DOCUMENT RESUME

ED 119 177 CS 002 492

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TITLE Relationships between Spanish and English Reading Skill and Concept Usage in Spanish and English by Mexican-American Bilingual Migrant Children.

INSTITUTION Colorado Univ., Boulder. Bureau of Educational Field Services.
SPONS AGENCY Office of Education (DHEW), Washington, D.C.
PUB DATE 75
NOTE 42p.
AVAILABLE FROM Bureau of Educational Field Services, School of Education, University of Colorado, Boulder, Colorado 80309 ($1.50)

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage
DESCRIPTORS *Bilingual Students; Elementary Education; *English (Second Language); Mexican Americans; *Migrant Children; Reading; *Reading Skills; *Spanish; Spanish Speaking
IDENTIFIERS *Concept Usage; Elementary Secondary Education Act Title I; ESEA Title I

ABSTRACT

This study compared Spanish and English reading skill with concept usage and was directed at predicting oral reading level. A total of 144 bilingual migrant children, aged seven through twelve years, from six summer programs in Colorado were administered the Test of Concept Utilization (TCU) and the Silvaroli Informal Reading Inventory in both Spanish and English on alternate days. The main finding in TCU scores across all ages was that children gave more semantic discrepant responses in English than in Spanish, indicating that children were more fluent in Spanish. For the most part, however, the mean scores for TCU concept categories were the same in Spanish and English. The main reading level in English was approximately three years behind for all ages. Reading in Spanish was almost nonexistent, with twelve-year-olds (sixth grade students) barely reading at a first grade level. It was essentially impossible to predict reading scores from TCU scores in Spanish because of the low reading ability in Spanish. In English, the concepts of shape and homogeneous function were the most consistent predictors for all age groups. (Author/JM)

MIGRANT EDUCATION RESEARCH REPORT
Completed through the
Diagnostic and Instructional Mobile Unit Project
for Migrant Children at the
University of Colorado

Sponsored by
The Colorado Department of Education
Title I ESEA Migrant Education Division

RELATIONSHIPS BETWEEN SPANISH AND ENGLISH READING SKILL AND CONCEPT USAGE IN SPANISH AND ENGLISH BY MEXICAN-AMERICAN BILINGUAL MIGRANT CHILDREN

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ACKNOWLEDGMENTS

The authors wish to acknowledge those members who were involved in the research project. Their input and productivity were invaluable because of their perception of the research and the conscientious performances in pursuing accuracy and precision in the gathering and analysis of the data.

RUDY MELGOZA, the language translator, for his superb work in transforming English to Migrant Spanish and Migrant Spanish to English. His capabilities for language interpretation and rewriting the languages were certainly an integral part of this research.

FLOR FONTES, MARGARET JACOBY, CLARE KENNELLY, CHRIS REED, AND RENATO SANTOS, our examiners who administered the Tests of Concept Utilization and Silveroli Reading Tests with the utmost of skill and understanding.

MICHAEL CRAGER for his computer programming, and running the statistical analysis of the data.

JOHN HOFFMAN, the Migrant Education Mobile Unit Director, for his great concern and constant willingness to assist in many phases of the study. His expert advice, because of his experience in working with migrant children and his association with teachers and administrators was always considered.

Appreciation certainly goes to the children who took part in the study, the support of their parents, and the cooperation from the teachers and the school administrators.

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INTRODUCTION

Basic to the learning of, and skill in reading is the facility with which a child uses language and understands concepts. Recent cross-sectional and longitudinal research (Crager and Spriggs, 1972; Crager, 1974, 1975a) with both Spanish surname and Anglo children indicated that certain concept usage scores on the test of Concept Utilization (TCU) (Crager and Spriggs, 1972) predict reading success and failure in the early school grades from first to fourth grade. Shape and Homogeneous Function concepts on the TCU were positively correlated (r^S of +.50 to +.60) with reading scores, while other concept usage, e.g., Stimulus Bound (irrelevant detail responses), and Infusions (affectively laden, unusual or reality distorted responses) correlated negatively (r^S of -.30 to -.35) with reading skill. Preliminary results from pilot educational programming suggest that cognitive education, in part based upon TCU results, is helpful in improving reading skills in Spanish surname children with reading delays.

Significant delays in reading and educational achievement for Mexican-American children have recently been documented and described in a series of reports by the U.S. Commission on Civil Rights (Mexican American Education Study, 1974; Toward Quality Education for Mexican Americans, 1974, The Unfinished Education, 1971). Using questionnaire data obtained from principals, 50 to 70 percent of Mexican-American students in fourth, eighth, and twelfth grades were reported as reading one-half or more years below the "level expected for the grade to which the students were assigned."

Migrant children have additional difficulties in reading and educational achievement since Spanish language and culture are more indigenous to their everyday life, yet they are required to learn to read in English.

Until very recently there was no concept assessment instrument available in Spanish to aid in either predicting or educationally programming reading success for Spanish-surname children. Since the TCU in English has been helpful in predicting reading for Spanish-surname children who speak and learn to read English, a translation of the test into Spanish was hypothesized to be helpful for predicting reading success for Spanish-speaking children.

Thus, a recent study (Carline and Crager, 1974) translated the TCU into migrant Spanish and was used in a study to attempt to predict reading success in bilingual migrant children. Approximately 100 children were given the TCU in English and in Spanish and also tested for oral reading skill in both languages. Reading achievement scores (California Achievement Test) were obtained from the respective schools that the children attended.

The results of this study were as follows. The translation of the Test of Concept Utilization into Spanish was accomplished with few cultural relevance difficulties and, with minor language modifications, was available to assess concept level usage in Spanish. The same scoring system previously developed in English was found applicable to Spanish responses of migrant bilingual children. The study was directed at predicting oral reading level from Spanish and English TCU scores,

but met with failure because of lack of control of examiner effects. The oral reading scores in Spanish and English turned out to be erroneous. The Spanish and English TCU scores did not predict California Achievement Test reading scores. However, the Spanish TCU and English TCU scores obtained from the same subjects produced scores that were very similar. Correlations between these TCU scores were high and the means for the same scores were the same in Spanish and Enlish.

The present study investigated the use of the English and Spanish Test of Concept Utilization (TCU) as a predictor of reading grade level in Spanish and English under more precisely controlled conditions of testing reading skill and concept testing than in the previously reported study by Carline and Crager. It also was undertaken to obtain baseline measures of reading skill in Spanish and English and TCU concept usage in Spanish and English for male and female migrant children, ages seven through twelve.

METHOD AND PROCEDURES

Design

Spanish and English concept usage scores and Spanish and English reading grade level scores were obtained from six age groups of migrant children (ages 7-12), with half of each group males and the other half females. Half of each sex were tested in concept usage and reading, first in English, then in Spanish, the other half in Spanish first, then in English. Thus, concept usage and reading level in Spanish and English were the measures in a 2 (sex) x 2 (order) x 6 (age) factorial design analysis of variance.

Subjects

The S's were 144 bilingual, migrant children, selected randomly from six schools in Northeastern Colorado during the summer. An equal number of subjects from each age were obtained from the schools. The mean ages for each of the age groups, 7-12, were as follows: 7.1, 8.0, 9.1, 9.9, 10.9, and 11.9.

Examiners

The six examiners were fluent in speaking and reading Spanish and English and were familiar with Mexican-American migrant culture. Four of the six were Mexican-American (two male, two female) and two were Anglo (one male, one female). All were trained extensively in administration and scoring of the procedures used in this study. Of the Mexican-American examiners, two males were raised in the migrant culture

and were college students; one female was an elementary school teacher, and the other female was a teacher's aid. The Anglo male was a college student and the Anglo female was a teacher's aid.

Procedures

All children were pre-tested to determine a minimal level of Spanish and English oral language usage, which was the definition of bilingualism used in this study. Each S was asked the following questions in English and then in Spanish for the pre-test: 1. "Tell me your name." 2. "Point to your hair, your arm, your mouth." 3. "What do you do with a glass of water?" 4. "Tell me three things you see in this room." 5. "Tell me three things you did today." S's were required to give correct responses to all the questions in both languages to be included in the study. The rejection rate following this criterion was 5.6 percent. All rejections resulted from an inability to answer these questions in English.

Half of the S's at each age and of each sex were then given the Spanish Test of Concept Utilization (S-TCU) and a (Migrant) Spanish translation of the Silvaroli Reading Inventory, Form B on Day 1. The same S's were given on Day 2 the English Test of Concept Utilization (TCU) (Crager and Spriggs, 1972), and the (English) Silvaroli Reading Inventory, Form A. The other half of the S's were given the English TCU and the English Silvaroli Reading Inventory, Form A on Day 1. These latter S's were given on Day 2 the Spanish TCU and the Spanish translation of the Silvaroli Reading Inventory, Form B. The attrition rate

from Day 1 to Day 2 was 35 percent due to school absence. These subjects were replaced through restricted random selection.

All examiners tested approximately an equal number of children at each age. Each examiner completed all testing for any particular child.

The Test of Concept Utilization (TCU) consists of fifty pairs of pictures of real world objects. The S gives a verbal response to each pair to the question "How are they alike or how do they go together?" Each response is scored into a category, which includes twelve concept categories other than the five main ones. The Spanish version of the TCU (S-TCU) was translated by the examiners from the English TCU. The translation was concordant with migrant Spanish usage, and was checked for accuracy independently by a Spanish language professor.

The results from the Silvaroli gave a reading score by grade level. Form A of the Silvaroli was used to obtain English reading levels. Form B was translated into Spanish concordant with migrant Spanish usage by the six examiners, and was used to obtain Spanish reading levels. The Spanish translation was produced to be identical to the English in type size and style, and pictorial representation. The original instructions for establishing reading levels with the Silvaroli allow the examiner to determine the approximate level of difficulty of the material to be read. The procedure used in this study was as follows: The S's were asked to read the vocabulary list concordant with their approximate reading level, e.g., first grade = age 7, second grade = age 8, etc. If a subject missed five words or less on the vocabulary list, reading was then begun on that same level. If the

child missed six to ten words on the vocabulary list, reading was begun at one level below the vocabulary list level. If ten to twelve words were missed on the vocabulary list, the child was instructed to read the vocabulary list one level below. If twelve to twenty words were missed on the vocabulary list, the child was instructed to read a vocabulary list two levels below. This procedure was used only to establish the difficulty level at which the child began reading. From this point on, the instructions in the Silvaroli Reading Inventory Manual were followed to obtain a grade level reading score based on oral reading and comprehension. The reading scores obtained were the Silvaroli "Instructional Level." All oral reading and comprehension responses were tape recorded to allow independent assessment of each child's reading level. A random sample of the tape recordings throughout the study indicated at least 90 percent independent agreement for grade level assessment with the examiner's assessment of reading level.

Since this is the first known translation of the Silvaroli Form B into Spanish, and since reading levels in Spanish have not been established for this test, the Spanish reading levels designated for Form B were assumed to be the same as the English Form B.

The Silvaroli was selected as a reading measure for translation into Spanish upon recommendation of several Mexican-American educators (a teacher, a principal, and a bilingual researcher). It was recommended as one of the least culturally biased reading tests for Mexican-American students.

RESULTS OF THE STUDY

Migrant children showed significant and marked delays in reading. Table 1 shows the Spanish and English mean grade level for each age. A significant F ratio for reading grade level was found by age, in both Spanish and English reading. Results indicated the average reading level in Spanish was significantly less than the reading levels in English for most of the ages. Significant correlated t-tests were found for ages 8, 9, 11 and 12, and the directional differences were the same for the nonsignificant differences for ages 7 and 10. The range over reading levels was greater for English than Spanish. Spanish reading grade level mean by age twelve (sixth grade) was barely at first grade. The English reading level mean by age twelve (sixth grade) was in the 3rd grade category. Overall, the mean reading level was approximately three years behind over all grades in English, with fourth graders just reading at first grade level.

Large percentages of the children at each grade level showed delays of two to three years below grade level. Tables 2 and 3 indicate these results in percentage form. The percentage of children two or more years behind in grade level in Spanish reading varied from 75 to over 90 percent. In English, these figures varied from almost 70 percent to over 90 percent. Similarly, large percentages of the children were found to be three or more years behind in both Spanish and English reading.

Figures 1 and 2 present the reading grade level data in histogram form for Spanish and English reading for the entire sample of S's. Only

TABLE 1

Reading Grade Level, F Ratios for Age, and Correlated t-tests Comparing Transformed Score Means of Spanish Silvaroli Reading Levels with Transformed Score Means of English Silvaroli Reading Levels, (Standard Deviations in Parenthesis) for Migrant Bilingual Male and Female Children, Ages 7 through 12 (N = 144 Total, N = 24 for Each Age Group, Half Male, Half Female)

	Spanish Silvaroli		English Silvaroli			
Age Group	Transformed * Reading Grade Level Means	Reading Grade Level Means	Transformed* Reading Grade Level Means	Reading Grade Level Means	t value	p
7	1.2 (0.5)	< preprimer	1.5 (1.1)	< preprimer	1.04	-
8	1.4 (0.9)	< preprimer	2.4 (1.2)	< primer	3.33	< .01
9	1.9 (1.5)	< preprimer	3.5 (1.8)	0.5	3.43	< .01
10	2.5 (2.9)	< primer	3.9 (2.1)	0.9	1.86	-
11	2.5 (2.2)	< primer	5.3 (2.8)	2.3	3.83	< .01
12	3.9 (3.2)	0.9	6.7 (1.9)	3.7	3.69	< .01
	F Ratio for Age = 4.98 (< .01)		F Ratio for Age = 22.8 (< .001)			

* Transformed Scores: The Silvaroli reading grade level scores obtained were transformed to a 9-point scale for purposes of statistical analysis as follows: no reading = 1, preprimer = 2, primer = 3, 1st grade level = 4, 2nd grade level = 5, 3rd grade level = 6, etc.

TABLE 2

Cumulative Percent of Bilingual Migrant Children Reading At and Below Grade Level on the Spanish Translation of the Silvaroli, Form B, Age Groups 7 to 12, Grades 1 to 6 (Percent of Children At Each Grade Level in Parenthesis). N each Age Group = 24.

Age Group + Assumed Grade	Reading At Grade Level, Number of Grade Levels Above (+) or Below (-)												
	+4	+3	+2	+1	Grade Level*	-1	-2	-3	-4	-5	-6	-7	-8
7 1st Grade	(0)	(0)	(0)	(0)	(0)	100 (4.2)	95.8 (12.5)	83.3 (83.3)	-	-	-	-	-**
8 2nd Grade	(0)	(0)	(0)	(0)	(0)	100 (8.3)	91.7 (0)	91.7 (16.7)	75.0 (75.0)	-	-	-	-
9 3rd Grade	(0)	(0)	(0)	(0)	100 (4.2)	95.8 (4.2)	91.6 (8.3)	83.3 (12.5)	70.8 (4.2)	66.6 (66.6)	-	-	-
10 4th Grade	100 (4.2)	95.8 (4.2)	91.6 (0)	91.6 (0)	91.6 (0)	91.6 (8.3)	83.3 (4.2)	79.1 (0)	79.1 (4.2)	74.9 (4.2)	70.7 (70.7)	-	-
11 5th Grade	(0)	(0)	(0)	(0)	(0)	100 (12.5)	87.5 (0)	87.5 (4.2)	83.3 (12.5)	70.8 (8.3)	62.5 (4.2)	58.3 (58.3)	-
12 6th Grade	(0)	(0)	(0)	100 (4.2)	95.8 (0)	95.8 (20.8)	75.0 (4.2)	70.8 (4.2)	66.6 (8.3)	58.3 (4.2)	54.1 (4.2)	49.9 (8.3)	41.6 (41.6)

* Grade Level Reading for Age Group 7 was assumed to be at 1st grade, Age Group 8 at 2nd grade, etc. A +1 is one grade level above, -1 is one grade level below grade level, etc.

** A dash (-) in the table indicates the S^S could not achieve scores on the reading test equal to that grade level.

TABLE 3

Cumulative Percent of Bilingual Migrant Children Reading At and Below Grade Level on the English Silvaroli, Form A, Age Groups 7 to 12, Grades 1 to 6 (Percent of Children at Each Grade Level in Parenthesis). N each Age Group = 24.

Age Group + Assumed Grade	Reading At Grade Level, Number of Grade Levels Above (+) or Below (-)											
	+3	+2	+1	Grade Level*	-1	-2	-3	-4	-5	-6	-7	-8
7 1st Grade	(0)	100 (4.2)	95.8 (0)	95.8 (0)	95.8 (0)	95.8 (25.0)	70.8 (70.8)	-	-	-	-	-**
8 2nd Grade	(0)	(0)	(0)	100 (4.2)	95.8 (16.7)	79.1 (20.8)	58.3 (33.3)	25.0 (25.0)	-	-	-	-
9 3rd Grade	(0)	(0)	100 (4.2)	95.8 (8.3)	87.5 (20.8)	66.7 (20.8)	45.9 (12.5)	33.4 (16.7)	16.7 (16.7)	-	-	-
10 4th Grade	(0)	100 (4.2)	95.8 (0)	95.8 (8.3)	87.5 (12.5)	75.0 (4.2)	70.8 (29.2)	41.6 (8.3)	33.3 (20.8)	12.5 (12.5)	-	-
11 5th Grade	100 (4.2)	95.8 (0)	95.8 (12.5)	83.3 (4.2)	79.1 (16.7)	62.4 (8.3)	54.1 (8.3)	45.8 (16.7)	29.1 (4.2)	24.9 (20.7)	4.2 (4.2)	-
12 6th Grade	(0)	(0)	100 (12.5)	87.5 (4.2)	83.3 (12.5)	70.8 (29.1)	41.7 (16.7)	25.0 (8.3)	16.7 (12.5)	4.2 (4.2)	0 (0)	0 (0)

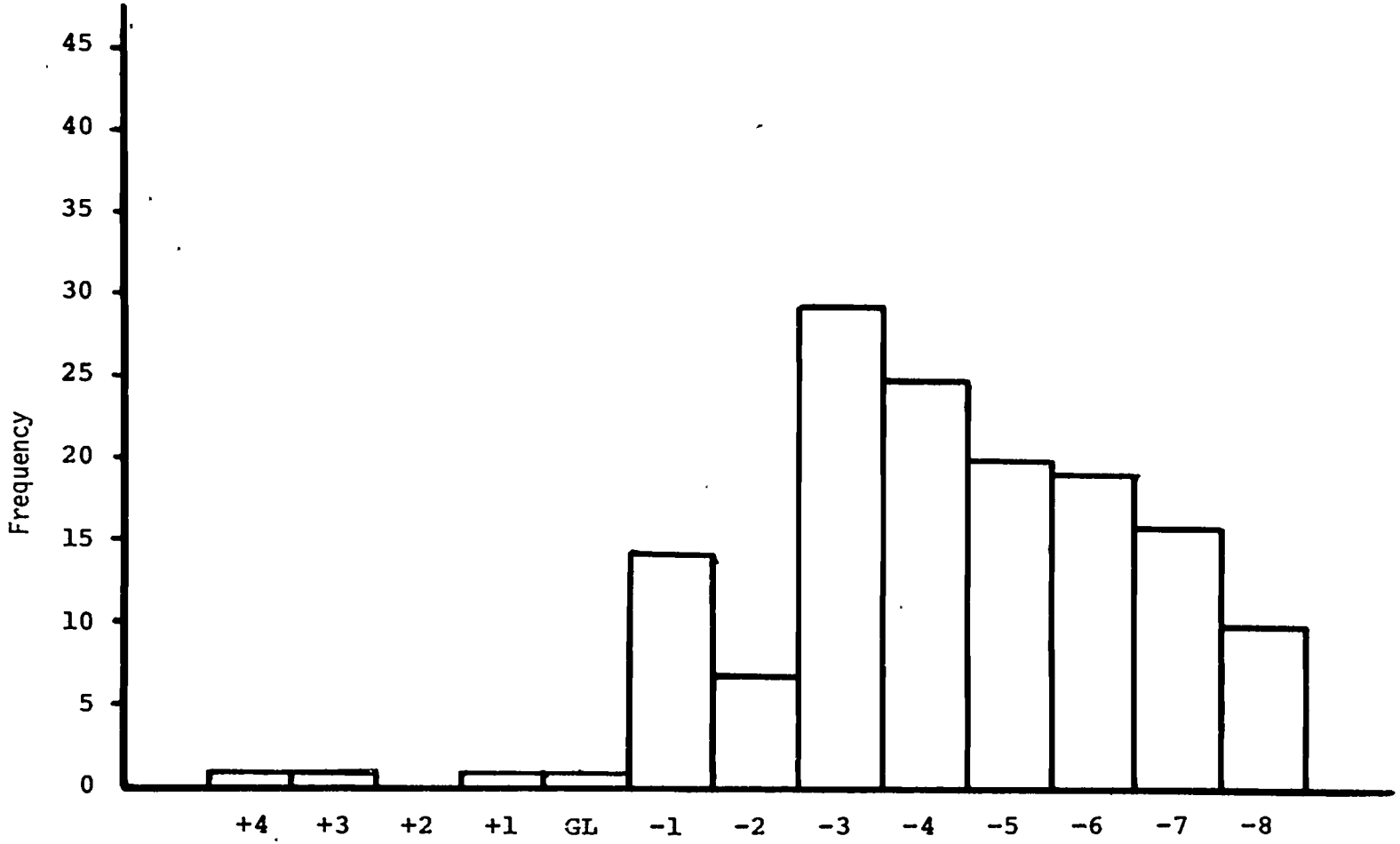
* Grade Level Reading for Age Group 7 was assumed to be at 1st grade, Age Group 8 at 2nd grade, etc. A +1 is one grade level above, -1 is one grade level below grade level, etc.

** A dash (-) in the table indicates the S^S could not achieve scores on the reading test equal to that grade level.

a small percentage of children, roughly 3 percent, read at grade level or above in Spanish. The distribution for English reading appeared essentially normal, but the mean was approximately three grade levels below expected grade level. Only 11 percent of the children read in English at expected grade level or above.

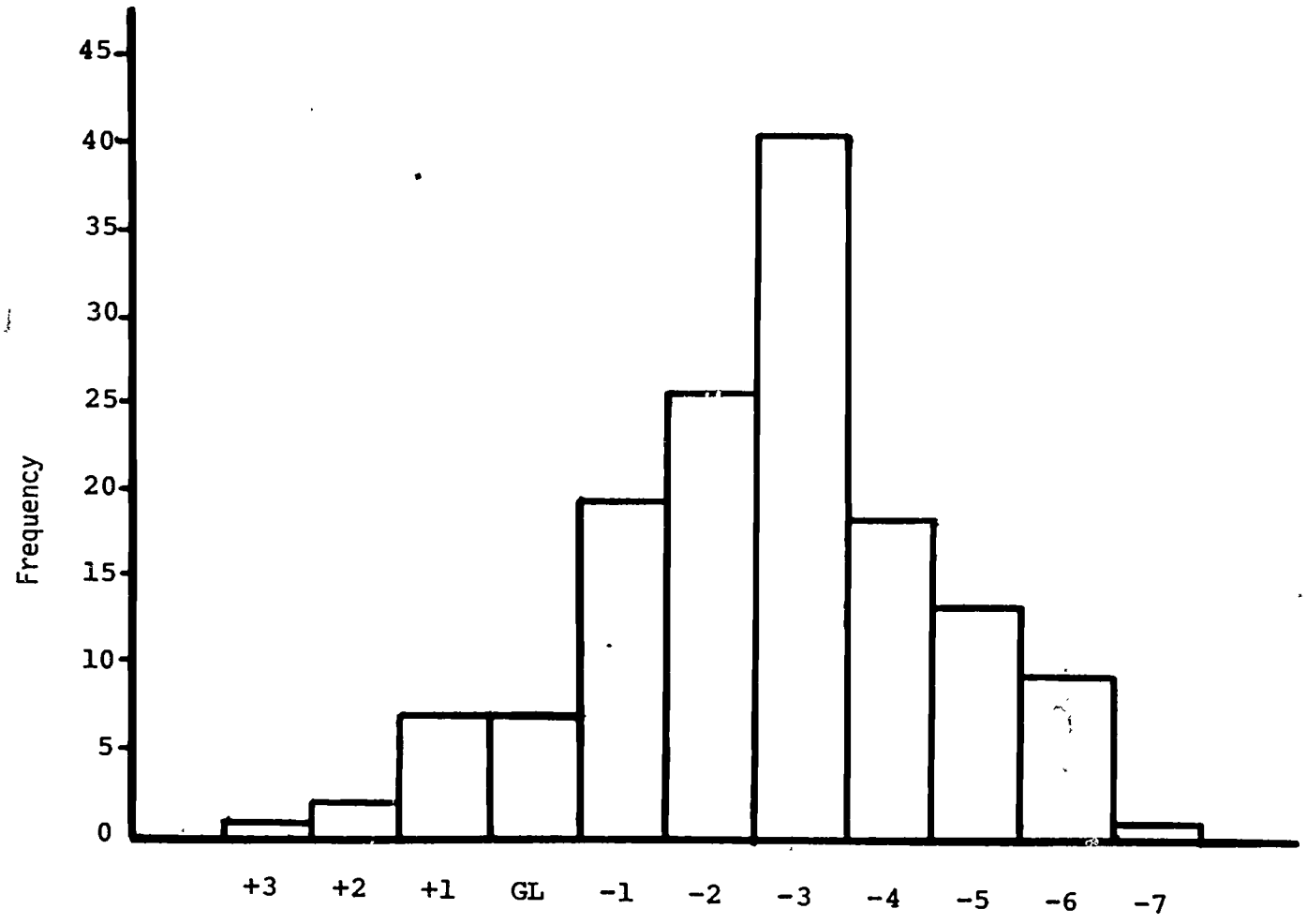
The percentage of children who are unable to read at all can be determined from Tables 2 and 3. For each age, the percent of non-readers is indicated in the extreme right percentage figure listed for each age. Thus, in Table 2, Spanish reading, 83.3% of the children at age seven could not read in Spanish, and 58.3% could not read in Spanish by age 11. Similarly in Table 3, 70.8% of the seven-year-old children were non-readers in English while 4.2% of the children age 11 were non-readers in English.

The six age groups of children were combined into three groups, ages 7-8, 9-10, and 11-12, to obtain three groups of 48 subjects each. Correlation coefficients were calculated between each of the TCU concept category scores in Spanish and English and the reading scores in Spanish and English. The groups were combined in order to obtain a more stable estimate of the actual correlation between these measures. Tables 4, 5 and 6 show the statistically significant correlations between the TCU scores and the reading scores for each of the age groups. Since a large number of correlation coefficients were calculated (29 TCU scores in Spanish and 29 in English with the two reading scores), only correlation coefficients at the .01 level or less were judged significant in order to reduce the effect of chance variation.



	%	0.7	0.7	0	0.7	0.7	9,7	4.9	20.1	17.4	13.9	13.2	11.1	6.9
cum.	%	100.0	99.3	98.6	98.6	97.9	97.2	87.5	82.6	62.5	45.1	31.2	18.0	6.9

Figure 1. Frequency of bilingual migrant children reading above, at, and below grade level on the Spanish translation of the Silvaroli (GL = Grade Level Reading, + sign = above GL, - sign = below GL).



	%	0.7	1.4	4.9	4.9	13.2	18.0	28.5	12.5	9.0	6.2	0.7
cum.	%	100.0	99.3	97.9	93.0	88.1	74.9	56.9	28.4	15.9	6.9	0.7

Figure 2. Frequency of bilingual migrant children reading above, at, and below grade level on the English Silvaroli (GL = Grade Level Reading, + sign = above GL, - sign = below GL).

TABLE 4

Statistically Significant Correlations ($r = .37$, $p < .01$): Concurrent Predictions of Spanish and English Reading Levels from Spanish TCU and English TCU Concept Category Scores for Migrant Children, Ages 7-8 ($N = 48$).

English TCU Concept Category	Spanish Reading Level	English Reading Level
Shape (S, S-)	-	.47
Homogeneous Function (HF, HF-)	-	.47
Abstract (A, A-)	-	.40
Relational Function (RF, RF-)	-	.47
Reality Match Score - Shape (RS-S)	-	.46
Reality Match Score - Homogeneous Function (RS-HF)	-	.42
Reality Match Score - Abstract (RS ·)	-	.40
Reality Match Score - Relational Function (RS-RF)	-	.49
Reality Match Score - Total (RS-T)	-	.43

Spanish TCU Concept Category	Spanish Reading Level	English Reading Level
Abstract (A, A-)	-	.46
Reality Match Score Abstract (RS-A)	-	.41

TABLE 5

Statistically Significant ($r = .37$, $p < .01$) Correlations: Concurrent Predictions of Spanish and English Reading Levels from Spanish TCU and English TCU Concept Category Scores for Migrant Children, Ages 9-10 ($N = 48$)

English TCU Concept Category	Spanish Reading Level	English Reading Level
Homogeneous Function (HF, HF-)	-	.37
Reality Match Score - Homogeneous Function (RS-HF)	-	.40

Spanish TCU Concept Category	Spanish Reading Level	English Reading Level
Abstract (A, A-)	.37	.44
Reality Match Score - Abstract (RS-A)	.37	.47
Stimulus Bound (Cq, Sq, Sq-, Sz, Sz-)	-	.47
Irrelevant Detail Score (IDS)	-	.45

TABLE 6

Statistically Significant ($r = .37$, $p < .01$) Correlations: Concurrent Predictions of Spanish and English Reading Levels from Spanish TCU and English TCU Concept Category Scores for Migrant Polygots, Ages 11-12 (N = 48)

English Concept Category	Spanish Reading Level	English Reading Level
Shape (S, S-)	-	.37
Homogeneous Function (HF, HF-)	-	.54
Abstract (A, A-)	-	.50
All Equivalence	-	.38
Reality Match Score - Homogeneous Function (RS-HF)	-	.46
Reality Match Score - Abstract (RS-A)	-	.48
Reality Match Score - Relational Function (RS-RF)	-	.41
Reality Match Score - Total (RS-T)	-	.41
Acceptable Mains	-	.43

Spanish Concept Category	Spanish Reading Level	English Reading Level
Object Bound (W, X, M, P, V)	.41	-
Shape (S, S-)	-	.57
Homogeneous Function (HF, HF-)	-	.48
Abstract (A, A-)	-	.64
Reality Match Score - Shape (RS-S)	-	.53
Reality Match Score - Homogeneous Function (RS-HF)	-	.47
Reality Match Score - Abstract (RS-A)	-	.60
Reality Match Score - Relational Function (RS-RF)	-	.42
Reality Match Score - Total (RS-T)	-	.50
Acceptable Mains	-	.54

Overall, few TCU concept category scores in Spanish or in English predict Spanish reading level in any of the age groups. No correlations were significant for age 7-8 in predicting Spanish reading level from either English or Spanish TCU concept categories. The most abstract concept scores (A and RS-A which are highly intercorrelated) were found to predict Spanish reading level from Spanish TCU for the 9-10 age group, and none of the English TCU categories predicted Spanish reading level in that age group. A combined category score predicted Spanish reading level from Spanish TCU for the 11- and 12-year-old age group. This TCU score (WXMPV) is a group of scores that has been designated as Object Bound and deals primarily with the subject giving responses denoting object parts, movements of objects and semantic responses, e.g., "They both start with the letter M."

A number of Spanish and English TCU concept categories, however, predicted English reading level with individual correlations as high as .64. Most of these correlations were for concept categories that comprise the major TCU categories, i.e., Shape (S, S-), Homogeneous Function (HF, HF-), Abstract (A, A-), and Relational Function (RF, RF-), and their companion Reality Match Scores (RS-S, RS-HF, RS-A, RS-RF, and RS-T). The Reality Match Scores are highly intercorrelated with the main concept category scores, and for purposes of this study can be considered the same. The RS-T score is the sum total of the five main concept category scores. The norms for the main concept category scores, while having their own individual growth curves over age, generally increase as age increases.

The Stimulus Bound TCU category (Cq, Sq, Sq-, Sz, Sz-) predicted English reading significantly for age group 9-10. The perceptually bound category includes responses that form equivalences through achromatic color details in the plates (Cq), partial shapes, e.g., dots, lines, (Sq, Sq-), and size of the two objects (Sz, Sz-). Previous to this study, an Irrelevant Detail Score (IDS) was developed, which adds three scores to the perceptual bound categories listed above. The three added scores were Word Usage equivalences, e.g., "both start with M" (W), Parts, e.g., "both have a stem" (P), and Movement, e.g., "both roll" (M). The Spanish TCU Irrelevant Detail Score was found to have a positive correlation with English reading level for age group 9-10.

Table 7 lists the statistically significant differences (correlated t-tests) between Spanish and English TCU concept category means for each of the six age groups. Six concept category means were found to be significantly different. The main finding, which held true for every age group, was that the children gave more semantic discrepant (SD) responses on the English TCU than on the Spanish TCU. The means were also higher in Spanish in the following TCU categories: (Abstract (A) and Reality Match-Abstract (RS-A) at age 12, Minor Relational, i.e., Together (T) and Constructions, e.g., stories (CS) at age 9, and Object Qualities (Σq) at age 8. Thus, in most of the TCU concept categories, the means were the same in Spanish and English.

Tables 8 and 9 summarize the statistically significant F-ratios obtained in the factorial design analysis of variance of 29 TCU scores in Spanish and English (age x sex x order). None of the analyses of

TABLE 7

Statistically Significant Differences and Probability Levels (Correlated t-tests) between Spanish and English TCU Concept Category. Means for Migrant Children, Ages 7 - 12 ($S.D.^S$ in parenthesis) N=24 each Age Group.

Age Group	TCU Concept Category	Spanish TCU Mean	English TCU Mean	t	p
7	Infusions (Σ/N,/B,/A)	2.9 (3.5)	7.8 (9.8)	2.32	< .05
7	Semantic Discrepancies (SD)	0.2 (0.5)	3.3 (2.9)	5.10	< .01
8	Sum of Qualitative Responses Given to Unilaterials (Σq)	3.4 (4.9)	0.9 (1.2)	2.44	< .05
8	Semantic Discrepancies (SD)	0.3 (0.6)	3.5 (3.7)	4.25	< .01
9	Minor Relational (T,CS)	2.6 (1.9)	1.5 (1.4)	2.45	< .05
9	Semantic Discrepancies (SD)	0.6 (1.1)	1.8 (2.0)	2.37	< .05
10	Semantic Discrepancies (SD)	0.2 (0.5)	2.1 (1.5)	5.80	< .01
11	Semantic Discrepancies (SD)	0.4 (0.9)	2.1 (1.9)	4.10	< .01
12	Abstract (A)	1.0 (1.1)	0.3 (0.5)	2.50	< .02
12	Reality Match Score - Abstract (A)	0.8 (1.1)	0.3 (0.4)	2.40	< .05
12	Semantic Discrepancies (SD)	0.1 (0.3)	1.8 (1.7)	4.70	< .01

variance showed any main sex effects for the TCU scores in Spanish or English. The major finding in the analyses was that there were a number of TCU scores in Spanish and English which showed main effects for age. Many of the TCU categories which showed main effects for age were the same in Spanish and English. These included most of the main TCU categories (Shape, Homogeneous Function, Abstract, Relational Function) and their companion Reality Match Scores. Most of these scores showed a similar curve over age, generally characterized by an increase in the mean from ages 7 to 9, with the means remaining the same from age 9 through age 12.

In all the analyses of variance, there were only two significant interactive effects, one for English TCU score Homogeneous Function, and one for Spanish TCU score Infusions (Σ/N,/B,/A). There was a sex x order interaction for the English Homogeneous Function (HF) score. Females gave more HF concepts than males on the English TCU when they took the Spanish TCU first.

A sex x order x age interaction was found for Infusions (Σ/N,/B,/A) in Spanish. The following effect was found for younger, but not the older age groups: males gave more Infusions when taking the English TCU first, and females gave more Infusions when taking the Spanish TCU first.

Two significant main order effects were found. An F of 5.47 ($p < .05$) was found for English TCU Infusions (Σ/N,/B,/A). The mean number of Infusions was greater on the English TCU when taken first. The second statistically significant ($F = 4.51$, $p < .05$) main order effect was for the English TCU Minor Relational categories (T, Cs, Cs-). The mean number of English Minor Relational Concepts was greater when the English TCU was taken first.

TABLE 8

Statistically Significant Age Effects from 2 (Sex) x 2 (Order) x 6 (Age) Analysis of Variance Results for Spanish TCU Scores of the Migrant Children. (N = 144).

Spanish TCU Concept Category	Spanish TCU Score Means for Each Age Group						F	p
	7	8	9	10	11	12		
Shape (S, S-)	2.1	4.5	5.1	5.3	5.0	6.6	5.20	<.01
Homogeneous Function (HF,HF-)	1.9	3.5	4.5	4.3	4.0	4.8	4.61	<.01
Abstract (A, A-)	0.2	0.5	0.4	0.6	0.5	1.0	2.56	<.05
All Equivalence	12.8	19.3	22.3	22.2	22.1	26.4	3.31	<.01
Acceptable Mains	8.7	14.5	15.7	18.6	15.4	21.6	4.71	<.01
Reality Match Score Shape (R-S)	2.0	4.3	5.1	5.0	4.8	6.4	5.16	<.01
Reality Match Score (RS-HF) Homogeneous Function	1.8	3.2	4.3	3.9	3.7	4.5	5.14	<.01
Reality Match Score (RS-RF) Relational Function	4.3	6.0	6.4	7.1	6.3	8.2	4.54	<.01
Reality Match Score Total (RS-T)	11.7	19.3	21.8	22.4	21.2	26.4	5.44	<.01
Inferior Mains	4.5	7.5	8.5	8.7	8.2	8.1	2.44	<.05
Minor Relational (T,CS,CS-)	9.0	3.7	2.6	2.2	2.4	2.0	3.77	<.01
Unilaterals (U-U)	15.8	10.8	10.0	5.4	8.1	4.4	2.41	<.05
Sum of Qualitative Responses given to Unilaterals (Σq)	8.0	3.4	3.6	4.3	4.2	0.5	2.47	<.05

TABLE 9

Statistically Significant Age Effects from 2 (Sex) X 2 (Order) X 6 (Age) Analysis of Variance Results for English TCU Scores of the Migrant Children. (N = 144)

English TCU Concept Category	English TCU Score Means for Each Age Group						F	p
	7	8	9	10	11	12		
Shape (S,S-)	2.5	4.1	5.0	5.0	4.7	5.5	2.87	$<.05$
Homogeneous Function (HF, HF-)	1.8	3.8	4.4	3.6	4.1	5.1	5.44	$<.01$
Relational Function (RF, RF-)	5.7	8.3	9.0	10.6	9.8	10.4	3.86	$<.01$
All Equivalence	13.3	18.9	22.5	21.9	21.4	25.4	2.76	$<.05$
Acceptable Mains	7.0	15.3	15.7	18.7	18.4	20.3	5.79	$<.01$
Reality Match Score - Shape (RS-S)	2.5	4.1	5.0	4.9	4.7	5.4	2.78	$<.05$
Reality Match Score - Homogeneous Function (RS-HF)	1.7	3.2	3.7	3.3	3.6	4.6	5.62	$<.01$
Reality Match Score - Relational Function (RS-RF)	4.2	6.3	7.2	7.2	7.0	8.0	5.44	$<.01$
Reality Match Score - Total (RS-T)	12.3	19.1	21.5	21.5	21.5	24.7	4.40	$<.01$
Minor Relational (T, CS, CS-)	7.5	3.4	1.5	2.4	1.7	2.2	3.73	$<.01$
Infusions (Σ/N,/B,/A)	7.8	4.6	2.6	3.8	2.1	2.6	4.72	$<.01$
Semantic Discrepancies (SD)	3.3	3.5	1.8	2.1	2.1	1.8	2.54	$<.05$

DISCUSSION OF THE RESULTS

Spanish and English Reading

A most striking finding in this research was the very low English reading levels of migrant children for all ages. There were even lower levels in Spanish reading. It is evident that this sample of bilingual children has not experienced much Spanish reading instruction, since most (58%) of the 12-year-old students (sixth grade) were reading only at the first grade level in Spanish, and over 40% could not read in Spanish at all. The Spanish reading level was consistently lower than English over all ages.

The English reading levels of these migrant children were far below grade level. Nearly 75% of the 7-year-old children could not read at all, which was significant in itself. More striking was the finding that the 10-year-old students (fourth grade) were reading at a mean grade level of barely first grade (0.9) and 75% were two or more grade levels behind, a level defined as "severe reading retardation" in the Mexican-American Educational Series study (The Unfinished Education, 1971). The reading results found in that study indicated 17% (19% in Colorado) of the Mexican-American students were two or more years behind in reading. Their results were obtained from principal and teacher ratings of students along with some achievement testing.

Assuming the Silvaroli is a relatively accurate assessment of reading level, migrant children appear to show much more severe reading delays as a group than the overall Mexican-American population.

If the findings of the present study are a true representation of the longitudinal process, it takes at least from first through fourth grade to obtain a first grade reading level as an average for migrant children under present educational conditions. Also, these severe delays continued for fifth and sixth graders, whose average grade levels were 2.3 and 3.7, respectively.

These results suggest major difficulties for migrant children in relating to the present teaching procedures and materials found in a standard curriculum in any school system that depends upon reading as a tool, e.g., gaining appropriate age and grade level knowledge and skill through such materials as structured grade level textbooks, supplementary books and magazines when the reading level of the students is far below the level of materials. Children whose chronological age would normally place them at fourth grade reading achievement level (approximately 80% of this sample) would thus be functionally alienated from the fourth grade curriculum content if access to it were based upon reading.

If reading in Spanish or English is to be used as a vehicle for bilingual/bicultural education for migrant children, considerable education would first have to be accomplished in basic reading skill. Early efforts at bilingual/bicultural education would have to be accomplished mainly through non-reading education and communication.

As indicated in the histograms, 75% of the entire sample of migrant male and female children in this study were two or more years delayed in English reading and 88% in Spanish reading. A percentage as high as this suggests a major factor (or factors) at work in reading delays. Bilingualism in itself or specific learning disabilities appear unlikely to account for the results. Furthermore, the ethnicity and familiarity of the examiners with the Mexican-American culture suggests no interference in obtaining accurate reading measures.

Some of the educational deficiencies cited in the Mexican-American Education Series may well be involved in accounting partially for delayed reading, e.g., low financial support, facility deficiencies, cultural bias, etc. But migrant children in the present study show even more severe reading deficiencies than the children in the Mexican-American study. Thus, a major factor (or factors) more indigenous to migrant Mexican-American children is suspected.

The authors suggest that educational discontinuity in reading instruction of frequently moving migrant children is likely to account for a significant amount of reading delays. Frequent absence from school may also be a significant contributing factor (35% of the children in the study had to be replaced because of absence on the second day of testing). Increasing alienation from the school curriculum as school grade increases, as well as attitudinal and motivational factors related to limitations of social goal attainment may also be factors in determining these results.

The authors suggest, however, that educational discontinuity is one of the most relevant and immediate causes, and in turn may well prevent the more typical development of language and cognition as well as reading skill.

Predicting Reading from the TCU

The positive correlations between TCU Shape and Homogeneous Function concepts and English reading were found for migrant children as it had been found previously for Anglo and non-migrant Spanish-surname children. This finding was thus replicated in this study. Spanish TCU Shape and Homogeneous Function concepts also correlated significantly with English reading, but not with Spanish reading. Large percentages of the migrant children (e.g., 70% of the ten year olds) could not read at all in Spanish, and as the previous discussion concluded, the children probably have received little or no Spanish reading instruction. Thus, the prediction of Spanish reading level from Spanish or English TCU scores was essentially not testable. The great similarity between Spanish and English TCU scores found, however, suggest the hypothesis that if Spanish reading were formally taught, the Spanish TCU would correlate with Spanish reading.

Additional Spanish and English TCU scores were also correlated with reading scores in English, including Acceptable Mains, Abstract, Relational Function concepts, and some of the Reality Match scores. These and the previously stated results suggest that children possessing the most articulate concept usage and common or usual reality concepts show the

best reading success. Such findings were especially the case for the 7-8- and the 11-12-year old groups.

While the 9-10 year olds showed this pattern in part (Homogeneous Function and Abstract concepts correlated with English reading skill), the Stimulus Bound score and the Irrelevant Detail score also correlated positively with English reading, and the Shape (whole shape) responses correlation did not appear as it had for the other two age groups.

Previous unpublished results suggested that focusing upon irrelevant details, and partial shape responses (bits-and-pieces) on the TCU were correlated with reading difficulties, especially early in the learning of reading, while giving whole shape responses (Shape) correlated with reading success. The results suggest that a closer focus upon the stage of the reading process a child is in may clarify the correlations. For example, the tendency to give whole shape TCU responses may well be correlated with sight reading and sight vocabulary skill, and the tendency to focus upon irrelevant details may be negatively correlated with sight reading. Learning phonics as a strategy may correlate positively with the giving of Irrelevant Detail and Stimulus Bound responses on the TCU. Giving Homogeneous Function responses on the TCU may correlate more specifically with comprehension, internal meaning translation, and similar processes in communication skills. These hypotheses were in part suggested by previous unpublished research and pilot educational remediation in the classroom. The 7-8-year-old group read mainly at the primer and lower level where good sight vocabulary is more relevant

for success in reading. Beyond that initial level phonics is often introduced, and the 9-10-year-old group, struggling with first grade learning of reading may have been so involved.

Further research which relates specific reading stage skill to cognitive usage education appears necessary to answer these hypotheses.

The result in previously unpublished research which found a negative correlation between Infusions (Σ/N,/B,/A) and reading scores was not found in the present study. This score indicates the giving of unusual, affectively laden, and reality distorted responses. The hypothesis previously generated from this negative correlation was that ideosyncratic meaning systems interfere with reading comprehension, and have generally been linked in the reading literature to one type of reading disorder (Crager and Spriggs, 1972; Blank, Weider and Bridger, 1968). Possibly the reading delays seen in migrant children are so masked by other significant factors, e.g., lack of instruction due to discontinuity, that such factors as specific reading disability, which account for smaller amounts of the variability do not surface in the results. If such were the case, then as reading instruction for migrant children was significantly improved, one might expect to find this negative correlation to occur.

Spanish and English Concept Usage Development in Migrant Children

Since the Spanish and English TCU scores were highly intercorrelated, and there were few differences in the kinds of concepts given in Spanish as compared to English, and as only two order effects were found, this

suggests the TCU given in either language is a good predictor of the cognitive usage in the other language for bilingual children as defined in this study. While likely to be found, further research would be needed to determine if the cognitive usage in Spanish for Spanish-only-speaking children could predict ultimate facility in English, and reading skill in Spanish or English. The results lend support to this speculation in that the differences are few when Spanish and English TCU scores are compared.

A significant difference that was found consistently in every age group was that Semantic Discrepant (SD) responses were given at a significantly higher rate for the English TCU than in Spanish. Since this finding was independent of order (i.e., taking the Spanish TCU before or after the English TCU), it supports the conclusion that migrant children are more articulate in Spanish than in English when one uses accuracy of word usage, syntax, word order, etc. as the measure. Thus, migrant children were syntactically and semantically more accurate in Spanish than in English. Conversation with a migrant child in English may thus lead to erroneously low judgments as to the child's basic language-conceptual facility.

The children given the English TCU first also showed more English Infusions than when given the Spanish TCU first. While further analysis of this result is in order, it may suggest that these children may translate ideas with fewer idiosyncrasies when they are able to use the Spanish language first with new material before translation into English. than when asked to respond first in English. Such an interpretation is

not supported for the use of various concepts tapped by the TCU, however, e.g., Shape, Homogeneous Function, Abstract, Relational Concepts, etc., since there were no differences found for these in comparing Spanish and English, nor any order effects.

The final major finding concerns the growth curves of TCU concept usage in Spanish and English over the 7-12-year-old range. Most of the major TCU concept categories (Shape, Homogeneous Function, Relational Function, Abstract) showed increases from 7 to 9 years of age, then showed virtually no increase from 9 through 11. For some categories there was a slight rise from ages 11 to 12. The statistically significant age change was thus from ages 7 to 9, with the curve flattening from that point on. Previous unpublished research (Crager, 1975b) which obtained norms for Spanish-surname, non-migrant children did not show such a flattening effect over age, even when only lower socio-economic level Spanish-surname non-migrant children comprise the subject sample. Means for non-migrant Spanish-surname children show the same early concept usage, but continue to increase (or for some categories, decrease) over age, when measured on the TCU cross-sectionally.

The meaning of this finding is unknown. We suggest that this flattening effect for migrant children is suggestive of diminished language and conceptual stimulation, possibly related to the same factors discussed earlier in the discussion of the reading findings, e.g., academic alienation, educational discontinuity, and functional curriculum constriction. Specific programmed language and concept education in a systematic,

connected program is highly recommended before further interpretation of this flattening effect is in order. It is reminiscent, however, of results found with children from constricted environments (Kagan, 1972).

DISCUSSION CONCERNING INTERRELATIONSHIPS AMONG THE FINDINGS AND SUGGESTIONS FOR RESEARCH IN THE EDUCATION OF MIGRANT CHILDREN

When one considers the findings and interpretations suggested in the present research as a whole, a major issue concerns the interrelations between delayed conceptual-language development and reading skill, and instructional discontinuity. We suggest that specific language-cognitive education, programmed sequentially in terms of difficulty level, and elaborated systematically in a manner insuring individual student educational continuity from school to school could have a major impact in improving migrant education. Such a program by itself may improve reading efficiency independently of improved reading instruction per se. A language-cognitive program could provide the necessary functional conceptual and language skills that make reading a communication tool independent of the basic mechanics of reading. Specific research is recommended to assess the impact of such language and cognitive education (language experience) upon reading skill for migrant children. Other basic skills, e.g., math, may also improve with the impact of good language and conceptual skill development in education. A pilot research program to develop such educational procedures is highly recommended. It should include a concatenated program coalescing both language development and conceptualization by using the language experience approach emanating from diagnostic judgments based upon TCU protocols.

The consistent correlations between certai TCU concepts (Shape and Homogeneous Function) and reading skill further suggest specific language-concept training, rather than unspecified "enrichment" of language

experience. Conceptual education may be not only more relevant, but also more efficient in improving reading skills than specific education in reading per se. It appears that specific focus on reading instruction, e.g., phonics, improving sight vocabulary, etc., may well have limited effects if language and conceptual skills remain at rudimentary levels.

A large-scale interstate research project that would systematically vary Spanish and English language-conceptual education, reading instruction, and continuity is recommended, if the pilot project proves successful.

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