341	.06041	-.09276	-.05481	-.07277	-.10877	.07097	-.05878
ITEM 4	Recall	.01913	.22339	-.03130	-.00361	.02766	.11264	-.06241	-.05416	-.35755
ITEM 5		.00970	.29680	-.01568	-.00598	.08455	-.30123	.06587	-.34224	-.25484
ITEM 6		-.03911	.64572	.04325	-.01342	-.00638	-.03390	.04960	.02829	-.01325
ITEM 7		-.06348	.131[illegible]	.07935	-.60541	-.06670	.01919	-.03270	.03903	.05023
ITEM 8		-.00316	.16345	.02604	-.57202	-.03750	.08989	.10340	.06997	.14175
ITEM 9	Letter	-.08452	.02917	.07791	-.56772	.00352	.08716	-.09041	-.00758	.01256
ITEM 10	Recog.	-.12007	-.03082	.06034	-.62173	-.02148	.07544	-.06489	.00450	-.05015
ITEM 11		-.02031	-.12225	.07400	-.51331	-.06880	.16445	-.07796	-.07143	-.13540
ITEM 12		-.10674	-.05387	.03207	-.58477	.00439	.06044	.21112	-.00272	-.02853
ITEM 13		-.48034	-.04874	.10839	-.15512	-.03501	.15068	.06361	-.03435	-.02278
ITEM 14		-.44452	-.01682	.05253	-.14199	-.02473	.19405	-.03160	-.06615	.00261
ITEM 15	Aud.	-.61681	-.00668	.02488	-.01746	.01494	.08119	.01411	.00747	.01168
ITEM 16	Discrim.	-.59203	-.02729	-.01920	.00102	-.04883	.12037	.11294	-.02744	-.02845
ITEM 17		-.61741	.04483	.01021	-.09871	.04637	-.02556	-.01092	.02120	.03552
ITEM 18		-.45126	.08596	.08590	-.00893	-.10548	-.06097	-.07471	.15549	-.01321
ITEM 19		-.06244	.14873	.58754	-.09681	-.02191	.12867	-.13587	-.04280	.16361
ITEM 20		-.05552	.16379	.58862	-.10578	.02420	.14733	-.10461	-.03048	.16426
ITEM 21	Vis.	-.04018	-.03577	.62707	-.04297	-.01642	.09414	.18285	.02937	-.06303
ITEM 22	Discrim.	-.05004	.08403	.65562	-.02971	-.02578	.08517	-.05603	.00927	.05354
ITEM 23		-.03348	-.21714	.55446	-.07316	-.00428	.05930	.08215	-.01763	-.29765
ITEM 24		-.04402	-.02538	.66202	-.07896	-.01932	.05696	.07729	.02623	-.08327
ITEM 25		-.08440	.03215	.11371	-.10723	-.10743	.37613	-.24112	.02926	-.09653
ITEM 26		-.09970	-.02254	.12001	-.02010	-.05308	.44521	-.07130	.00910	-.00476
ITEM 27		-.11518	-.04319	.10247	-.17807	.05736	.35252	.04720	-.02642	-.05619
ITEM 28		.01020	.10909	.15865	-.20839	.06412	.40883	-.17321	.01855	.12336
ITEM 29		.01475	.12522	.22069	-.21638	.05428	.41377	-.26741	.04039	.09571
ITEM 30	Lang.	-.12614	-.04487	.04339	.00998	-.25132	.38888	.06618	.00082	-.07057
ITEM 31	Dev.	-.07008	.01085	.01407	-.06120	-.09406	.37470	.02657	.02618	-.00307
ITEM 32		-.10145	.01976	.08296	-.10171	-.05425	.31208	-.17926	.13511	-.01592
ITEM 33		-.02576	-.03352	.03474	-.04524	-.02238	.43646	.15774	-.01913	-.01009
ITEM 34		.02955	.00858	-.03866	-.00131	.08516	.14206	.01124	.33556	-.02181
ITEM 35		-.01152	.04168	.07012	-.04093	-.03231	.34851	.02459	.22209	.00999
ITEM 36		-.05485	.04497	-.01250	.00368	.01255	.25890	.11412	.42426	-.00536

Appendix D

Entry Level Test

Correlations with Monroe-McFarland Reading Readiness

N = 796 pupils

	Rdy	BS	VD	Letters	Tot.	IR	LR	AD	VD	LD	Tot.
Monroe											
Reading Words		.40	.29	.22	.61	.06	13	29	18	.26	29
Beg Letter Sounds			.47	.39	.76	.07	18	54	19	32	.42
Visual Discrim.				.43	.76	.06	11	.28	.12	21	.25
Identifying Letters					.65	.03	31	.34	15	23	.31
Total Test						.08	.23	.47	.19	.34	.42
ELT											
Imm. Recall							.18	11	.11	.10	.54
Letter Recog.								.32	.39	.45	.64
Aud. Discrim.									.27	.36	.65
Visual Discrim.										.36	.60
Lang. Dev.											.73

Entry Level Test

Correlations with Clymer - Barrett Prereading Battery

N = 574 pupils

		Clymer-Barrett Subtests									ELT Subtests					
Clymer-Barrett	LR	WM	VD	BS	ES	AD	Shape	Copy	VM	Total	IR	LR	AD	VD	LD	Tot.
1. Letter Recog.		.46	.93	.50	.39	.50	.28	.34	.34	.73	.00	.64	.44	.29	.30	.53
2. Word Match			.73	.42	.35	.42	.32	.31	.38	.64	.09	.24	.20	.34	.29	.37
3. Visual Discrim. (1 + 2 = 3)				.53	.43	.54	.34	.38	.40	.81	.04	.57	.41	.35	.34	.54
4. Beg Sounds					.58	.90	.35	.42	.42	.72	.00	.30	.55	.27	.36	.53
5. Ending Sounds						.86	.29	.28	.31	.62	.08	.26	.34	.29	.38	.45
6. Aud. Discrim. (4 + 5 = 6)							.36	.40	.41	.75	.10	.31	.51	.31	.42	.56
7. Shape Comple.								.44	.90	.60	.09	.17	.25	.20	.27	.32
8 Copy-A-Sent									.70	.57	.03	.22	.30	.21	.25	.33
9. Visual Motor (7 + 8 = 9)										.66	.07	.21	.29	.23	.29	.36
10 Total											.06	.44	.49	.35	.41	.58
Entry Level Test																
Imm. Recall												.01	.06	.06	.09	.50
Letter Recog.													.31	.31	.27	.58
Aud. Discrim.														.14	.32	.66
Visual Discrim.															.23	.48
Lang. Dev.																.68

Entry Level Test

Correlations with CTBS (Form S Level 8)

N = 550 pupils

	LS	WRI	Comp	WRII	RDG	LangI	LangII	Lang I	M Con	Comput	Tot	IR	LR	AD	VD	LD	Tot.
CTBS																	
1. Letter Sounds	.67	.51	.66	.85	.46	.42	.49	.51	.33	.47	.05	.24	.47	.24	.35	.41	
2. Word Recog I		.60	.71	.87	.42	.37	.44	.49	.37	.49	.02	.15	.36	.16	.23	.28	
3. Read Comp.			.63	.82	.33	.32	.36	.43	.43	.50	.05	15	.24	.18	.23	.25	
4. Word RecogII				.87	.39	.37	.43	.47	.42	.52	.02	.18	.35	.17	.24	.29	
5. Total Read (1+2+3+4+5)					.46	.42	.51	.55	.45	.58	.03	.20	41	.23	.30	.35	
6. Lang I						.58	.83	.44	.32	.41	.13	.25	.38	.18	.33	.39	
7. Lang II							.88	.41	.31	.40	.06	.14	.30	.15	.28	.28	
8. Total Lang (6 + 7 = 8)								.48	.35	.47	.12	.20	.38	.19	.34	.37	
9. Math Concepts									.58	.83	.06	.19	.32	.16	.25	.30	
10. Math Comp										.92	.01	.10	.13	.13	.19	.17	
11. Total Math (9+10 = 11)											.03	.16	.23	.16	.24	.24	
Entry Level Test																	
Imm. Recall												.15	.07	.19	.18	.53	
Letter Recog.													.41	.40	.47	.67	
Aud Discrim.														.33	.41	.67	
Visual Discrim.															.48	.67	
Lang. Dev.																.78	

Entry Level Test

Correlations with Metropolitan Achievement Test

N = 875 pupils

	Metro Subtests			ELT Subtests					
	List.	Read.	Num.	IR	LR	AD	VD	LD	Total
Metro Ach.									
Listening		.82	.68	.09	.29	.45	.23	.35	.45
Reading			.70	.07	.31	.41	.23	.33	.42
Numbers				.13	.23	.35	.24	.39	.44
ELT									
Imm. Recall					.02	.04	.09	.07	.54
Letter Recog.						.37	.32	.33	.57
Aud. Discrim.							.27	.34	.65
Vis. Discrim.								.32	.58
Lang. Dev.									.68