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AUTHOR Anderson, Gordon V.; Anderson, H. T.  
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ABSTRACT

The study reported here compares the performance on a mental ability test of children in grades two and three from homes in which English is the language spoken with those from homes in which Spanish is the language used. During the Spring semester, the InterAmerican Tests of General Ability, Level Two, and their Spanish parallel, were administered in a number of central and southern California elementary schools. The research design provided that pupils be selected for the tests "to represent fairly (1) the entire population of school children from homes in which English is the major language (English speaking), and (2) the entire population of children from homes in which Spanish is the major language (Spanish speaking)," with about an equal number of boys and girls. Socioeconomic levels of the subjects were to be reported on the basis of parents' occupation. The students were selected from the schools or classes which represented the three socioeconomic levels, by systematic choice from an alphabetical list. The InterAmerican Tests of General Ability at Level Two comprise four subtests: Oral Vocabulary, Number, Classification, and Analogies. No reading is required of the testees; all items are in pictorial, figural, or numerical form. At both grades two and three, it was found that English-speaking children attained higher scores than Spanish-speaking children for total score as well as for each of the subtests. When the subtests are compared it becomes evident that the superiority of the English-speaking children is most marked on the Vocabulary and Number subtests. (Author/JM)

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A COMPARISON OF PERFORMANCE ON A MENTAL ABILITY TEST  
OF ENGLISH SPEAKING AND SPANISH SPEAKING CHILDREN IN  
GRADES TWO AND THREE

Gordon V. Anderson and H. T. Anderson

The University of Texas

The present study compares the performance on a mental ability test of children in grades 2 and 3 from homes in which English is the language spoken with those from homes in which Spanish is the language used.

During the spring semester, 1970, the InterAmerican Tests of General Ability, Level 2, and their Spanish parallel, were administered in a number of central and southern California elementary schools in a joint project of the California State Department of Education, through its Mexican-American Education Research Project (John Plakos, Coordinator), and Guidance Testing Associates, publishers of the tests. (Administration of the tests was planned and directed by John Chandler, of the Department of Education.)

We gratefully acknowledge the participation of the California State Department of Education, the coordinators, and the local personnel who participated in the project, those who have had a part in processing the data, and especially Dr. Chandler, the Director. The authors alone, however, are responsible for the results reported in this paper.

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The research design provided that pupils be selected for the tests "to represent fairly (1) the entire population of school children from homes in which English is the major language (English speaking), and (2) the entire population of children from homes in which Spanish is the major language (Spanish speaking)," with about an equal number of boys and girls. Socioeconomic levels of the subjects were to be reported on the basis of parent's occupation: Low (service and farm workers, unemployed, and welfare); Middle (clerical and sales, craftsmen, foremen, operatives, nonfarm laborers); and Upper (professional, technical and managerial). A list of occupations was used to assist in the determination of socioeconomic level. The subjects were selected from the schools or classes which represented the three socioeconomic levels, by systematic choice from an alphabetical list.

The InterAmerican Tests of General Ability at Level 2 have two forms in English, CE and DE, and two forms in Spanish, CEs and DEs. The items are identical for both language groups. The subtests include Oral Vocabulary (30 items), Number (oral and written, 30 items), Classification (24 items), and Analogies (16 items). Illustrations of the materials and a statement of the rationale and method of development are included in the handout. It will be noted that no reading is required of the testees; all items are in pictorial, figural, or numerical form; directions are read aloud by the examiner.

With regard to these data, we wish to guard against overgeneralization. The findings are limited to this particular project, and

must not be interpreted to represent English-speaking or Spanish speaking children in general, nor even those of California. The tests included in each group studied are from 10 to 16 schools in 5 to 7 counties of central and southern California.

For purposes of comparison, the subjects were divided into four groups: (1) 258 English-speaking children in grade 2; (2) 237 Spanish-speaking children in grade 2; (3) 161 English-speaking children in grade 3; and (4) 192 Spanish-speaking children in grade 3. Results from forms CE and DE and CEs and DEs were combined, since it had been shown, in earlier studies, that the alternate forms gave equivalent score distributions. Scrutiny of the results from the testing for this study showed that this was true also for the population whose scores are reported here.

Mean scores and standard deviations for each of the subtests and for total score are presented in Table 1. It will be noted that at both grades 2 and 3, English-speaking children attained higher scores than Spanish-speaking children for total score as well as for each of the subtests. When the subtests are compared it becomes evident that the superiority of the English-speaking children is most marked on the Vocabulary and Number subtests; although differences are statistically significant also for the Classification and Analogies subtests, these differences are much less in comparison. At grade 2 for Classification and Analogies subtests, and at grade 3 for the Classification subtest, the differences between means for the language groups is less than two raw score points.

In addition to making comparisons between language groups, the differences between scores from grade 2 to grade 3 were studied. For English-speaking children gains from grade 2 to 3 were highly significant for all subtests; but for Spanish-speaking children, there was not a significant gain in Vocabulary subtest score from one grade to the other. Gains were significant for each other subtest, but for both language groups the amount of gain on Classification and Analogies subtests was small--less than one raw score point for three of the four comparisons. A marked rise in score for the Number subtest for both groups probably reflects attention to number concepts and arithmetic processes during the third grade; the tests were administered in the spring of the year.

When the test performances of English-speaking and Spanish-speaking children are compared, although the differences between means are highly significant, the considerable amount of overlap in scores for the two groups should not be lost sight of. At grade 2, 23 percent of the Spanish-speaking subjects surpassed the median for the English-speaking children, and 22 percent of the latter group fell below the median for the Spanish-speaking children; at grade 3, for total score, the overlap is less, with 13 percent of Spanish-speaking children above the median for the English-speaking subjects, and 11 percent of the latter falling below the median for Spanish-speaking children. However, this shift is largely due to the failure of Spanish-speaking children to make a significant gain on the Vocabulary subtest. On the Number subtest, Spanish-speaking subjects made improvement in score relatively as great as English-speaking children,--between five and six raw score points in each instance. That

the Spanish-speaking children made no appreciable gain in vocabulary development probably reflects the fact that stimulation for further Spanish vocabulary development was minimal. It seems safe to assume that these children are bilingual, and that instruction in the schools was in English. If English vocabulary development from one grade to the other had been compared, a quite different picture may have emerged.

For the Classification subtest, at grade 3, 35 percent of the Spanish-speaking children surpassed the median attained by English-speaking subjects, and 32 percent of the latter fell below the median score for the Spanish-speaking children.

Correlation coefficients among the four subtests for each of the four groups of subjects were computed, and are presented in Table 2. All of the correlation coefficients are significant at the percent level, except in two instances, both of these being between the Vocabulary and Classification subtests, but these did not fall below the 5 percent significance level. Since this variation in relationship was not consistent for either language or grade groups, no meaningful generalizations can be made about them. The absolute magnitude of all coefficients is low, indicating that each subtest is making a unique contribution to total score variance, but the low significant relationships among all subtests supports the justification for combining them into a total score for an estimate of general ability.

For each of the four subgroups of children in the study, tests of the possible significance of differences between male and female subjects

were made. At both grades 2 and 3, English-speaking boys surpassed girls in performance on the vocabulary test, but by only a small difference, although statistically significant. No sex differences appeared among the Spanish-speaking children.

The hypothesis that Spanish-speaking children in general were at a lower socioeconomic level than English-speaking children, and that this might account for the differences, only one attained a bare 5 percent level of significance; for the population studied, there do not appear to be any differences in test performance related to socioeconomic level as judged from father's occupation. This is contrary to expectation, generalizing from other studies, and it may be due to either a narrow range of socioeconomic level, or somewhat inaccurate ratings for the children in the present study.

Record was made of the ages of each child in the population studied, but no statistical studies were made of relationships between age of child and test performance. At grade 2, the median age of English-speaking children was 8.2, and for Spanish-speaking subjects, 8.5; at grade 3 the corresponding median ages were 9.1 and 9.4. These are only approximations, since ages were reported in years rather than a report of the subject's birth date. The distribution of ages for Spanish-speaking children was somewhat skewed toward older ages; e.g., at grade 2 there were 13 English-speaking children at age 9, none older; while there were 39 at age 9, and 5 at age 10 among the Spanish-speaking children (tested at the end of the year). The same kind of skewness appeared at grade 3.

R. B. Cattell has suggested that there are two kinds of intelligence, crystallized and fluid. The vocabulary and number tests would probably be classified as tests of crystallized intelligence, and the Classification and Analogies tests might be expected to appear among tests for fluid intelligence. In light of this theory, it is possible to adduce some explanations for the test score differences between the language groups, in relation to the influences from cultural and educational factors. In terms of the categorizations of intelligence posited by Philip Vernon, the British psychologist, it should be stressed that for the groups investigated by the present study, we have data only with respect to one estimate of intelligence C --no inferences concerning intelligences A or B can be made from our data.

A COMPARISON OF PERFORMANCE ON A MENTAL ABILITY TEST  
OF ENGLISH SPEAKING AND SPANISH SPEAKING CHILDREN IN  
GRADES TWO AND THREE

TABLE 1  
Means and Standard Deviations on the Test of General Ability, Level 2

Subtest	English Speaking Children		Spanish Speaking Children		Diff/SE <sub>Diff</sub>
	Mean	S. D.	Mean	S. D.	
Oral Vocabulary	19.50	3.19	15.84	4.13	10.965
Number	16.40	4.54	13.69	4.52	6.653
Classification	15.45	3.11	14.41	3.72	3.360
Analogies	10.75	3.48	9.67	3.04	3.685
Total Score	62.09	10.26	53.62	11.02	8.826
n =	258		n =	237	
Grade 3					
Oral Vocabulary	21.67	3.40	16.23	4.11	13.643
Number	22.36	4.70	19.06	4.67	6.594
Classification	16.22	2.87	15.35	3.31	2.644
Analogies	12.23	3.17	10.45	3.20	5.235
Total Score	72.48	10.26	61.10	10.10	10.454
n =	161		n =	192	

TABLE 2  
Subtest Intercorrelations for the Test of General Ability, Level 2

	Grade 2: Engl. Speaking			Grade 2: Spanish Speaking		
	Number	Class.	Anal.	Number	Class.	Anal.
Vocab.	.273	.144	.362	.406	.352	.242
Number		.423	.473		.419	.263
Class.			.323			.333
	Grade 3: Engl. Speaking			Grade 3: Spanish Speaking		
	Number	Class.	Anal.	Number	Class.	Anal.
Vocab.	.460	.256	.444	.247	.141	.258
Number		.255	.429		.224	.311
Class.			.250			.281

# GUIDANCE TESTING ASSOCIATES

6516 SHIRLEY AVENUE  
AUSTIN, TEXAS 78752

## THE INTER-AMERICAN TESTS FOR BILINGUAL MEASUREMENT

The Inter-American Series of educational tests includes Tests of General Ability and Tests of Reading published in separate English and Spanish editions with parallel content in the two languages. Nonverbal items such as figure analogies and numerical computation are precisely the same except that in one edition the directions are given in English and in the other in Spanish. In the directions for each test, in the verbal items of the Tests of General Ability, and in the items of the Tests of Reading, an attempt is made to express the same thing in English and Spanish with language of similar difficulty. Native speakers of each language have cooperated in constructing the tests.

The early history of the Inter-American Series is presented briefly in the "Foreword" of the Examiner's Manual of the Cooperative Inter-American Tests published in 1950 by the Educational Testing Service:

The Cooperative Inter-American Tests were developed in preliminary form by the Committee on Modern Languages of the American Council on Education. These materials were transferred to the Cooperative Test Division where editorial revisions were made and the final forms were produced. The tests now constitute a series, international in character, with parallel editions in two languages, English and Spanish.

Origin of the Cooperative Inter-American Tests In 1940, the Committee investigated the teaching of English in Puerto Rico. As a result of this study, it seemed important to measure progress in English in relation to achievement in the native language, Spanish. Since no bilingual tests were available, the Committee undertook the construction of a series of parallel tests in the two languages.

A simple translation of a standardized test from one language to another was obviously not adequate because of differences in speech idiom and in culture. It was decided to build two forms of the test side by side, equating and balancing linguistic and cultural material from the two languages. In this way, students with the same general ability and approximately the same school opportunity could be expected to show achievement in the second language which would be comparable, even though inferior, to their achievement in their native tongue. The construction of such tests is an intricate task, and the Committee does not claim to have solved all of the problems involved. However, the development of these tests represents an advance in bilingual testing.

The series produced for the Puerto Rican study included tests in: general ability at the primary, intermediate, and advanced levels; reading at the three levels; language usage; and vocabulary and interpretation of reading materials in the natural sciences and the social studies. Each test was developed in alternative forms, A and B, and all forms in both English and Spanish. Tests of this series were administered in Spanish to some 6,000 pupils in the schools of Mexico, in English to some 10,000 in the continental United States, and in English and Spanish or in Spanish alone to some 20,000 pupils in Puerto Rico.

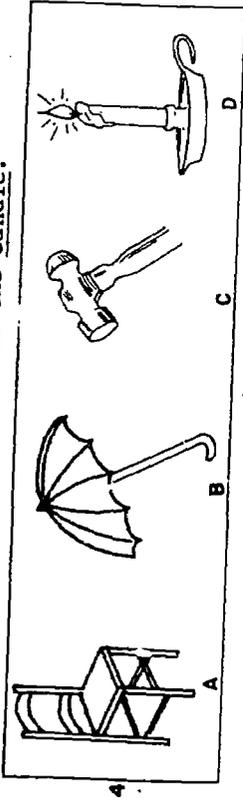
Several years' experience with the tests and many studies of the materials derived from their administration have convinced the Committee that they can be extremely useful. They have shown themselves suitable for measuring achievement either in English or in Spanish, or for comparison of achievement in the two languages in situations where bilingual measurement is desired.

In 1959 the publication of the tests was transferred to Guidance Testing Associates, a non-profit corporation organized to continue their publication and development. The series was revised with the assistance of two grants from the U. S. Office of Education to the University of Texas, and other tests have been constructed.

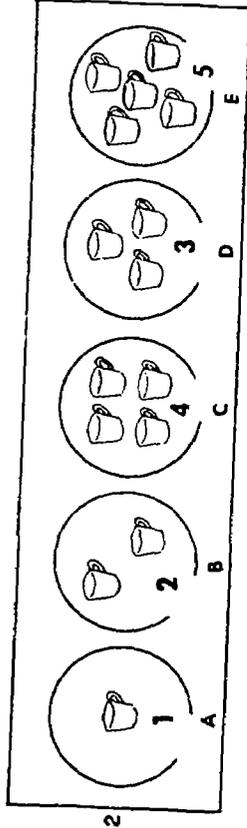
Samples of material from the Tests of General Ability, Level 2, and its Spanish parallel Pruebas de Habilidad General, Nivel 2, will illustrate the nature of the series. Each part of a test is introduced by Practice Exercises.

(Over)

**Part I. — Oral Vocabulary**  
Mark the letter under the candle.



**Part II (a). — Number (Oral)**  
Jean had 6 cups but broke 1 of them. Mark the letter under the circle which shows how many cups she has now.

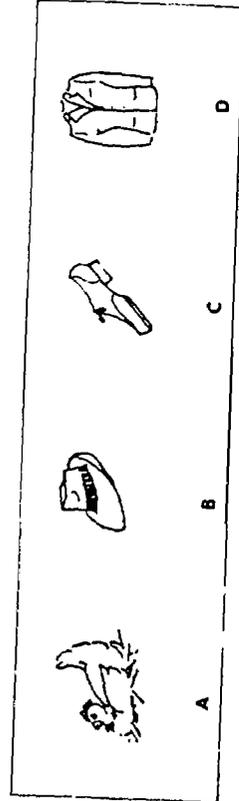


**Part II (b). — Number (Written)**  
Do all of the problems on this page by yourself.

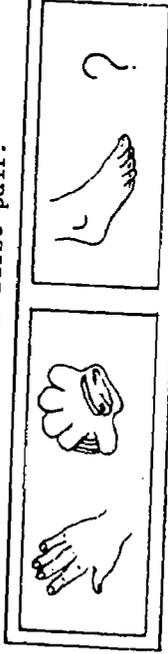
1. 
$$\begin{array}{r} 3 \\ + 4 \\ \hline \end{array}$$

2. 
$$\begin{array}{r} 4 \\ + 5 \\ \hline \end{array}$$

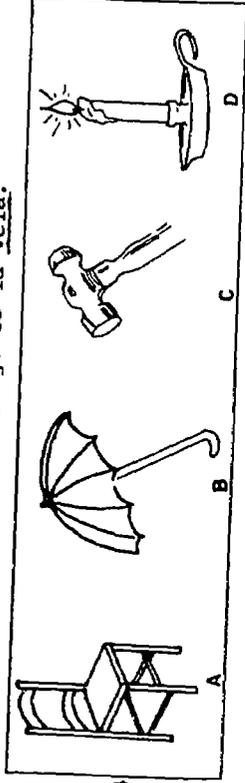
**Part III. — Classification**  
Find the picture which does not go with the others.



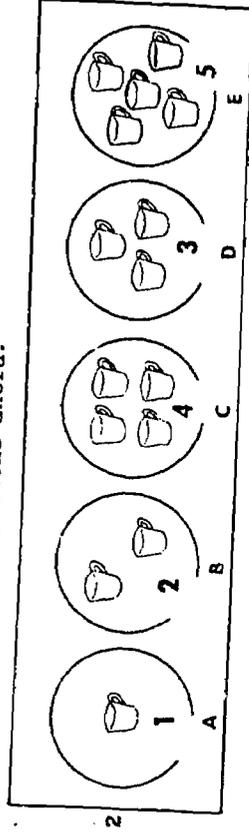
**Part IV. — Analogies**  
Find the picture which makes the second pair of pictures like the first pair.



**Part I. — Vocabulary Oral**  
Marken la letra debajo de la vela.



**Part II (a). — Número (Oral)**  
Julietta tenía 6 tazas, pero rompió 1 de ellas. Marquen la letra debajo del círculo que muestra cuántas tazas tiene ahora.

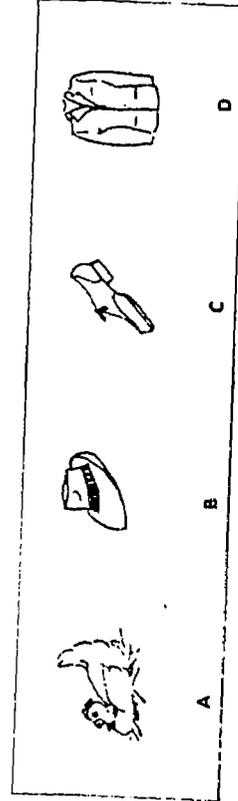


**Part II (b). — Número (Escrito)**  
Hagan todos los problemas en esta página ustedes mismos.

1. 
$$\begin{array}{r} 3 \\ + 4 \\ \hline \end{array}$$

2. 
$$\begin{array}{r} 4 \\ + 5 \\ \hline \end{array}$$

**Part III. — Clasificación**  
Busquen el dibujo que no va con los otros.



**Part IV. — Analogías**  
Busquen el dibujo que hace que el segundo par de dibujos se parezca al primer par.

