

# **Transfer of Reading Skills in Bilingual Children**

## **Subproject 2 of Acquiring Literacy in English: Crosslinguistic, Intralinguistic, and Developmental Factors**

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Subproject 2 consisted of three sets of studies that focused on the transfer of language skills in Spanish-speaking English language learners (ELLs). The first two sets of studies followed students across multiple years, examining the cross-linguistic, intra-linguistic and developmental factors that influence second language literacy development. The third set of studies was an intervention designed to determine whether “teaching for transfer” could be shown to facilitate the acquisition of English reading skills.

### **Purpose**

Subproject 2 was designed to investigate four main research questions:

1. What is the nature of the development of phonological awareness and spelling in young bilingual children? (Study Set 1)
2. What is the relationship between language and literacy skills in Spanish and English? (Study Set 2)
3. What is the role of home literacy and language environment on bilinguals’ English and Spanish vocabulary development? (Study Set 2)
4. Can interventions be developed that help third and fifth grade children transfer cognate knowledge from Spanish to English? (Study Set 3)

### **Study Set 1: Longitudinal Studies of Phonological Awareness and Spelling in Young Bilingual Children**

Study Set 1 examined the relationships among language of instruction, vocabulary development, phonological awareness, and spelling in young Spanish-English bilingual children in two substudies. In substudy 1a, subjects were 102 kindergarten and first grade children, in three groups: 45 bilingual children receiving Spanish language instruction (SLI) only, 35 bilingual children receiving English language instruction (ELI) only, and 22 English-monolingual children receiving ELI. Subjects for substudy 1b were the 66 first graders in the sample for substudy 1a.

### ***Measures and Timeline***

The studies began in fall 2000 and continued through spring 2003. Measures used included the Picture Vocabulary subtests of the Woodcock Language Proficiency Battery-Revised (WLPB-R) (Woodcock, 1991) and its Spanish parallel (Woodcock & Muñoz-Sandoval, 1991) and the Phonological Awareness Task developed by the Research Core. This task consisted of experimental pseudowords containing the diphthongs /aI/ and /eI/ and parallel pseudowords containing control vowels. A descriptions of this instrument is available at [www.cal.org/acquiringliteracy](http://www.cal.org/acquiringliteracy).

In substudy 1a, the measures were administered individually. On the Phonological Awareness Task, the examiner read each pseudoword aloud. The child repeated the pseudoword and then indicated how many separate phonemes it contained using counters. In substudy 1b, the measures were group administered; on the Phonological Awareness Task, the examiner read each pseudoword aloud, and the students wrote it down, indicating the predicted number of phonemes through spelling.

Data collection took place in Years 1 and 2. In Year 3 the researchers focused on data analysis and dissemination of results.

### ***Analysis and Findings***

Analytical methods for both substudies included analysis of variance and multiple regression analysis. In substudy 1a, findings indicated that children in ELI, whether monolingual or bilingual, performed almost equivalently on the Phonological Awareness Task. Bilingual children in SLI demonstrated two significant differences from their peers:

- They were more likely to hyposegmentalize the experimental pseudowords. That is, they were more likely to indicate a low number of phonemes for a pseudoword, for example indicating /f/-/ide/ for the pseudoword *fide*. Hyposegmentation is a developmentally prior strategy for performance on a phonetic segmentation task.
- They were more likely to hypersegmentalize the vowels in the experimental pseudowords. That is, they were more likely to rely on the Spanish phonological system and indicate two phonemes for the /aI/ and /eI/ diphthongs.

Findings from substudy 1b were similar. Only students in SLI exhibited Spanish-influenced spelling in the English spelling task, for example writing “beim” for the pseudoword *bame*, indicating a powerful effect of language of literacy instruction. Native Spanish speakers who received ELI showed no transfer errors, suggesting that such errors are not a simple product of phonological interference, but rather a reflection of Spanish orthographic knowledge in the absence of English orthographic knowledge. The students in ELI, on average, spelled more items correctly than students in SLI, who had not yet learned conventional spelling patterns in English. In addition, English phonological representations, as measured by English non-word repetition, and English phonological awareness were associated with correct English spelling and lack of Spanish-influenced errors. Spanish PA was not significantly associated with English spelling outcomes.

Analysis of Spanish and English vocabulary in relation to phonological awareness indicated that unbalanced bilinguals, who had a higher score in either Spanish or English, were more likely to achieve high scores in phonological awareness than balanced bilinguals who were equally strong or weak in both languages. This finding suggests that L1 vocabulary knowledge can facilitate L2 phonological awareness, even though L1 literacy knowledge may generate incorrect L2 phonological analyses in specific cases.

In addition, children with good Spanish vocabulary showed more Spanish-influenced spelling, while English vocabulary predicted more orthographically plausible English spellings. The relationship between English vocabulary and English spelling was similar for children instructed in Spanish and those instructed in English. English vocabulary and literacy instruction both made unique, positive contributions to English pseudoword spelling, while Spanish literacy instruction played a more important role than Spanish vocabulary in the production of Spanish-influenced spelling in English.

### **Study Set 2, Part 1: Longitudinal Studies of Intra- and Inter-Linguistic Relationships in the Development of Literacy Skills in Spanish and English**

Part 1 of Study Set 2 examined the transfer of a broad range of component language and literacy skills between Spanish and English in order to identify the components of Spanish reading that are predictive of growth in English literacy over time among Spanish-speaking elementary school children. Study subjects were Spanish-speaking children in schools in Boston, Chicago, and El Paso. The researchers collected data from four to six classrooms at each site, depending on the number of target students available in each classroom. At the beginning of the study (end of second grade), a total of 287 students were participating. By the end of the fourth grade, 189 students remained: 59 Spanish–English bilingual students who received ELI only, 96 Spanish–English bilingual students who received SLI through second or third grade and then transitioned into ELI, and 34 monolingual English speakers. All schools in the sample were implementing the Success for All curriculum (Slavin & Madden, 2001), which provides 90 minutes of daily literacy instruction that is highly structured and therefore relatively consistent across classrooms and schools. The program has parallel curricula in English and Spanish and targets the component literacy skills of interest: PA, word reading, and reading comprehension.

#### ***Measures and Timeline***

The studies began in fall 2000 and continued through spring 2006. In Year 1, seven group-administered measures were developed, piloted, and finalized:

- The Extract the Base Test (English and Spanish)
- The Test of Phonological Processing in Spanish (TOPPS)
- The Phonology Transfer Test
- The Spelling Transfer Test
- The Diagnostic Assessment of Reading Comprehension (DARC)
- The Cognate Awareness Test

Descriptions of these instruments are available at [www.cal.org/acquiringliteracy](http://www.cal.org/acquiringliteracy).

In addition to the measures developed specifically for Subproject 2, a battery of assessments from the WLPB-R and its Spanish parallel was administered to participating students. Researchers assessed students' oral language proficiency in second through fifth grades, phonological awareness in second and third grades, and word reading and reading comprehension in second through fifth grades. Beginning in fourth grade, measures of word knowledge were added to evaluate students' breadth and depth of vocabulary knowledge, awareness of derivational morphology and cognate relations, and reading vocabulary. Researchers also administered a demographic survey and collected data on classroom language use.

Part 1 of Study Set 2 built on a three-year study of transfer of literacy skills from Spanish to English funded by the U.S. Department of Education, Office of English Language Acquisition. That investigation examined how performance on indicators of Spanish reading at the end of second grade predicted English performance at the end of third grade and fourth grade 2. In Study Set 2, researchers followed the sample of students for an additional year, through fifth grade. This enabled them to embark on a study of the transfer of vocabulary skills in reading and to observe cross-language relationships as the students continued to develop literacy skills in English.

### ***Analysis and Findings***

Regression analyses were conducted to examine whether initial Spanish performance within each component of reading (phonemic segmentation, letter identification, word reading, pseudo-word reading, and comprehension) would predict English performance on the same measure at the end of third or fourth grade. Each analysis accounted for the possible contributions of general ability, initial level of oral English proficiency, years of formal instruction in English reading, and initial performance in English on the dependent variable of interest.

Findings indicated that Spanish phonemic awareness, Spanish letter identification, and Spanish word reading measured in second grade were reliable predictors of English performance on parallel tasks at the end of third grade. Second grade Spanish word reading was also predictive of English word reading at the end of fourth grade. The effect of Spanish phonemic awareness on English phonemic awareness emerged for all students. However, the effect of Spanish letter identification and word reading on English letter identification and word reading emerged only for students who had received formal instruction in Spanish reading. That is, direct relationships between Spanish and English performance on these measures were observed only among students receiving Spanish reading instruction.

A separate set of analyses looked at transfer of vocabulary knowledge. Comparisons of performance on the cognate awareness measure indicated reliable differences favoring the Spanish-instructed children on words that had cognate status in Spanish and English (e.g., *profound, edifice, jocose, malevolent*) but no differences between English-instructed and Spanish-instructed children on noncognate words (e.g., *wily, wanton, fiend*) that were matched in frequency and part of speech to the cognates. These findings suggest that the Spanish-instructed

children were able to use knowledge of the cognates in Spanish (*edifice/edificio, profound/profundo, jocos/jocoso*) to identify the meaning of the words on the English test.

Two studies under Study Set 2 used data from a subset of the larger sample to determine whether models of comprehension developed with predominantly monolingual populations accurately depicted the reading process for bilingual children. Participants were 137 bilingual fourth graders, 95 of whom had received SLI first and transitioned into ELI in third and fourth grades, and 42 of whom had received ELI only. The first study used structural equation modeling to analyze only English measures. As expected, English alphabetic knowledge and English fluency played a significant role in predicting English reading comprehension, indicating that a strong grasp of the alphabetic principle of English, coupled with accurate and speedy word recognition in English, were essential for the successful comprehension of text written in English. However, these decoding skills were less predictive of reading comprehension than their English linguistic comprehension counterparts, vocabulary knowledge and listening comprehension. The interplay among vocabulary knowledge, listening comprehension, and reading comprehension was made clear through strong and significant relationships for all three pairs of variables. The importance of vocabulary was also noteworthy; it directly affected reading comprehension but also exerted an indirect effect through its strong relationship with listening comprehension. These findings corresponded well with the relationships already defined in the research literature on monolingual English children; the structural equation model provided a clear window on how decoding and linguistic comprehension skills contribute to reading comprehension among bilingual Latina/o readers of English.

The second study built on the first by examining the same students' Spanish-language reading skills in addition to their English reading skills. Controlling for language of instruction, English decoding skill and English oral language proficiency, analysis explored the effects of Spanish-language alphabetic knowledge, fluency, vocabulary knowledge, and listening comprehension on English reading comprehension. Results revealed a significant main effect for Spanish vocabulary knowledge and an interaction between Spanish vocabulary and English fluency. Faster English readers benefited more from Spanish vocabulary knowledge than their less fluent counterparts.

These results are reminiscent of the phenomenon described by LaBerge and Samuels (1974), who suggested that as decoding-level skills became increasingly automatic, the reader's ability to focus increase amounts of attention to the process of creating meaning from text was improved. The cross-linguistic interpretation of the automaticity theory is that as L2 lexical access requires decreasing attention (i.e., as fluency increases), the bilingual reader is able to devote more cognitive energy to meaning-making strategies that use both the L1 and the L2. The fact that vocabulary knowledge was the significant L1 predictor is salient in this regard, as the construct has often been considered an adequate proxy for background knowledge (Perfetti, 1998), interpretation (García, 1991), and comprehension monitoring (Verhoeven, 2000). These processes may be instrumental in facilitating the L1-specific strategies that bilingual readers have been shown to employ while reading English language texts, such as cognate recognition (Nagy, García, Durgunoglu, & Hancin-Bhatt, 1993) and translation (Jiménez, García, & Pearson, 1995).

A final study under Study Set 2 examined differences in Broad Reading Outcomes (a construct that combines word reading and passage comprehension) for the entire group of study subjects in the fifth grade year. Analysis consisted of two univariate ANCOVAs with fifth grade English Broad Reading scores as the dependent variable. The first model included second grade level of literacy and SES as covariates, while the second included mother's level of education as a proxy for SES.

Results of both analyses indicated that Spanish-speaking students achieved significantly different reading outcomes depending on the language of instruction. Children who received SLI followed by ELI did not fare any worse on Broad Reading outcomes than students in ELI only. However, children who received SLI only fared significantly worse than children in the other two groups.

### **Study Set 2, Part 2: Study of the Role of Home Literacy and Language Environment on Bilinguals' English and Spanish Vocabulary Development**

Part 2 of Study Set 2 examined factors related to home language use and literacy practices of bilingual children and their influence on vocabulary skills in English and Spanish. Study participants were 96 Spanish-English bilingual fifth graders drawn from the participants in Study Set 2, Part 1. Sixty-one of them had received SLI and then transitioned into ELI, and 35 of them had received ELI only.

#### ***Measures and Timeline***

The study took place during the 2003-2004 school year, when participating students were in fifth grade. Parental reports on language use and literacy practices in the home were drawn from a demographic survey that had been developed for use across all of the ALE subprojects and administered to the participating children's parents or guardians. The survey was available in both Spanish and English; it elicited information about demographic variables and socio-economic status, length of stay in the U.S., home language use and exposure, and literacy practices in the home in Spanish and English (e.g., number of books at home, frequency with which the parents themselves read, frequency of reading to their children, frequency with which they helped their children with homework). A description of this instrument is available at [www.cal.org/acquiringliteracy](http://www.cal.org/acquiringliteracy). Non-study-specific measures used were the English and Spanish picture vocabulary subtests of the WLPB-R, which were administered to the children at school.

#### ***Analysis and Findings***

Helping the child with learning or homework in English and reading with the child in English were the most frequently reported literacy support activities, and storytelling in English and Spanish was the least frequently reported. However, there was wide variation across households: in some households several of these activities never occurred, while in others they occurred every day. At home, children tended to speak with their parents mostly in Spanish and with their siblings using a combination of both languages but with some preference for English. Approximately half the parents reported preferring to read in Spanish, and the other half in English.

Vocabulary measures administered at the end of fifth grade indicated that, on average, children had age-appropriate proficiency in both languages. However, the variation in Spanish test scores was greater than the variation in English test scores. Compared with a population mean of 100 with a SD of 15 points, the mean for the standardized vocabulary score was 88.5 (SD = 29.4) in Spanish and 91 (SD = 12.2) in English. Only 66 percent of the children in the sample had average or above average Spanish vocabulary scores when compared to U.S. norms, whereas for English, almost 75 percent did. This indicates that English was the stronger language for children in this sample.

The study also looked at predictors that might have had a language-specific effect on vocabulary for English (as the “high-status” language in formal education) and Spanish (as the “low-status” language in formal education). Overall, researchers found that home language preferences were associated with children’s language proficiency: children from families that preferred to use English at home tended to have higher English proficiency, and children from families with a preference for Spanish at home tended to have higher Spanish proficiency. However, analysis also identified several individual predictors of vocabulary scores:

- Paternal preference for English predicted higher scores on the English vocabulary measure, even for students who received their initial literacy instruction in Spanish. Maternal preference for English did not have the same effect. Reasons for this were not clear; future research could look at causes of paternal preference for English and reasons for its influence on children’s English language proficiency.
- Paternal and maternal preference for Spanish predicted higher scores on the Spanish vocabulary measure, even for students whose initial literacy instruction was in English.
- The language children preferred to use with their siblings had a much larger effect on English proficiency than the language preferred by the parents. Children who were highly proficient in English tended to come from households where child-child communication occurred in English, and parent-child communication occurred in either English or Spanish.
- The language preferred by the parents had a larger effect on Spanish proficiency than the language children preferred to use with their siblings. Children who were highly proficient in Spanish tended to come from households where parent-child communication occurred in Spanish. Thus, it was important that parents speak Spanish to their children if they want to help them maintain their Spanish proficiency.
- Gender was a predictor of English vocabulary scores; girls tended to outperform boys.

These results echo previous research findings that native language maintenance across generations is influenced by the language used at home (Pearson, 2002). The gender effect finding may be related to findings on attitudes of immigrant children: immigrant girls often hold more positive attitudes toward school and are more engaged in learning, outperforming immigrant boys, while teachers often perceive immigrant boys as threatening (Suárez-Orozco & Suárez-Orozco, 2001). In addition, immigrant girls tend to hold very high aspirations for school achievement, while at the same time valuing relations with their families highly (Portes & Hao,

2002). Thus, they might be more motivated to maintain Spanish for familial purposes, but also to acquire English for school achievement.

### **Study Set 3: Enhancing Awareness of Cross-Language Morphological Relationships as a Strategy for Independent Word Learning**

Study Set 3 involved an instructional intervention designed to help third and fifth grade Spanish-English bilingual children transfer cognate knowledge from Spanish to English. The study was intended to determine whether the development of an aspect of linguistic knowledge in Spanish is causally linked to development of the same aspect in English, and thus to elucidate whether instruction that “teaches for transfer” can be shown to directly facilitate the acquisition of English reading proficiency.

Study subjects were 160 third and fifth grade Spanish-English bilingual students in South Florida. The students were randomly assigned to either the six-week cognate-awareness intervention curriculum or a six-week Florida Comprehensive Assessment Test (FCAT) preparation curriculum.

#### ***Intervention, Measures, and Timeline***

The intervention, consisting of three units of eight lessons each, was designed to increase awareness of two types of morphological relationships across Spanish and English: cognates and parallel morphological derivations (in which, for example, the suffix *-mente* in Spanish consistently maps onto the suffix *-ly* in English). The study tested whether students who had been instructed on these cross-language relationships could exploit that knowledge when inferring the meaning of unknown words in English. The intervention materials were developed and piloted in the fall of 2003.

The students in the study were pre-tested on Spanish and English versions of the listening comprehension, picture-word vocabulary, letter word identification, and reading comprehension subtests of the WLPB-R. Pre-testing also included group administration of three researcher-developed tests: a vocabulary mastery test, a Spanish assessment of derivational morphology, and an English assessment of derivational morphology.

The intervention was implemented in third grade classrooms in 2004 and in fifth grade classrooms in 2005. Post-intervention testing assessed students' learning of the content delivered over the lessons and the degree to which students were able to generalize the strategies taught through the intervention to words that had not been explicitly taught. Three assessments that had been developed by the Research Core were used: the Extract the Base Test (English version), the Extract the Base Test (Spanish version), and the Cognate Awareness Test. In addition, study subjects were tested using the Sentence Verification Technique (Royer, Carlo, & Cisero, 1992). Each of these measures used low-frequency English words. Half of the words were cognates; the other half were noncognates matched to the cognates on frequency and part of speech. The cognates that formed part of the transfer items were words that had high frequencies in Spanish but low frequencies in English (e.g., *jocosos-jocose*; *edificio-edifice*; *tranquilo-tranquil*).



## ***Analysis and Findings***

Test data was analyzed using ANCOVA, controlling for individual differences in performance at pretest. Instructional condition was a between-subjects factor with two levels (treatment, control), and target word type was a within-subjects factor with two levels (cognates-non-cognates or parallel-nonparallel affixes). Results indicated that students who were exposed to the cognate curriculum learned more of the target cognates than the students who were exposed to the FCAT preparation curriculum. Students in both grades and in both curricula were able to spontaneously apply knowledge of Spanish words when require to infer the meaning of unfamiliar English words. In addition, there was no difference between the groups in their ability to transfer cognate knowledge to words that were not targeted in the curriculum, above and beyond what they knew at the beginning of the study. Further analysis will investigate whether knowledge of the transfer cognate items is related to differences in Spanish frequency and whether this variable might help explain the lack of a transfer effect among students in the cognate intervention.

## **Significance**

The set of studies described here built on earlier research on cross-language relationships while expanding on that research in several important ways.

First, before this project few assessments existed that supported the assessment of parallel reading components in two languages. In addition to using the WLPB-R and its Spanish counterpart, researchers associated with ALE Subproject 2 worked with the ALE Research Core to develop assessment instruments that would allow for such parallel assessment. In addition, they developed measures that were explicitly designed to assess transfer of reading skills from one language to the other.

Second, most previous studies on cross-language relationships were cross-sectional rather than longitudinal. The longitudinal research design of the studies in ALE Subproject 2 allowed researchers to identify factors that influenced the development over time of reading skills in two languages, as well as to assess first language influences on second-language development.

Third, the studies in ALE Subproject 2 accounted for the effects of variables such as general ability and oral language proficiency. This allowed the researchers to test competing hypotheses about cross-language relationships; in particular, it led to the recognition of the strong and significant relationships among oral vocabulary knowledge, listening comprehension, and reading comprehension.

Fourth, the research conducted in Subproject 2 controlled for language of classroom instruction as well as for instructional practices in reading. Accounting for these factors allowed the researchers to identify differences in the magnitude and direction of relationships between Spanish and English literacy.

Finally, the research design of Subproject 2 allowed the researchers to test causal hypotheses about the effects of Spanish knowledge on the development of English vocabulary (both cognates and non-cognates) and to test hypotheses about the mechanisms of transfer. By supplementing the correlational studies with short-term focused experimental interventions, the researchers were able to investigate the possible utility of “teaching for transfer” through the use of a cognate-focused curriculum.

### **Further Cross-Project Work**

The researchers continue to analyze and report on the data collected in the study. Ongoing work seeks to provide further insight into the influence of family and community context, first and second language phonological awareness and word-level reading skills, second language oral proficiency, and language of instruction on the development of later reading skills in English.

In addition, the researchers are participating in cross-project analyses that look at developmental progressions through the several age groups studied in the three ALE subprojects. These analyses look at relationships across a variety of family and school domains, including socioeconomic status, home language use, home literacy practices, school language use, oral language proficiency, word-level reading skills, and text-level reading skills.

Finally, drawing upon data collected from populations not represented in the primary study samples, including monolingual English-speaking and monolingual Spanish-speaking children, the researchers are establishing contextualized performance levels that provide information about how the bilingual children in the ALE subproject samples compare with monolingual populations with regard to language and literacy performance. This analytical process will enable the researchers to better understand the language and literacy development of the bilingual children in the subproject samples.

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