

SECOND LANGUAGE RESEARCH FORUM (SLRF)
Tucson, AZ
October 26, 1996

University of Miami Bilingualism Study Group
Barbara Zurer Pearson, D. K. Oller, V. M. Umbel, & M. C. Fernández
(with A. Cobo-Lewis)

Mailing Address: Psychology Annex, 221; Coral Gables, FL 33124-0721 USA
Phone: 305-284-1760/fax: 305-284-4795
email: bpearson@umiami.ir.miami.edu

The Relation of Lexical Knowledge to Measures of Literacy and Narrative Discourse in Monolingual and Bilingual Children

*What does vocabulary knowledge tell us about other types of language knowledge?
What requirements for vocabulary do literacy and narrative activities impose on the child?*

No one would claim that all one needs to know in order to speak a language is just the words of that language. Knowledge of words is only one element of many in being able to use the whole language system. Likewise, no one would seriously claim to measure the extent of an individual's knowledge of a language by counting the number of words the individual knew in that language (even supposing that one could). But in fact, vocabulary testing is often a reasonable way to get a reading on how much experience someone has with a given language.

One may do this because there are strong empirical associations between estimates of the numbers of words one knows and a range of other language behaviors. So while there is no logical necessity for vocabulary to be a good index of other language functions, it is the unusual case--like hyperlexia or Williams Syndrome, for example--when it is not.

Granting that there are many impenetrable questions about lexical knowledge (which of course makes them more interesting), there are also some relatively quick and easy ways to

probe it at a level which gives useful information. As a teacher interested in knowing which of my students had read and understood an assigned story, I might very well test their knowledge of the meanings of key words in the text. Experience would tell me that the students who knew the author's words are usually the ones who could also talk about the author's ideas, and those that didn't know the words, usually didn't know the ideas either. Similarly, intelligence tests traditionally include a vocabulary component. And the technical manuals, from Terman (1918) to Wechsler (1974), inform us that the vocabulary subsection of the test has the highest correlation to the full score. So once again, vocabulary knowledge is a useful index of more general abilities.

These associations, though, are true only for the groups for which they have been established. They cannot be extended to other groups, without first getting empirical confirmation. In particular, it is an unwarranted extrapolation with bilinguals. We know that bilingual children have their lexical knowledge distributed in two languages (Umbel et al. 1992; Pearson & Fernández, 1994; Pearson et al., in preparation). Therefore, comparisons involving a single language--that is, only a portion of the bilinguals' knowledge-- cannot be considered equivalent to similar comparisons for monolinguals, where the vocabulary term of the equation taps into their total lexical knowledge.

In this paper, we explore how various measures of receptive and productive vocabulary knowledge relate to each other and to a range of other language measures among matched groups of bilinguals and monolinguals. To jump to the bottom line, in a series of careful comparisons between monolinguals and bilinguals--matched for SES and language of the home--we have seen a large gap between bilinguals' performance and a monolingual

reference group in "Oral Language"--principally VOCABULARY. Within the Oral Language cluster of the Woodcock Johnson and other measures described below, the deficit, relative to both the norming sample and the local control groups, is seen in vocabulary--in Spanish, only in production vocabulary and in English, in both Picture Vocabulary (production) and the PPVT (receptive vocabulary). A similar gap is NOT found in the literacy skills. Rather we see a picture of relatively comparable literacy skills between the monolinguals and the bilinguals--at least once the Hispanic children have had some experience with English. By contrast, vocabulary starts very low--2 standard deviations below the mean at kindergarten and it appears to move up steadily to the low average range when tested at the 5th grade level. Unlike for monolinguals, vocabulary scores are almost never higher than literacy scores for any of the bilinguals. A separate but related finding is that vocabulary levels in English were affected by SES and Home Language; whereas in Spanish those two factors were not significant, but Language of the School was. Also, in the bilinguals, the vocabulary measure of one language did NOT predict the vocabulary measure of the other language; for literacy/narrative measures, the performance in one language did predict performance in the other.

One strong implication of this work is that a high level of vocabulary is not a necessary precondition for adequate literacy development (which is not to say that we don't think vocabulary is important in its own right). Further, vocabulary scores cannot be used as a reliable index of other language skills for bilinguals. If they are used, the regression equation will be substantially different for bilinguals than for monolinguals.

Method

Subjects:

The subjects are 810 children in kindergarten, 2nd and 5th grade (ages 5, 8, and 11) in 10 Dade County Public Schools. (Another 120 children are currently being tested within the same paradigm.) The children were participating in a large scale cross-sectional study based on a 3 factor design which includes grade, socio-economic status (SES), and linguality (monolingual versus bilingual). Within linguality, the children were divided by language of the home (only Spanish in the home vs English and Spanish equally) and language of the school (1-Way, all instruction in English vs. 2-Way, 40% Spanish and 60% English). The target is 30 children in each of 24 bilinguals cells and 60 children in the 6 monolingual cells.

A subset of 240 children, 10 children each in the 8 bilingual groups, and 20 children each in the 2 monolingual groups at both 2nd and 5th grades, that is 160 bilinguals and 80 monolinguals, provide measures for what we call the narrative syntax probe study (some of which I'll try to describe briefly below).

Put Figure 1 about here.

Measures:

1. How did we measure vocabulary?

First, we have the standardized tests, the Peabody vocabulary tests (PPVT and TVIP, in Spanish) for receptive vocabulary (a 4-choice task; the examiner says a word and the child points to the appropriate picture); and for productive vocabulary, from the Woodcock Johnson, the Picture Vocabulary subtest (at least at 2nd and 5th, the examiner shows a picture

and asks for a label from the child).

Then, from the probe study, we have transcribed and "Chatted" language samples in both English and Spanish from the children. The children narrated the wordless picture book, Frog, Where Are You?, used in the large cross-linguistic study reported in Berman & Slobin (1994). In accordance with their suggested protocol, the children looked through the book once to see what it was about, and then to avoid making it a memory task, they looked through it again turning the pages at their own pace while telling the story. The stories were recorded in one language at one session, and in the other a week or two later, in a counterbalanced order set for the full design. The average English stories are around 275 words; the average Spanish story about 245 words (with Standard Deviations of about 80 words). From the stories we counted the "Types," (number of different words used by the child), the "Types/100" (from the 1st 100 words--only a handful of the stories were under 100 words), a Type-token ratio, and I'm playing with a measure called "good types." So far, the only one that shows much discrimination is "types." (This, of course, is confounded by the differences in the length, but it still may have some utility.) We also tracked the use of a set of the basic vocabulary of the story: "frog," "jar" "beehive" "deer" "antlers" etc. and made a measure called in the charts "Frog Lexicon" (or elex or slex) based on a maximum of 14 points.

The correlation between the standardized and non-standardized measures is about .3 for the Monolinguals and .6 for the Bilinguals.

2. Then, how did we measure literacy? We used the 5 subtests of the Woodcock Johnson that Viv and Alan spoke about last week: Passage Comprehension, Letter-Word

Identification, Word Attack (reading "nonsense words"), Dictation, and Proofing (recognizing written errors). I have averaged them for the a measure I call "ELiter" or "SLiter" or "Literacy Average" (actually, I put Verbal Analogies in it, too, but where I've graphed Eliteracy, you'll see a separate line as well for Verbal Analogies so you can see where it is in relation to them). (The 2 "reading mechanics" scores (Letter-Word ID, and Word Attack) correlate very highly (.8+) and the 2 writing scores (Dictation and Proofreading) around .6. These reading measures then correlate about .6 or .7 with Passage Comprehension, while the writing measures show about a .55 correlation with Passage Comprehension.

3. Finally, how did we measure "narrative" skill? (That's the hard part.)

There is not to our knowledge a recognized rubric--no "answer key"--for scoring stories, but there is a wealth of descriptive information about this frog story in particular, which helps characterize the typical 3, 5, 9-year-old, or adult response to this prompt (Berman & Slobin, 1994, Chap. IIA). By comparing elements reported for "a few five-year-olds and 90% of 9-year-olds" or "a few 9's and a majority of the adults" we were able to assemble a developmental sequence for several elements of the domains discussed in the narrative literature as being the locus of development for children in this age range.

The 400 stories were evaluated (by hand) with a set of measures that I devised to combine both analytical and holistic judgments. These measures incorporated two broad areas: one primarily holistic set, the Story Score, looked at the child's ability to use a hierarchical story structure, maintain a clear flow of information, and include evaluative and metacognitive statements in recounting the events in the picturebook. The second, the Language Score, was a more analytical measure that examined the more purely linguistic

aspects of the children's performances: counts of selected verb forms, conjunctions, specific adverbs, and the specialized noun vocabulary of the story.

The Language Score tried to characterize how well the child handled the more advanced grammatical structures. The main thrust of the Language Score was to credit the children's performance for the language elements they demonstrated, not to penalize for mistakes, but it was not always possible to separate "positive" and "negative" scoring. Form errors inevitably had some impact on the Complex Syntax score, for example, because credit was only given when constructions were relatively well-formed. Even in lexicon, we ended up with three levels of credit: +1 if the child used a keyword, zero if the concept was not referred to, and a penalty of -.5 if the child demonstrated that she did not know the word (saying "flying things" for the bees, or "that beething" for the "beehive").

I also added in an error score. That is, a very salient characteristic of the bilinguals' stories (especially in Spanish) was the high number of morphosyntactic mistakes: the use of overregularizations, "falled" for "fell," or the wrong form of an article "el ventana" for "la ventana" [the window] or "a owl" instead of "an owl." (See also Martínez, 1993 on "morphosyntactic erosion.") In order to keep track of the incidence of such errors within the various bilingual subgroups and even among the monolinguals, a separate column was designated for "morpho-syntactic accuracy" (ms_acc).

The two scores, Story and Language, are not orthogonal, but they are distinct. For example, for one element of the "Complex Syntax" score, we tracked how the child expressed the causes of events--including intentions. The expression of intentions is also counted in the Story Score, but the Language Score credit for this was more specific: it indicated that the

child made an explicit link between clauses. If a child got points for an intention structure in the Language Score, she will necessarily have credit in the Story Score as well, but the converse is not true. Likewise, the ability to express simultaneity is a key element in the foregrounding and backgrounding of actions, counted in a global way under "sequence" in the Story Store. Here in the Language Score, though, we probed whether the child used the specific grammatical devices of the language for this purpose: the conjunctions "while" or "mientras," some uses of "when," or the present participle, as in "he climbed up a rock, calling out to his frog."

To show better how the rating system works, here are three story openings, two from monolingual children and one bilingual, and a summary of the scoring categories.

Story Example 1 (Low Average, ML):

line	1	The dog - looked in - the bottle and looked at the frog. And the boy was sitting on a chair. And his - sock and his shirt was laying on the floor.
	5	And the light was on. And the window was opened ... When - {the} the boy and the dog were sleeping - the frog - stuck his head out (with his head and his arm) - out of the bottle.

Story Example 2 (High, ML):

line	1	One day a boy and his dog had found a frog. They kept him in the big jar. While the boy was asleep the frog climbed out of the jar
	5	and ran away. When the boy woke up the next morning he was very upset to see his frog missing. He searched everywhere.
	10	In boots.... And he turned over tables.

Story Example 3 (High, BL):

line: 1 Once there was a little boy with his little dog.
 It was already night time.
 They were looking at the little frog.
 The little boy - and his dog went to sleep.
 5 The frog - wanted to go out
 to see {the w} the world.
 So he came out of the little - can.
 It was morning already.
 The puppy and the boy looked to the - can
 10 and saw
 {that there} that the frog was not there.

Rough Outline of the Frog Story Rubric

Story Score	Points	"Average" 2nd grade story (and midpoint score)
Elements	12	a search story, including losing the frog, setting out in search, and finding a frog.
Sequence	12	sentence-by-sentence, picture-by-picture chain of events (little or no orientation, setting, summary).
Reference	6	use of indefinite article for first mentions; generally adequate pronoun antecedents, with some lapses (or use of "thematic pronoun strategy" (K-S, 1986).
Internal States	6	little reference to emotions, reactions, or thoughts of the characters.
Engagement	12	matter-of-fact tone; no "literary" language
Total	48	
Language Score		Baseline story generally correct, but unelaborated
Complex Syntax	24	mostly simple verbphrases; points added for each occurrence, (up to 3) of modals or aspectual markings ("began to," "kept on"); (in Spanish, perfect tenses, subjunctive); across clauses, points given for conjunctions other than "and then" ("y despue's"); bonus for noun or adjective clauses.
Lexicon	12+	uses most of a set of 12 words, specific to the story: ("frog," "jar," "bees," "beehive," etc.)
Morpho-syntactic accuracy	12	(errors deducted from 12) generally well-formed, a few non-prescriptive structures ("a owl," "there was bees")
Total	50	
Frog Total	98	

Results:

For this poster, we have made the following demonstrations of what we are calling the Vocabulary Gap for Bilinguals, that is their disproportionately low vocabulary scores relative to scores in other domain.

1. Figures 2-5: Graphs of Story and Language Scores (from Frog Stories) by sub-group (high and low SES for monolinguals; language of the school, SES, and language of the home for bilinguals); a. 2nd Grade, English, b. 5th Grade, English, c. 2nd Grade, Spanish, d. 5th Grade, Spanish

The bilinguals' scores in ENGLISH are largely equivalent to the monolinguals in Story Score; in Language scores, there's a dramatic deficit in 2nd grade, and the gap narrows in 5th.

In SPANISH, the Story Scores are just a little lower than in English; Language scores are considerably lower. Not shown here, lexicon accounts for a large part of the decrement. Only 4 or 5 children have higher Frog Lexicon scores in Spanish than English.

All groups but one have higher scores in English than Spanish. That group appears dominant in English, as well, when tested at 5th grade (cross-sectionally).

2. Frog Lexicon Comparisons by main factors (linguality, SES, School Type, Home Language) (Figure 6)
 - a. 2nd Grade (English)
 - b. 5th Grade (English)

The lexicon score accounts for a good bit of the Language Score decrement in bilinguals. The same pattern is observed of a large gap at 2nd, narrowing at 5th. There is an SES effect on Monolinguals' lexicon score, which is also observed among the Bilinguals. School Type is not a factor; Home Language is a greater factor at 2nd grade than at 5th.

3. Woodcock Johnson standardized scores, by subgroups (as in #1 above) for 2 "literacy measures" and 2 vocabulary measures (receptive and productive). (Figures 7--10)
 - a. 2nd Grade, English
 - b. 5th Grade, English
 - c. 2nd Grade, Spanish
 - d. 5th Grade, Spanish

The gap is widest at Kindergarten (not shown), narrowing at 2nd, and narrowing further by 5th grade. In English, both receptive and productive vocabulary are slightly lower than the average of the literacy scores.

In Spanish, the productive vocabulary is VERY LOW; receptive vocabulary patterns with the literacy and verbal analogy scores (which are on the low average side, especially for the 1-way schools).

4. When the "VOCABULARY GAP" was tested with a General Linear Model (cf. Manova) with language group as an independent variable and the difference score as the ~~in~~ dependent variable, the following effects were found:

"VOCABULARY GAP" Difference Monolingual vs Bilingual N=810 in K-2-5

Vocabulary gap = Literacy Average minus Vocabulary Average

Effect:		<i>F</i>	<i>p</i>
	Linguality	108.36	.000
	SES	21.63	.000
	Grade	12.19	.000
	Ling X SES	.25	.617
	Ling X Grade	15.06	.000
	Ling X Grade X SES	2.44	.087

5. Grade by Linguality Interactions for Narrative Measures versus Language Measures;

Complex Syntax versus Lexicon versus Morpho-syntactic Accuracy. (Figure 11)

The biggest difference between the linguality groups is not in Complex Syntax, but in Lexicon and Morpho-syntactic Accuracy (ms_acc). The first two are significant interactions of Linguality by Grade; MS_Acc is a main effect with no interaction.

6. Scatterplots of Literacy by Vocabulary (by Linguality). (Figure 12)

The value of r for both groups is about .56, but the bilingual group falls lower on both axes. There are almost no bilingual individuals with high vocabulary and low literacy, whereas there are many in the low vocabulary and high literacy quadrant.

7. Tests of Error Variance for Tests Effects for Bilinguals and Monolinguals.

	SS	df	MS
Test X S @ ML	119,700	1260	95.00
Test X S @ BL	335966	3240	103.69
$F(3240, 1260) = 1.09, p < .03$			
Test @ ML	8014	6	1355.72
Test @ BL	224,542	6	37423.6
$F(6, 6) = 27.60, p < .00041$			

The error variance among bilinguals and monolinguals (essentially the homogeneity of

variance) is relatively equivalent for the two linguality groups. The size of the test effect (the within subject variability in the distance of individual test scores from the mean for that individual) is MUCH larger for bilinguals. Since the Test X S effect is the same, that statement is true of the bilinguals generally, and not just a few of them.

8. Correlations across Languages for the Bilinguals. (Figure 13)

The Frog-Story Story Scores, Passage Comprehension, and even the Complex Syntax component of the Frog-Story Language Scores are highly correlated across languages ($r = .6, .6, \text{ and } .5$ respectively). The Frog Lexicon, Morphosyntactic Accuracy, and the Woodcock Johnson Picture Vocabulary Scores are essentially uncorrelated across languages.

IN SUMMARY:

1. We see a large gap between Bilinguals and Monolinguals in VOCABULARY, but NOT in LITERACY SKILLS (Passage Comprehension, Word Attack, Dictation, and Analogies).
2. In ENGLISH, both Receptive and Productive vocabulary are low compared to other scores for the same groups (and individuals);

In SPANISH, only Productive vocabulary is lower than other scores, and it is dramatically lower.
3. Bilingual children's language skills with respect to COMPLEX SYNTAX (elaborated verb phrases, complex adverbials, sentence embeddings, etc.) are closer to Monolingual values for those measures, whereas specific LEXICAL KNOWLEDGE and MORPHO-SYNTACTIC ACCURACY are far below Monolingual levels.

4. ML-BL gaps are larger at kindergarten and 2nd grade; by 5th grade the gap is considerably smaller--even in vocabulary.
5. In ENGLISH, SES and LANGUAGE OF THE HOME have significant effects on vocabulary scores;

In SPANISH, the SES and HOME LANGUAGE factors were relatively small; the most significant factor was SCHOOL LANGUAGE, favoring the 2-way schools.

6. The correlation coefficients of vocabulary scores with literacy scores are about the same ($r = .6$) but the same literacy score is "predicted" by a lower vocabulary score for the BL than for the ML.

(Also, the homogeneity of variance is about equivalent for the two groups, ML-BL)

7. The individual BL's scores on the individual tests in the battery are significantly and dramatically MORE HETEROGENEOUS than the MLs'. That is, a monolingual who does well on one subtest will more likely do well on other subtests, whereas bilinguals often do very poorly on one subtest and very well on another.
8. BL's literacy scores in one language predict literacy scores in the other; Vocabulary and other "oral" language measures do NOT predict scores in the other language.

IMPLICATIONS:

- I. A high level of vocabulary is NOT a precondition for adequate literacy development (which is not to say vocabulary isn't useful);**
- II. Vocabulary scores cannot be used as a reliable index of other language skills for bilinguals. If they are used, the regression equation will be substantially different for BLs than for MLs.**

References: (from Pearson "in preparation")

Berman, R. A. and Slobin, D. I. 1994. Relating events in narrative: A crosslinguistic developmental study. Hillsdale, NJ: Lawrence Erlbaum.

Chafe, W. 1982. Integration and involvement in speaking, writing, and oral literature. In D. Tannen (ed.), Spoken and written language: Exploring orality and literacy (pp. 35-53). Norwood, NJ: Ablex.

Chomsky, C. 1969. The acquisition of syntax in children from 5 to 10. Cambridge, MA: MIT Press.

FIG, Women's Technical Committee. 1989. Code of points: Artistic gymnastic for women. Switzerland: International Federation of Gymnastics (FIG).

Halliday, M.A.K. and Hasan, R. 1976. Cohesion in English. London: Longman.

Hedberg, N. L. and Westby, C. E. 1993. Analyzing storytelling skills: Theory to practice. Tucson, AZ: Communication Skill Builders, Inc.

Hunt, K. W. 1977. Early blooming and late blooming syntactic structures. In Cooper, C. & Odell, L. (Eds.), Evaluating writing, (pp. 91-106). National Council of Teachers of English.

Karmiloff-Smith, A. 1981. The grammatical marking of thematic structure in the development of language production. In Deutsch, W., editor, The child's construction of language (pp. 123-147). London: Academic Press.

Karmiloff-Smith, A. 1986. Some fundamental aspects of language development after age 5. In Fletcher, P. & Garman, M. (Eds.), Language acquisition: Studies in first language development (pp. 455-476). Cambridge: Cambridge University Press.

- Karmiloff-Smith, A. 1987. Comparing language and cognition. In Hickman, M., editor, Social and functional approaches to language and thought (pp. 185-202). London: Academic Press.
- Kemper, S. 1984. The development of narrative skills: Explanations and entertainments. In Kuczaj, S., editor, Discourse development, (pp. 99-124). NY & Berlin: Springer Verlag.
- Labov, W. and Waletzky, J. 1967. Narrative analysis: Oral versions of personal experience. In Helm, J., editor, Essays on the verbal and visual arts, (pp. 12-44). Seattle: University of Washington Press.
- MacWhinney, B. 1995. The CHILDES Project: Tools for analyzing talk. 2nd Edition. Hillsdale, NJ: Lawrence Erlbaum.
- Martínez, E. A. 1993. Morpho-syntactic erosion between two generational groups of Spanish speakers in the United States. NY: Peter Lang.
- Mayer, M. 1969. Frog, Where Are You? New York: Dial Books.
- Pearson, B. Z. (in preparation). Narrative syntax probe study. In Eilers, R. E. (ed.), Bilingual Language and Literacy Project Monograph.
- Pearson, B. Z. & Fernández, S. 1994. Patterns of interaction in the lexical development in two languages of bilingual infants. Language Learning, 44, 617-653.
- Pearson, B. Z. and Umbel, V. M. 1995, November. The relationship between narrative and linguistic skills in English and Spanish among Hispanic school children in Miami. Paper presented at the 20th Annual Boston University Conference on Language Development, Boston, MA.

Pearson, B. Z., Umbel, V. M., Andrews de Flores, P., Cobo-Lewis, A. Measuring cross-language vocabulary in childhood bilinguals at different stages of development.

Unpublished manuscript, University of Miami Bilingualism Study Group.

Peterson, C. and McCabe, A. 1983. Developmental psycholinguistics: Three ways of looking at a child's narrative. New York: Plenum Press.

Silva-Corvalán, C. 1991. Spanish language attrition in a contact situation with English. In Seliger, H. and Vago, R. M., editors, First language attrition (pp. 151-171). Cambridge: Cambridge University Press.

Slobin, D. 1973. Cognitive prerequisites for the development of grammar. In C. A. Ferguson & D. I. Slobin, (Eds.), Studies in child language development (pp. 175-208. NY: Holt, Rinehart & Winston.

Snow, C. & Dickinson, D. K. 1990. Social sources of narrative skills at home and at school. First Language, 10, 87-103.

Stein, N. L. and Glenn, C. G. 1979. An analysis of story comprehension in elementary school children. In Freedle, R. O., editor, New directions in discourse processing (pp. 53-120). Norwood, NJ: Ablex.

Terman, L. M. 1918. The vocabulary test as a measure of intelligence. Journal of Educational Psychology, 47, 893-902.

Torrance, N. & Olson, D.R. 1984. Oral language competence and the acquisition of literacy In A. Pellegrini and T.D. Yawkey, (eds.) The development of oral and written language in social contexts (pp. 167-181). Norwood, NJ: Ablex.

Umbel, V. M., Pearson, B. Z., Fernández, M. C. & Oller, D. K. (1992). Measuring bilingual

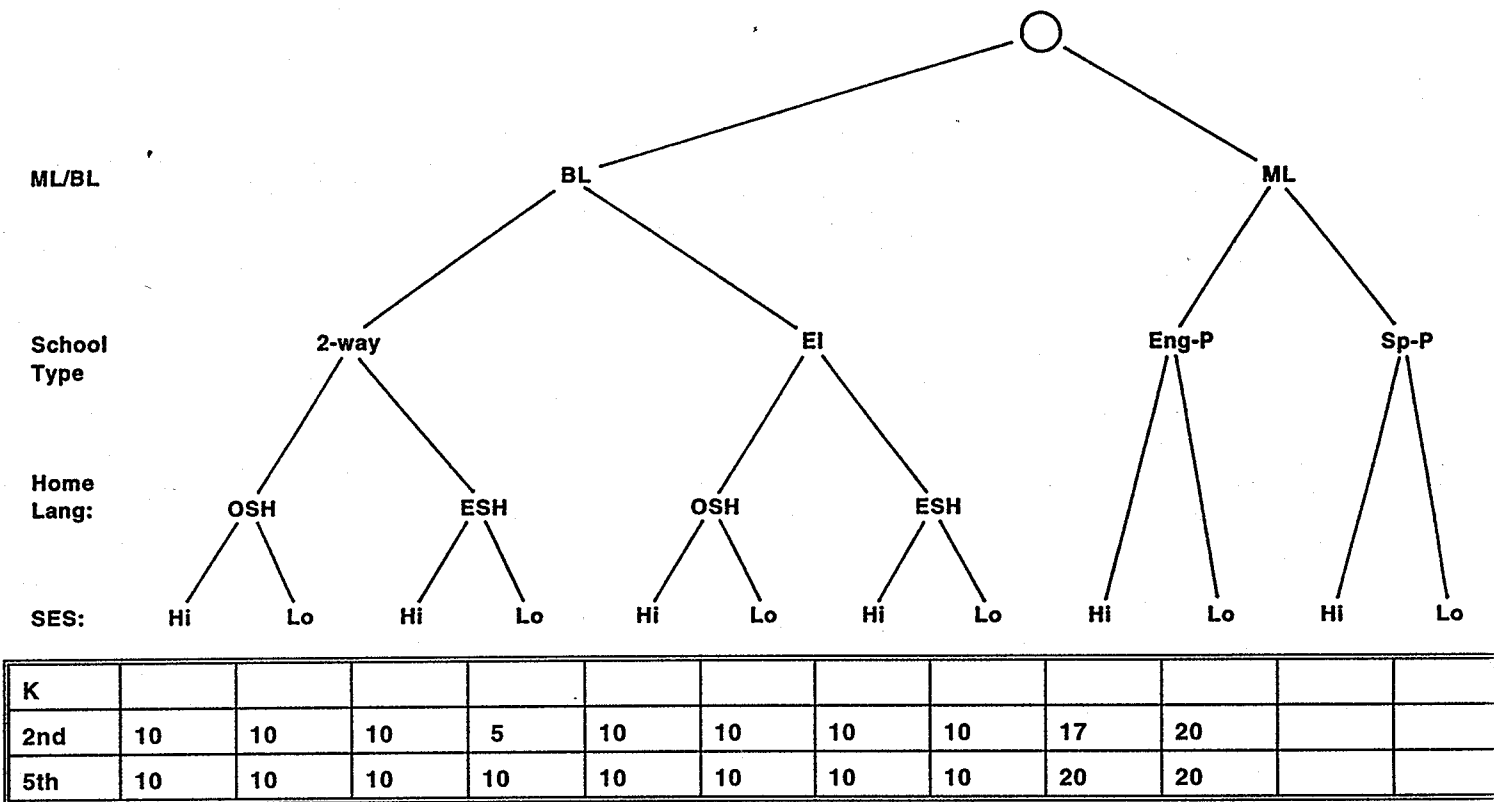
children's receptive vocabularies. Child Development, 63, 1012-1020.

Wechsler, D. 1974. Manual of the Weschler Intelligence Scale for Children--Revised. NY: Psychological Corp.

Woodcock, R. 1991. Woodcock Language Proficiency Battery: English Form--Revised. Chicago: Riverside.

Woodcock, R. & Muñoz-Sandoval, A. F. (1995). Batería Woodcock-Muñoz Pruebas de aprovechamiento--revisada. Chicago: Riverside.

Figure 1. Factorial Design (with numbers in Frog Story Cells)



Legend: **BL**, Bilingual **ML**, Monolingual

School Types:

for Bilinguals: **2-Way**, English and Spanish in the School, **EI**, English Immersion School

for Monolinguals: **Eng-P**, English Peer (with mostly English-speaking students)

Sp-P, Spanish Peers

Home Languages:

SH, Only Spanish at Home (to age 5) **ESH**, English and Spanish in the Home

SES:

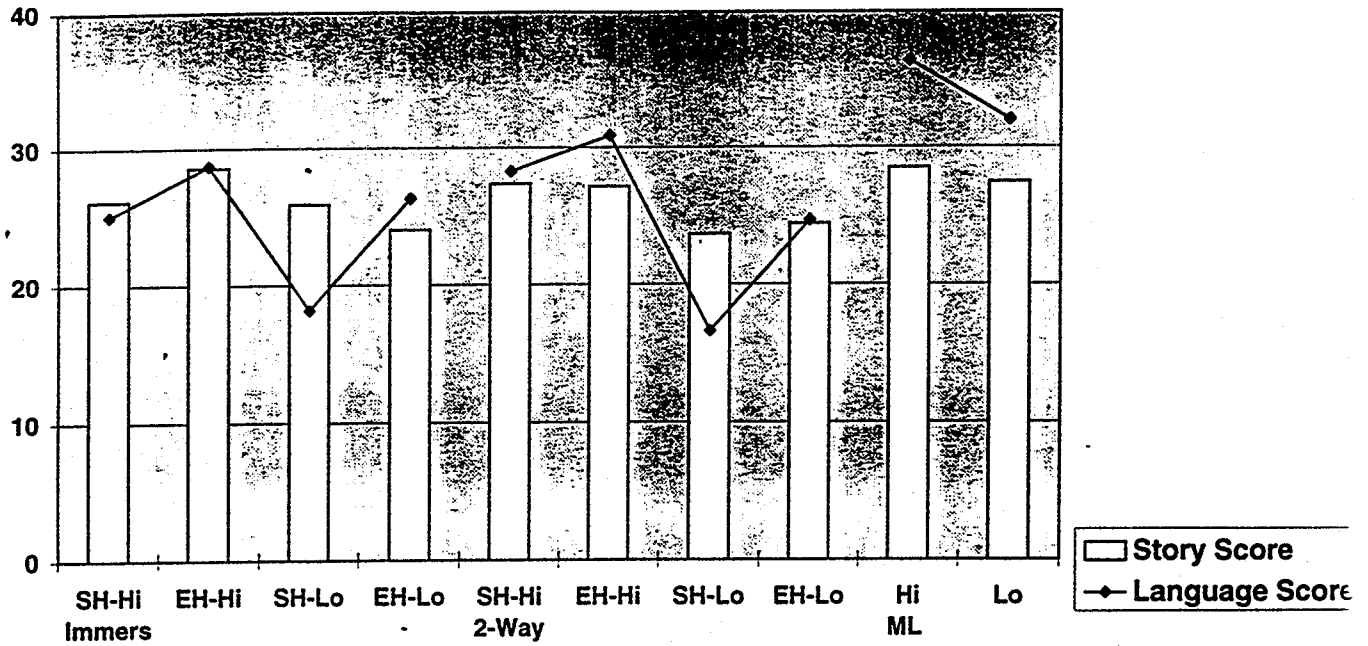
Hi, High Socio-economic status **Lo**, Low SES

Grades:

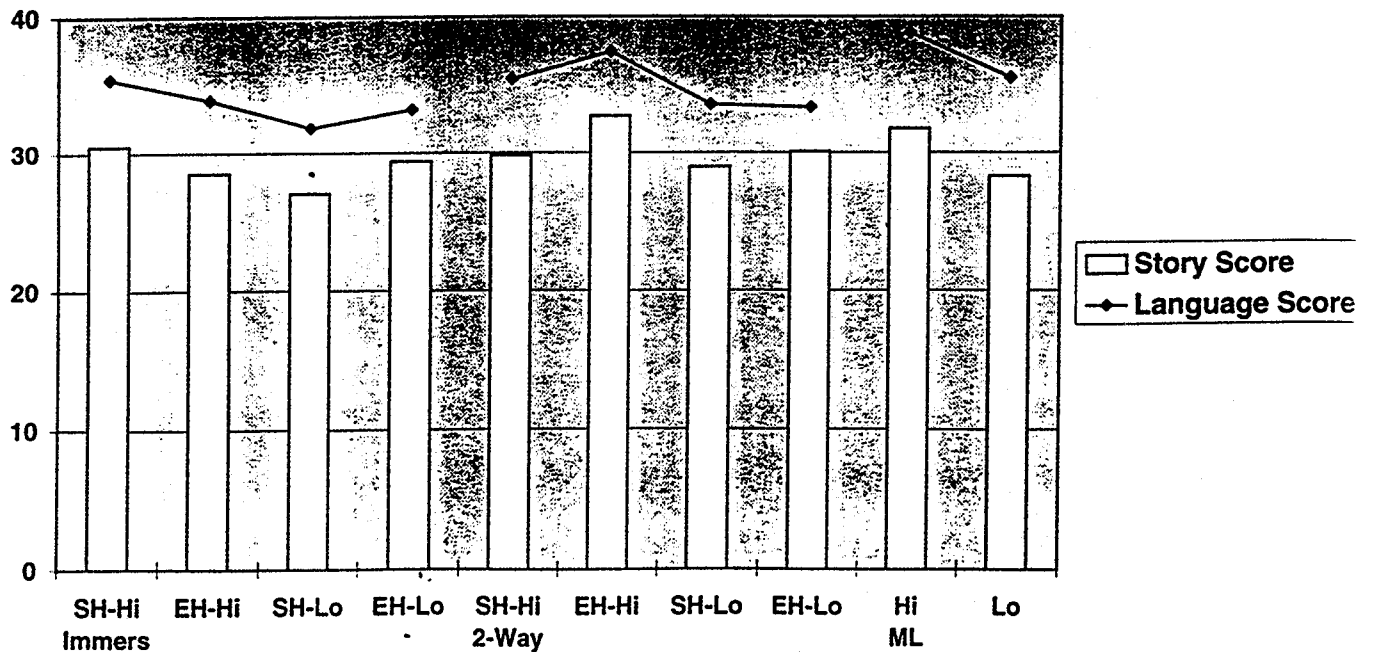
K, kindergarten (age 5) **2nd** grade (age 7 or 8) **5th** grade (age 10 or 11)

Figures 2-5. Frog Story Measures (English and Spanish separately) by Subgroup

2nd Grade English Story and Language Scores

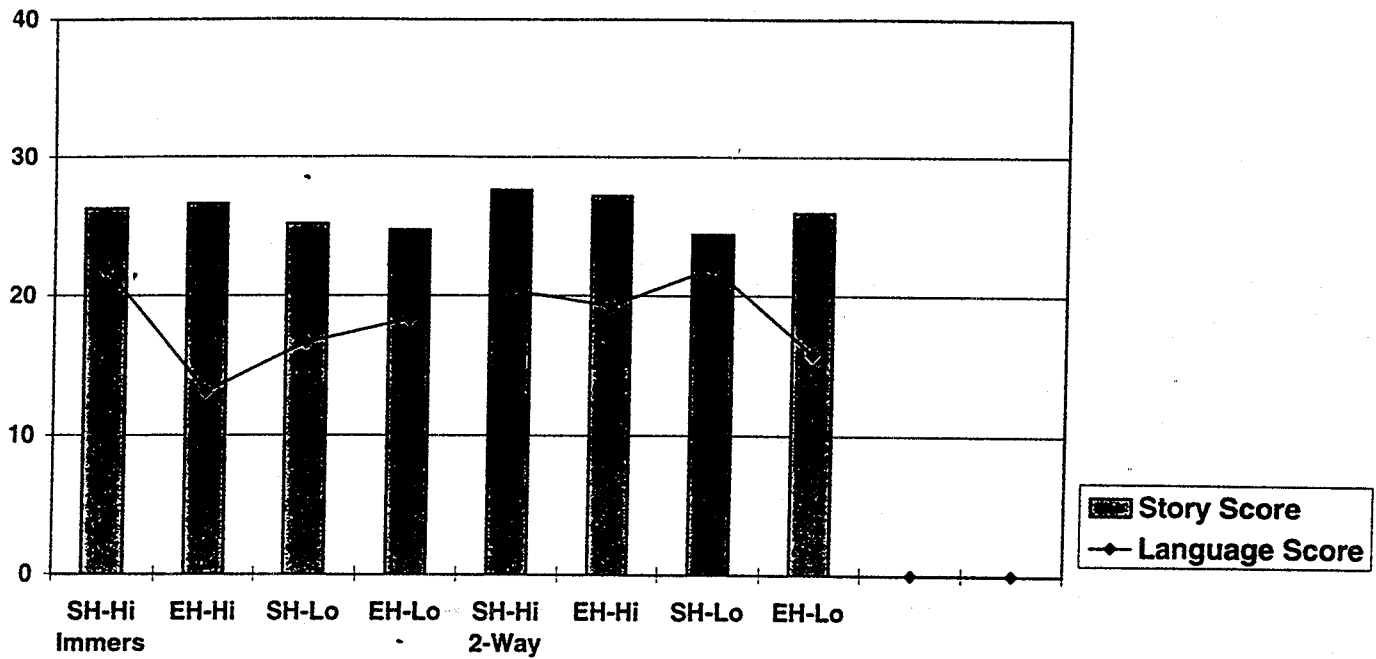


5th Grade English Story and Language Scores



Figures 2-5 (cont).

2nd Grade Spanish Story and Language Scores



5th Grade Spanish Story and Language Scores

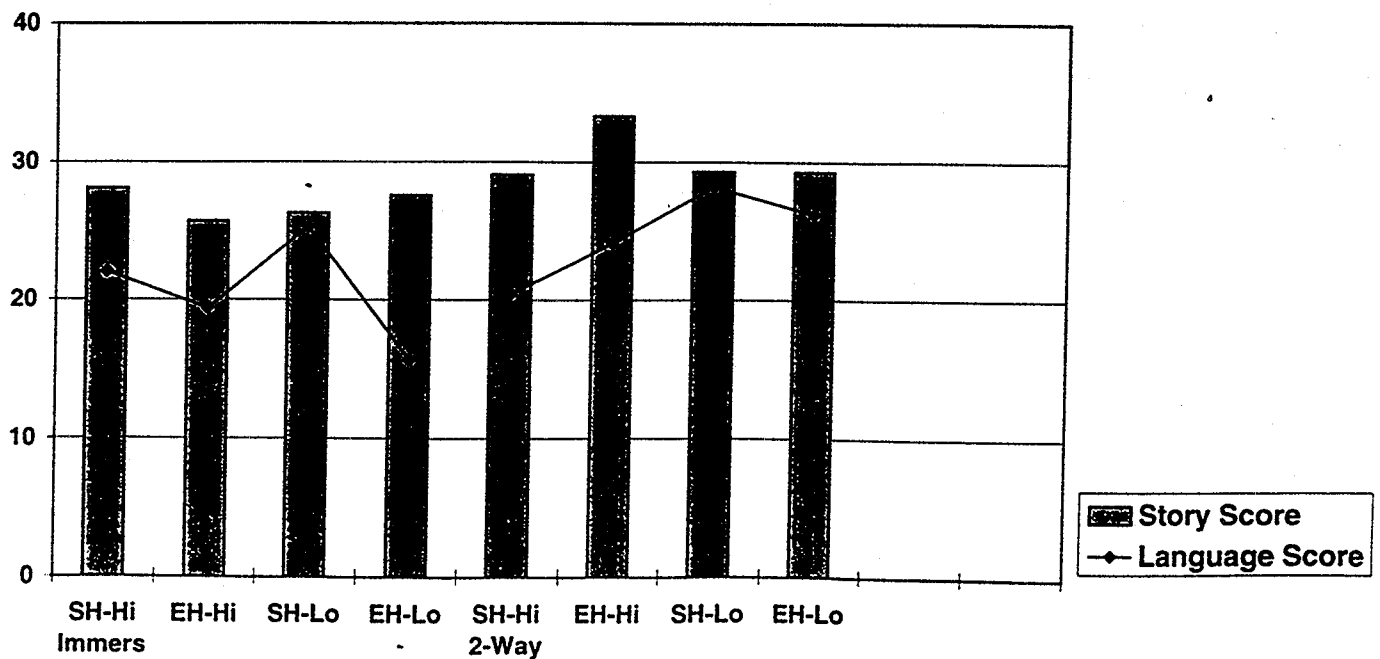
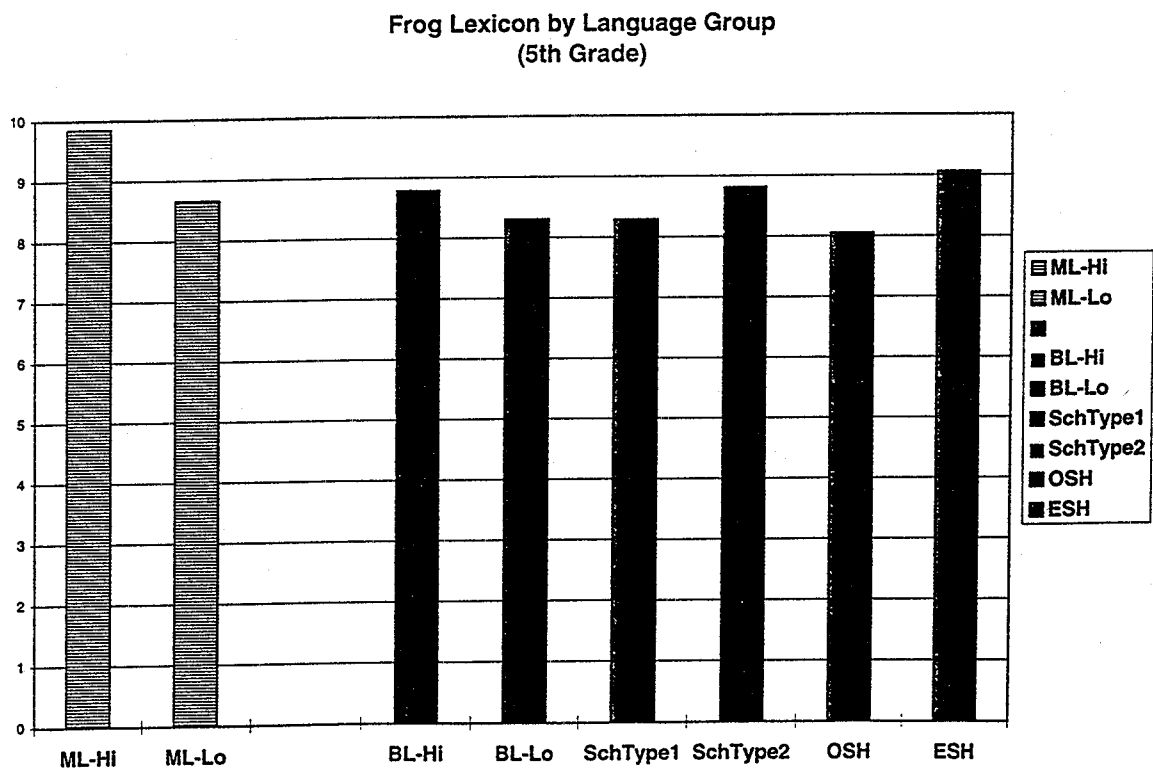
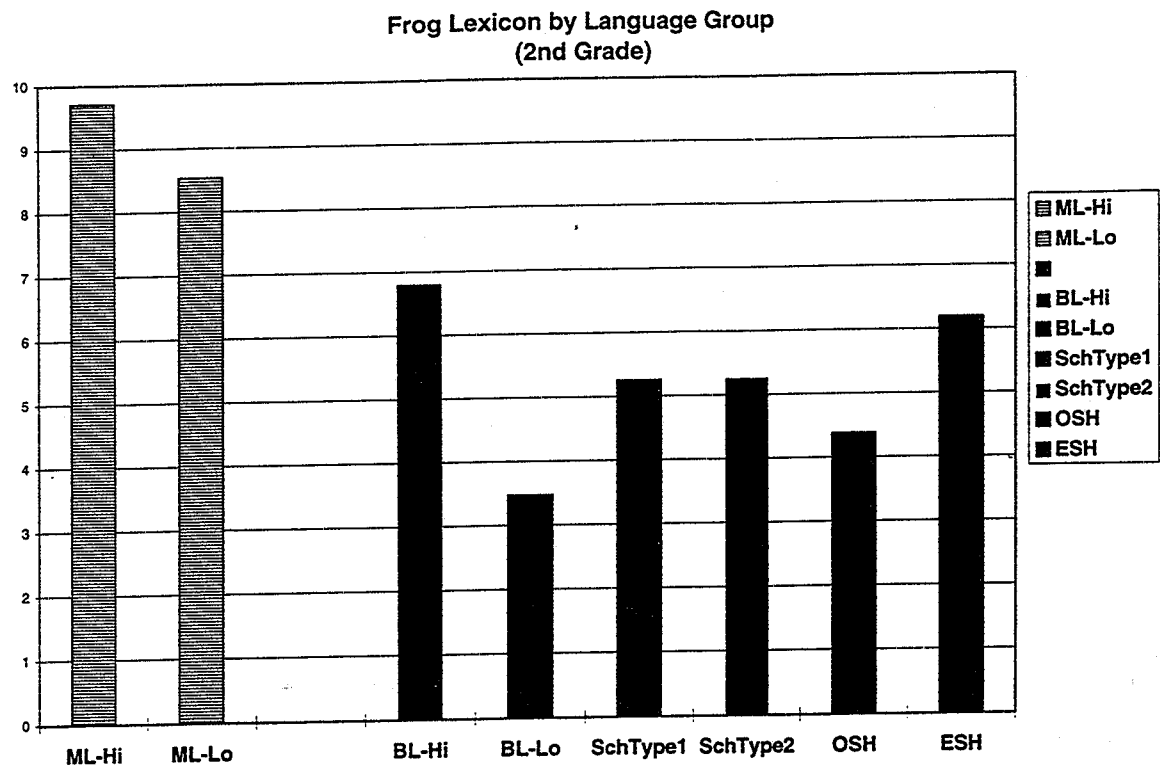
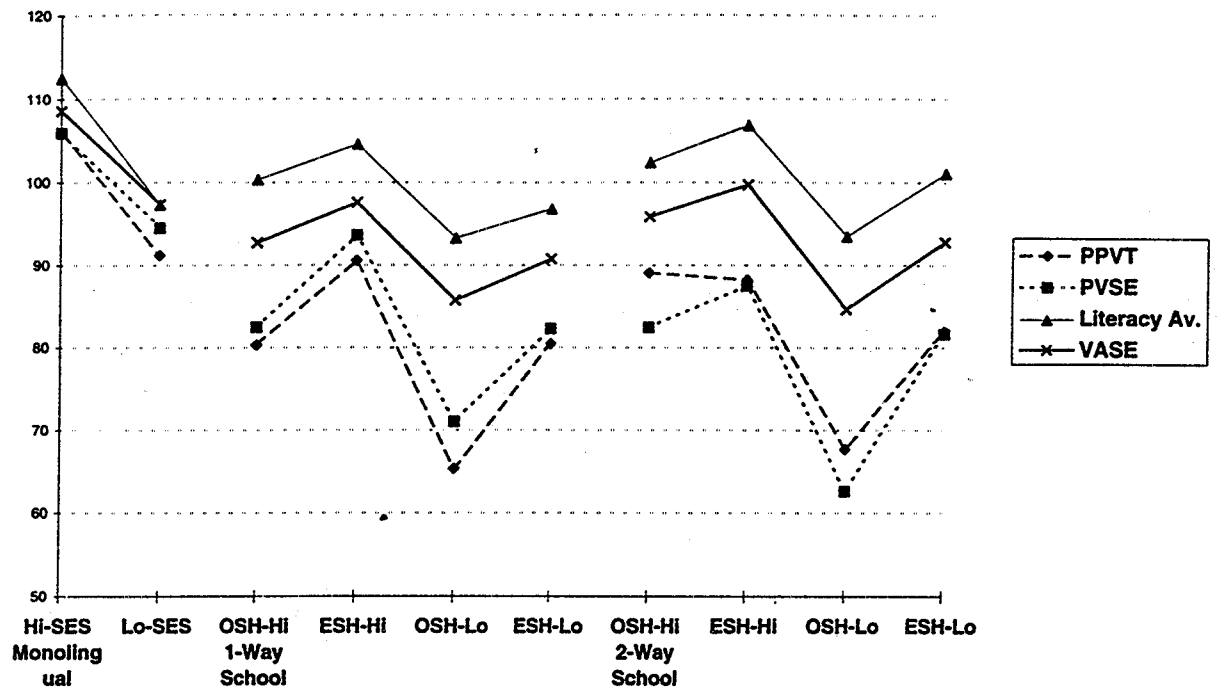


Figure 6.

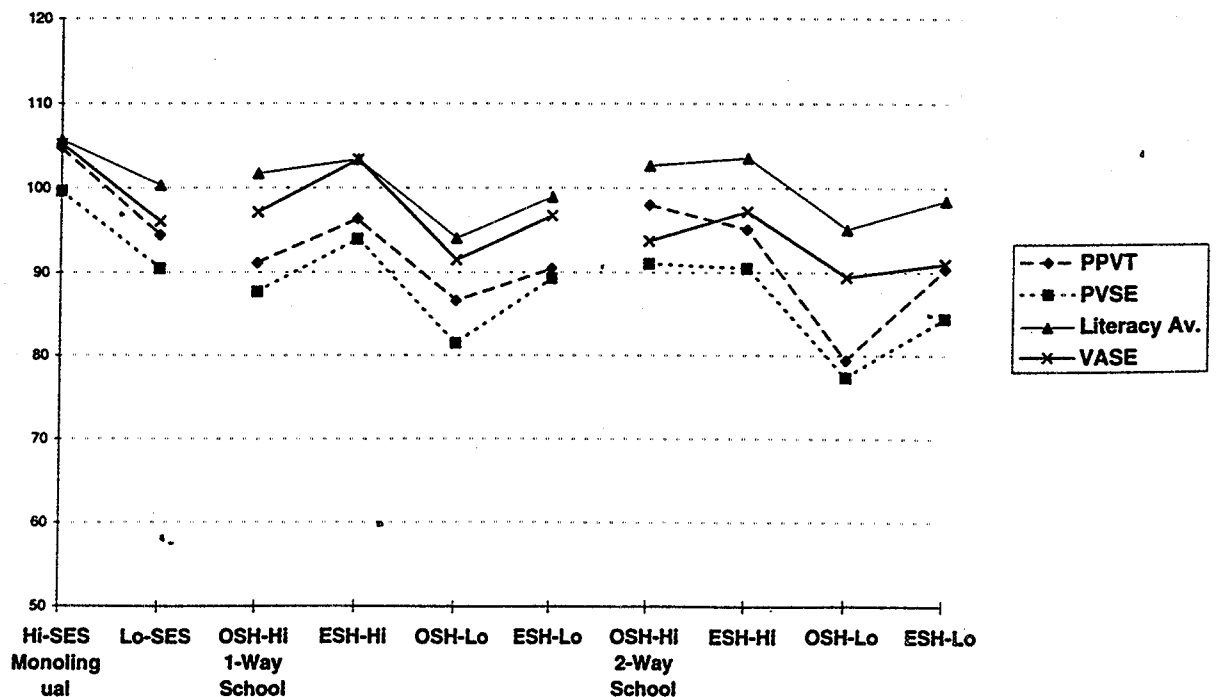


Figures 7-10. Standardized Scores (English and Spanish separately) by Subgroup

Literacy and Vocabulary Scores (English) by School Type and Home Language
2nd Grade

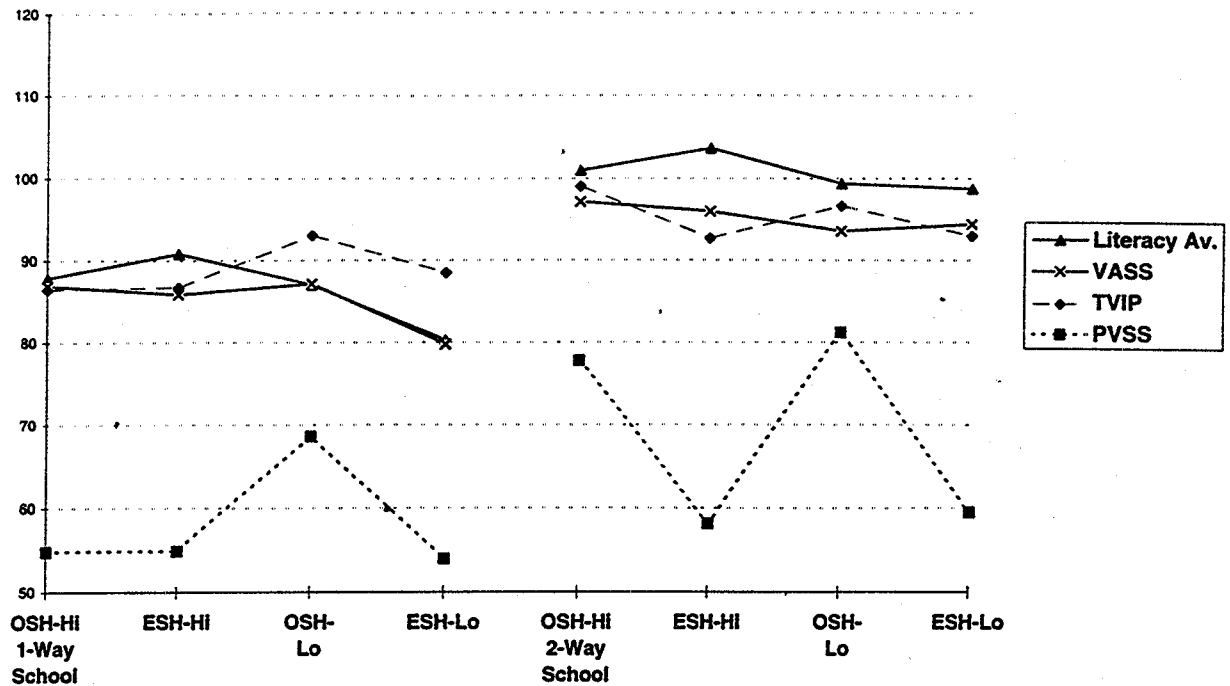


Literacy and Vocabulary Scores (English) by School Type and Home Language
5th Grade



Figures 7-10 (cont).

**Literacy and Vocabulary Scores (Spanish) by School Type and Home Language
2nd Grade**



**Literacy and Vocabulary Scores (Spanish) by School Type and Home Language
5th Grade**

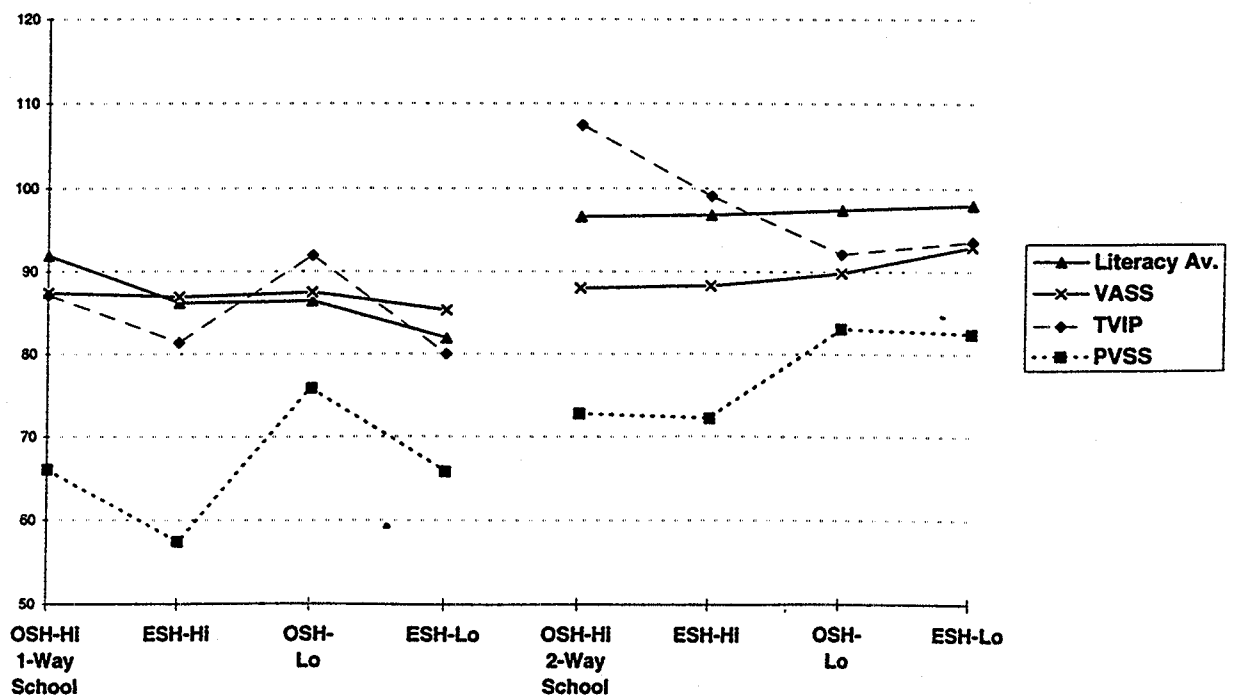


Figure 11. Grade by Linguality Interactions (Frog Story Component Scores).

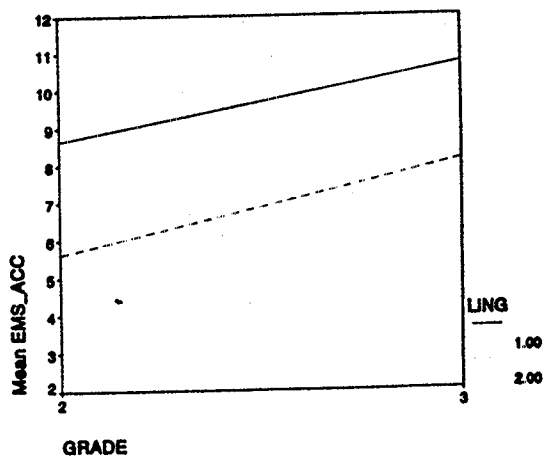
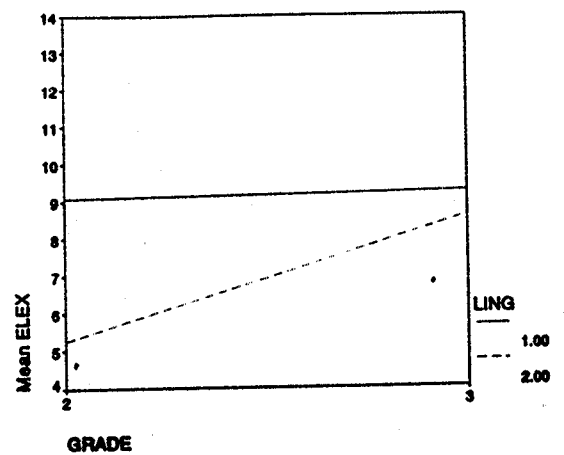
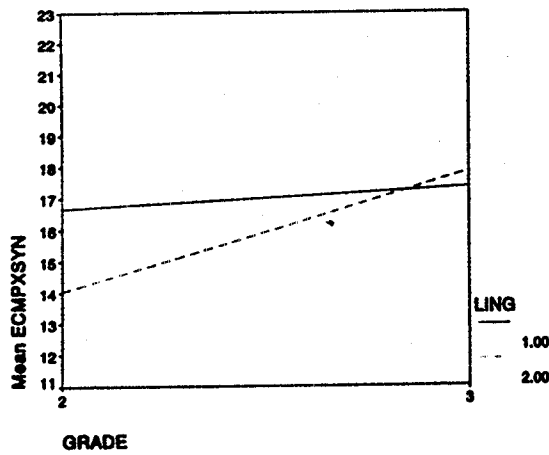
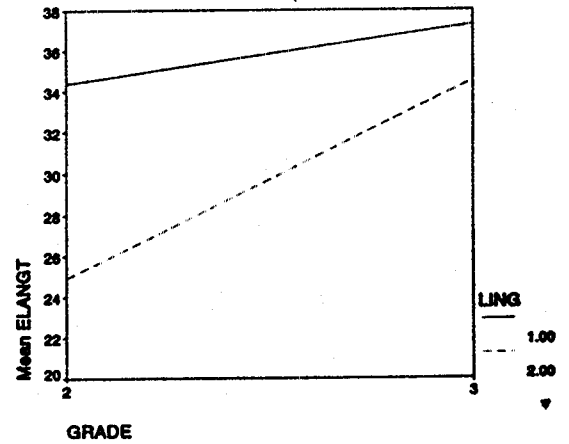
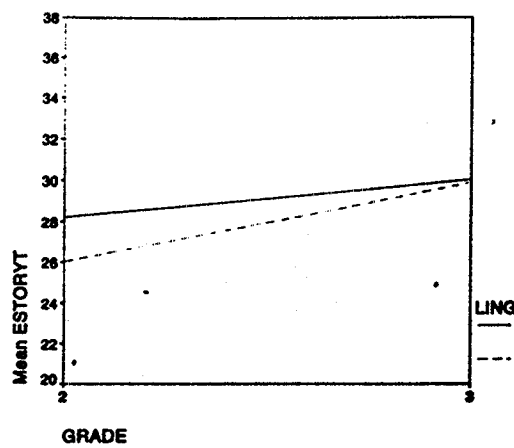


Figure 12. Scatterplots of Literacy by Vocabulary (by Linguality) (Ling 1= ML; 2=BL)

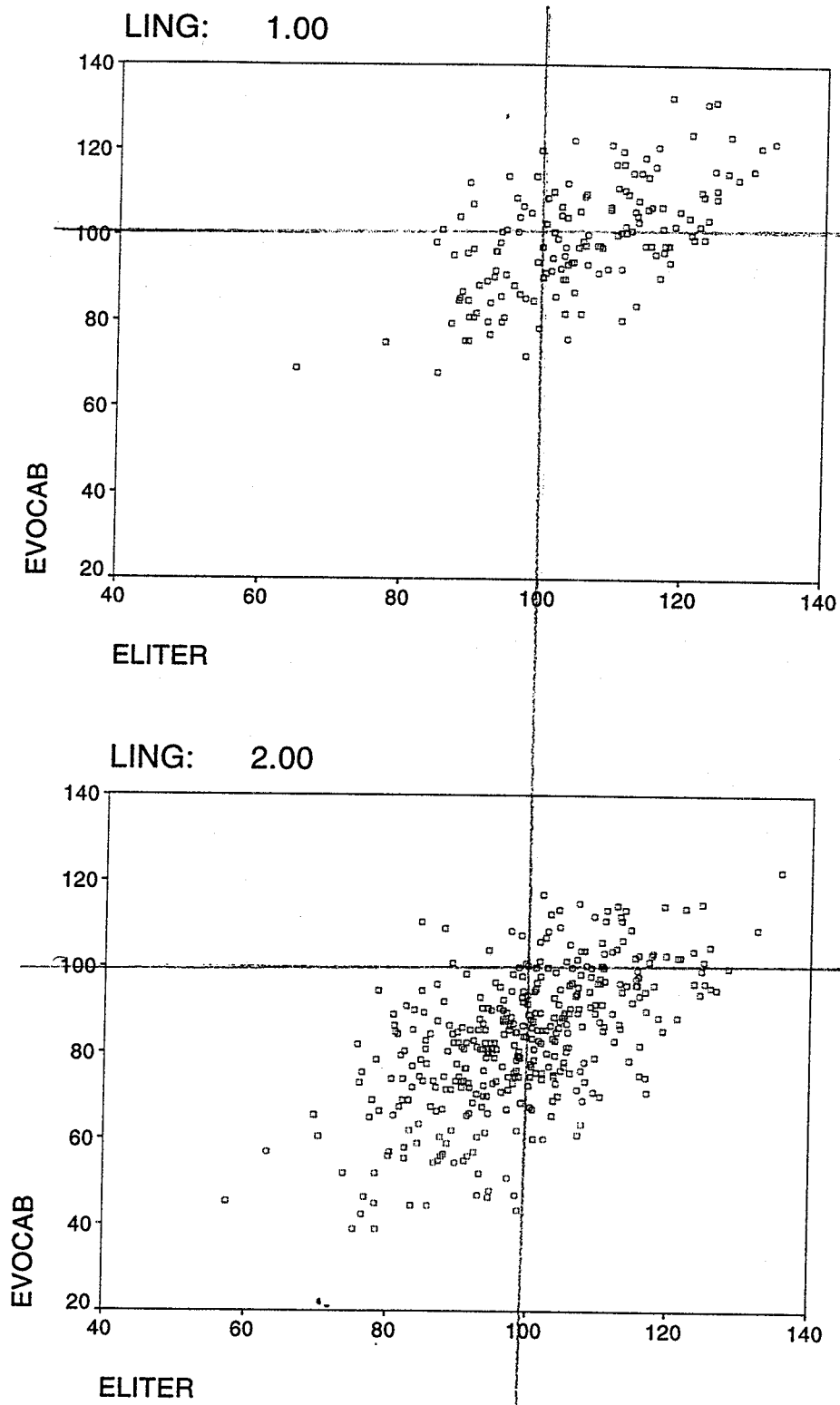
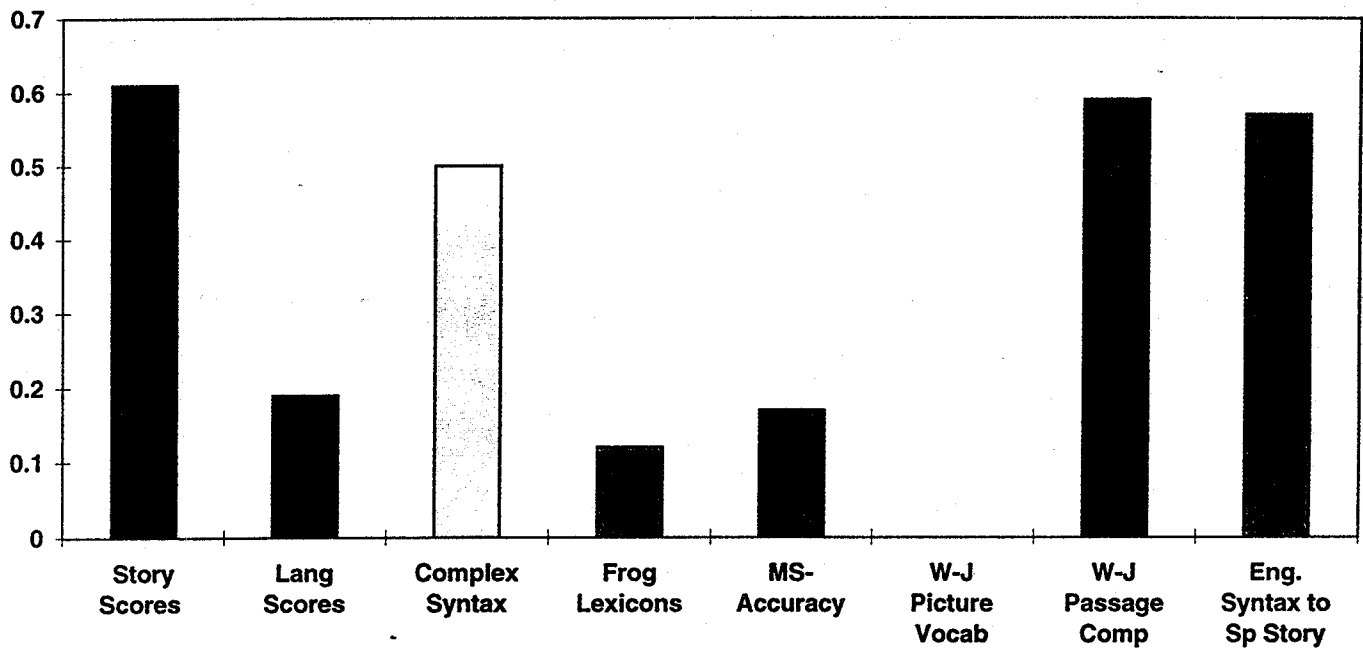


Figure 13.

Bilinguals' Correlations Across Languages



FROGS, Where Are You?!

by M. Mayer (1969)

