



HHS Public Access

Author manuscript

J Res Child Educ. Author manuscript; available in PMC 2020 October 09.

Published in final edited form as:

J Res Child Educ. 2012 ; 26(4): 371–391. doi:10.1080/02568543.2012.711800.

Assessing the Phonological Skills of Bilingual Children From Preschool Through Kindergarten: Developmental Progression and Cross-Language Transfer

Lisa M. López

University of South Florida

Abstract

The developmental progression hypothesis for phonological awareness states that children perform better on lower level tasks; and has mainly been addressed in the literature with children beginning at age 5. In addition, there has been limited amount of research done regarding the performance of dual language learners on phonological awareness tasks under the age of 5. There is a need for a valid measure of phonological awareness for bilingual preschool children at an earlier age. This article addresses three purposes: 1) developing a reliable measure of phonological awareness for bilingual preschool children, 2) testing the developmental progression hypothesis in both English and Spanish, and 3) comparing longitudinal performance across language on the measure. Two hundred and forty-one Spanish-English bilingual children were assessed on the author-developed Phonological Awareness Test at three time points (mean age of 4.58; mean age of 4.96; mean age of 5.94). Findings indicate differences in developmental progression by language as well as shifts in performance across language as children go through school. The children in this study transition from a language specific model of phonological awareness to a more skill specific model of phonological awareness as they progress through school.

Keywords

phonological awareness; preschool children; bilingual children; Spanish; English

The development of phonological awareness skills in young children has been at the center of the research literature relating to early literacy for decades. Theories have emerged regarding the role of phonological awareness in the process of learning to read in English. Research regarding the importance of phonological awareness in the development of literacy skills in languages other than English has led to additional theories being postulated and further leading to the study of a cross-language transfer, which may facilitate the acquisition of second language literacy skills for immigrant children. This article introduces a new measure created to capture bilingual children's performance on phonological awareness skills in both English and Spanish in their early development of these skills, and further investigates the relationship and development of these skills across languages.

Phonological Awareness

“Phonological awareness” is a term used to indicate that words are made up of a series of different sound units, both large (i.e., syllables, onsets, rimes), and small (i.e., phonemes) (International Reading Association, 1998). Phonological awareness tasks involve the manipulation of these units of oral speech (Lonigan, Barker, Burgess, & Anthony, 1995). Chard and Dickson (1999) define phonological awareness as “the understanding of different ways that oral language can be divided into smaller components and manipulated” (p. 262). These divisions can occur at various levels. Sentences may be broken down into individual words, and words, in turn, can be broken down in several ways (e.g., syllables, onset-rime, or phonemes). Phonological awareness, along with vocabulary development and letter knowledge, is one of the precursors to literacy for children learning English as their first or second language (Lipka & Siegel, 2007; National Institute of Child Health and Human Development [NICHD], 2000; Whitehurst & Lonigan, 1998).

Phonological Awareness Theories

A series of theories has developed through the years explaining what skills constitute phonological awareness (see Anthony & Lonigan, 2004, for a review). One of the most recently explored and most pertinent theories relating to phonological awareness within education is that of developmental progression, in which phonological awareness is considered a single factor in the development of early literacy skills, yet consists of numerous tasks evident at different levels of development (Chard & Dickson, 1999; Cisero & Royer, 1995; Treiman & Zukowski, 1996). Tasks used in determining the degree of competency in phonological awareness tap into a continuum spanning from easy to more complex abilities. The degree of difficulty found in individual phonological awareness tasks differs depending on the type of sound manipulation involved and the size of the unit, as well as the location of the unit in the word. The easier tasks involve manipulating longer strings of phonemes, such as words, while harder tasks include manipulation at the individual phoneme level. Tasks requiring discrimination of phonemes are more taxing than the discrimination of words or syllables, a combination of phonemes. Sounds are easier for young children to pronounce when they are attached to other sounds. As sounds become shorter, it is more taxing to pronounce these individual sounds, and young children have not yet developed these skills. Although these skills differ in their complexity and age of acquisition, research has shown that they encompass one single factor, that of phonological awareness (Anthony & Lonigan, 2004; Branum-Martin et al., 2006).

While developmental progression focuses on the development of phonological awareness by monolingual English speakers, a different focus has been placed on the development of phonological awareness among bilingual learners. Based on Cummins’ linguistic interdependence hypothesis, which states that children’s performance on one language directly relates to their performance in their second language, the cross-language theory has emerged in explaining the development of phonological awareness among bilingual language learners. Durgunoglu and colleagues empirically determined that Spanish and English literacy development is very similar, with phonological awareness playing a significant role for both languages. Durgunoglu (1998) found that children used their

Spanish skills to help them in developing English literacy skills. Those children with strong Spanish literacy were able to more easily develop English literacy skills.

The Role of Phonological Awareness in Early Literacy Development

Rhyme and alliteration are key to a child's acquisition of phonological awareness. Their ability to comprehend the structure behind rhyming and alliteration is one of the first steps in their grasping the true underpinnings of literacy (Chard & Dickson, 1999). This indicates that the child is starting to pay attention to the sounds made in each word (Stahl & Murray, 1994). Rhyming and alliteration are introduced to children at a very young age, mainly through children's books. Some children are capable of performing tasks involving rhyming and alliteration as early as 3 years of age. A greater number of children are capable of completing these tasks at age 4. Children's understanding of the structure of language, as represented in these tasks, is primarily developed in the first five years of the child's life. Most children acquire this abstract representation of linguistic structure through observations of their communicatory surroundings (Lindfors, 1987).

Phonemic segmentation, the most difficult phonological awareness task, is considered the best predictor of reading ability in children by fourth grade (Bryant, MacLean, Bradley, & Crossland, 1990; Calfee & Norman, 1998; Juel, 1988; Muter, Hulme, Snowling, & Taylor, 1997; Nation & Hulme, 1997; Raz & Bryant, 1990; Yopp, 1988). This segmentation task develops in concordance with the understanding of the functions of print. Isolating individual sounds in words, as well as manipulating these sounds by deleting the sound from, or adding the sound to, a word to create a new word or pseudoword, is by far the most difficult task for a child. In fact, not all children are capable of achieving these tasks, with about 20% of children unable to master these tasks by the 1st grade without direct intervention or special instruction (International Reading Association, 1998; Troia, Roth, & Graham, 1998). It is important, then, to note that prior to this stage, rhyming, the easiest phonological awareness task, is considered a reliable predictor of phonemic awareness (Anthony & Lonigan, 2004; Bryant et al., 1990).

Phonological Awareness in Dual Language Learners

In determining the pathways to literacy for dual language learners, phonological awareness plays a crucial role in both identifying phonological deficits and in ameliorating the transfer of literacy skills from the first to the second language. Bialystok and her colleagues (Bialystok, Majumder, & Martin, 2003; Bialystok, McBride-Chang, & Luk, 2005) have focused their bilingualism research specifically on identifying the components of phonological awareness that transfer across languages and serve as a buffer for the development of parallel skills in the new language. Tracing the development and transfer of these skills across languages has shown differences, based on inter-language relationships. For languages sharing a similar writing system, such as Spanish and English, the transfer of the phonological system is simplified (Garcia & Kleifgen, 2010). Bilingualism research has tied the development of oral language proficiency, in both the native and second language, to the facilitation of phonetic transfer (Durgunoglu, Nagy, & Hancin-Bhatt, 1993; Jimenez, Garcia, & Pearson, 1995; Lopez & Greenfield, 2004a, 2004b; Quiroga, Lemos-Britton,

Mostafapour, Abbott, & Berninger, 2002). This research has indicated that until the child has developed some proficiency in both languages, full transfer of phonological skills cannot occur. Genishi and Dyson (1984) point to the complicated nature of language development with additional factors, such as “personality, verbal memory, quality of adult input, and cultural expectations always interacting” (p. 21). These differing characteristics result in children varying in their rate and approach to language learning in both their first and second language.

The Assessment of Phonological Awareness Skills

Assessment is of concern in the study of phonological awareness. The variety of tasks used to measure both phonological and phonemic awareness and their varying degrees of difficulty result in inconsistencies when assessing phonological ability. Two main purposes have been identified for the use of phonological awareness assessments with monolingual children. Primarily, assessments are used to identify those students who may have difficulty in emergent reading activities. Once these students have been identified, assessments are then used to monitor their progress in intervention programs focusing on the instruction of phonological awareness.

It is important to assess children’s phonological awareness in order to determine whether there is a possible language delay, which may be remediated through intervention efforts. For this reason, there are a number of assessments, both standardized and informal, that help to categorize children into distinct groups. These assessments primarily focus on monolingual children in kindergarten and first grade, when learning to read is the main focus of education. Little is still available for children under the age of 5, although research has shown that predictions for reading success can be made in children as young as 3 (Lonigan, Burgess, Anthony, & Barker, 1998) and that children’s language development thrives in preschool and is well developed by age 5 (Lindfors, 1987).

Little is available in terms of assessments for the preschool population (Troia et al., 1998); however, that is beginning to change. The most widely used phonological processing assessment, the Comprehensive Test of Phonological Processing (CTOPP) (Wagner, Torgesen, & Rashotte, 1999), has been standardized for use with young children starting at age 5. For 5- and 6-year-old children, the subtests making up the phonological awareness composite are recommended and include Elision, Blending Words, and Sound Matching. A preschool version of the CTOPP, the pre-CTOPP, is being developed but is not yet available for general distribution, and it is unclear whether the tasks being used, such as elision, may result in floor effects for preschool children. The Phonological Awareness Literacy Screening: Pre-K (PALS: Pre-K) is available for use with the preschool population, but is not specific to phonological awareness. In addition, such subtests as nursery rhyme awareness require background knowledge that is limited to a certain population of preschool children.

All other phonological awareness assessments currently available focus mainly on children in elementary school, with the majority of the assessments administered in English. When testing a bilingual child, it is commonplace for the assessment to be translated on site for use in the child’s home language. The translation of these assessments is problematic, due to the

language specific nature of the task and therefore not recommended. Phonological awareness plays an important role in early literacy development. Consequently, developing a tool that specifically measures this development earlier than kindergarten is necessary. Furthermore, given the increasing number of children entering school for whom Spanish is their first language, developing a tool with an appropriate Spanish counterpart is important.

Current Study

With few measures available for children under the age of 5, it is difficult to determine the validity of the developmental progression hypothesis (Cisero & Royer, 1995) at preschool, nor how well the children are obtaining the phonological skills being incorporated into their instruction. Additionally, with the large number of dual language learners in preschool programs in the United States¹, it is equally important to determine how well they are performing in both their first language and in English. Research has determined that a cross-language transfer of phonological skills occurs when Spanish-speaking children are proficient in their first language and have obtained phonological skills in that language in 1st grade (Durgunoglu, 1998; Quiroga et al., 2002) and, more recently, at preschool (Lopez & Greenfield, 2004b). Thus, it is important to validate a measure of phonological awareness for younger children that can be administered in both English and Spanish, taking into account the difficulty continuum previously discussed. This will then help in determining the abilities of younger children on these tasks and the relationship of these abilities across languages.

Studying the effect of cross-language transfer longitudinally will help determine how children perform in phonological awareness as they go through schooling, validating the findings by Bialystok and colleagues (Bialystok et al., 2003, 2005), as well as those findings by Durgunoglu and colleagues (Durgunoglu et al., 1993; Durgunoglu, 1998, 2002), which state that children must first develop phonological abilities and language proficiency in their first language, before obtaining the metalinguistic capacity to process phonology cross-lingually. Metalinguistic ability in monolingual children is thought to develop once these children have a grasp of the language system. Bilingual children have been shown to develop this capability earlier on as they manipulate two languages (Genesee, Paradis, & Crago, 2004). This capacity for understanding the mechanics of language assist bilingual children in transferring their skills from one language to another, helping them to view skills with less focus on a specific language and more focus on the skill itself. This process has recently been coined “translanguaging” in emerging bilinguals, meaning that skills are developed without regard to a specific language but instead take into account the interaction across languages (Garcia & Kleifgen, 2010).

Developing a New Measure of Phonological Awareness

In the current study, the phonological awareness measure used by López and Greenfield (2004a, 2004b) was adapted to create a more effective and more comprehensive measure of phonological awareness at the preschool level. This measure was adapted taking into

¹About 27% of children enrolled in Head Start are from homes where a language other than English is spoken (Administration of Children, Youth, and Families, 2000).

consideration work done previously on this topic by such researchers as Dickinson (Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003) and Miccio (Miccio, López, & Hammer, 2003). The original measure consisted of three subtests: rhyme matching, alliteration matching, and sentence segmenting. For the present measure, two new subtests were included — rhyme production and syllable segmenting — as Spanish “has a better defined syllabic structure than the English language” (Jimenez-Gonzalez & Haro-Garcia, 1995, p. 198), making the process of segmenting syllables easier in Spanish than in English.

The results reported by López and Greenfield (2004a) provide an understanding of children’s abilities on these tasks and indicate that, unlike in previous studies, the tasks were at an appropriate level for preschool Spanish/English bilingual children. They also provide an understanding of the link between language proficiency and cross-language transfer. The purpose of this article is threefold: 1) report on the reliability of this revised measure; 2) look at children’s performance on the measure in both languages at three time points, from the beginning of the 4-year-old preschool year through the end of kindergarten; and 3) compare children’s performance across subtests, across languages, at the three time points.

Based on previous research on bilingualism, two hypotheses have emerged regarding the development of phonological awareness skills in Latino children. First it is hypothesized that the children will perform better on the phonological awareness assessment as they go through school. In looking at phonological performance across the two languages longitudinally, phonological awareness skills are thought to move from being language specific, as they are beginning to understand language use and phonological abilities, to more task specific, as they gain oral proficiency and the cross-language effect becomes more evident (Anthony et al., 2009; Durgunoglu et al., 1993; Jimenez et al., 1995). This is expected as students will have obtained phonological awareness training in school and will have developed better proficiency in the languages. Second, it is hypothesized that the students’ English skills will grow at a faster rate than their Spanish skills, as they spend more time in classrooms where the instruction predominantly occurs in English, a result of the school systems these children attend. “Emergent bilinguals come into school as users of a home language that dynamically develops (or not) in relationship to the development of English” (Garcia & Kleifgen, 2010, p. 110). This information will help inform classroom-based instruction for Latino English language learners.

Method

Participants

The children being reported on are part of a larger project, the Early Childhood Study of Language and Literacy Development of Spanish-Speaking Children (hereafter, the Early Childhood Study). The Early Childhood Study was designed to study the longitudinal development of bilingual language and literacy skills of Latino dual language learners (see Tabor, Paez, & Lopez, 2003, for a description of the study). Children were recruited to participate in the Early Childhood Study when they were entering their 4-year-old preschool year. The children were invited to participate if they lived in Spanish-speaking homes and were age-eligible for kindergarten the following year. Recruitment took place in three

communities in Massachusetts and one community in Maryland. The majority of the children (84%) were attending Head Start centers, although some public preschool programs also were represented. A total of 241 children (123 females; 118 males) completed the English and Spanish versions of the phonological awareness assessment at the three time points being reported on. At Time 1, the children had a mean age of 4.58 and were assessed at the beginning of their preschool year. At Time 2, the children had a mean age of 4.96 and were assessed at the end of their preschool year. At Time 3, the children had a mean age of 5.94 and were assessed at the end of their kindergarten year.² These children represented families who immigrated to the United States from 16 different countries, along with the United States territory of Puerto Rico. Some of the parents (7%) also were born in the United States but continued to use Spanish at home. Eighty-eight percent of the families had an income of less than \$40,000³, with an average of five people living in the house.

Measures

Phonological Awareness Test—As mentioned previously, the Phonological Awareness Test was developed for use in the Early Childhood Study. It was predominantly based on the Phonological Sensitivity Test used by López and Greenfield (2004a, 2004b). The task consists of five subtests: Rhyme Recognition, Rhyme Production, Initial Phoneme Recognition, Sentence Segmenting, and Syllable Segmenting. There are two versions of the test, one in Spanish and one in English. These two versions tap into the same skills and were constructed separately to demonstrate the children’s phonological abilities in their two languages, taking into account their development of bilingualism. The scoresheet for each language is available in Appendices 1 and 2.

The rhyme recognition subtest consists of two practice items, followed by six test items. Children are shown a target picture (such as a picture of a cat) and choice pictures (such as pictures of a hat and a ball) and provided with the names of each of the pictures. They are then asked to point to the picture whose name rhymes with the name of the target picture. For test items 1 through 3, the child chooses the correct picture from two pictures, and for test items 4 through 6, the child chooses the correct picture from four pictures. The rhyme production subtest consists of two practice items and four test items. Children are asked to produce a rhyme for a word spoken by the assessor, such as “day” or “fly.” Credit is given if the word the child provides is a rhyme, regardless of whether it is a real word or not, as the child is asked to provide a rhyme, not necessarily a real word.

The initial phoneme recognition subtest is similar in format to the rhyme recognition subtest, differing only in that the child is asked to match pictures of words that have names with the same initial sound. Again, for the first three items, the child chooses the correct picture from two pictures. For the second three items, the child chooses the correct picture from four pictures.

²Children not tested at the three time points were not included in the analysis. During the course of the study, 88 children either moved out of the state or attended a public school in which the project was not allowed entry.

³Families at 175% of the Federal Poverty Guideline, an income of \$39,568 for a family of five, are considered low-income in the Commonwealth of Massachusetts.

The sentence-segmenting subtest consists of two practice items and five test items. The child is provided with a set of colorful tiles to use in this task. The assessor reads a sentence from two to five words in length, and the child is asked to move one tile for each word in the sentence. The syllable-segmenting subtest is similar in format to the sentence-segmenting task, differing only in that the assessor says a word and the child is asked to move one tile for each syllable in that word.

During the two preschool administrations of the task, administration rules are in place. For each subtest, the child needs to pass at least one of two practice (or screening) items in order for the subtest to be administered. Additionally, rhyme production is not administered if the child does not correctly answer at least four out of the six rhyme recognition items, and syllable segmenting is not administered if the child does not correctly answer at least three of the five sentence segmenting items. These administration rules are similar to that of obtaining a ceiling on a standardized test, whereby if the child gets a certain number incorrect, the assessment is stopped. Therefore, the child is assigned a score of zero on that subtest, based on the conceptual understanding that the probability is high the child will not be able to correctly answer the following items. During the third administration the child is administered the entire test.

Procedure

The Phonological Awareness Test was one of a battery of language and literacy assessments administered to each of the children. The battery took approximately 45 minutes and was administered to the children individually at their school. Children were assessed in English and Spanish on different days, at least one week apart. When the children were assessed at Time 1, they were assessed in their stronger language first and then in the other language. Their stronger language was determined by asking parents on the consent forms what language they thought their children spoke best. Of the 241 children, 70% were assessed first in Spanish, with the remaining 30% being first assessed in English. Children were assessed using the same battery at Time 2 and Time 3. The languages of the administrations were counterbalanced in Times 2 and 3, no longer dependent on the child's stronger language. After the assessment sessions, children were given a book and a pencil as a reward for their participation.

The children attended two different schools/classrooms during the course of this study. At Times 1 and 2, they attended either a federal preschool program or a public preschool program. These programs have a set curriculum to help enhance language and literacy development before children enter formal schooling. The language used in the classroom is not monitored, although the majority of the classrooms used English as the primary language. At Time 3, the children were attending the first year of formal schooling (kindergarten). Although most children were attending bilingual programs, where Spanish instruction occurs for part of the year and then English is introduced, this instruction changed to English early in the year due to changes in educational policy within the state. Therefore, all children were receiving some level of English instruction by Time 3. No formal assessment of the classroom language environment or curriculum was completed.

Statistical Approach

A series of analyses were done using the data from the three time points in order to look, first, at statistical properties of the measure; second, to track children's development of phonological skills as they go through preschool and kindergarten; and, third, to compare children's phonological awareness cross-linguistically. Cronbach's alpha was calculated for the test in each language at each time point as a measure of reliability. Confirmatory Factor Analysis was then used to test the hypothesized models of performance across languages on the test at each time point. The models focus on the hypothesis that these skills begin as language-specific abilities and develop into task-specific abilities as children go through phonologically based instruction and develop a better sense of language proficiency. Additionally, in order to track children's development on each skill, in each language, over time, a Repeated Measures MANOVA (5 subtests \times 2 languages \times 3 timepoints) tested for a main effect by subtest, language, and time, along with language*time, language*subtest, time*subtest, and language*time*subtest interactions, in determining whether children performed differently across the time periods on the subtests in each language. The Wilks' Lambda test statistic is reported, along with the significance coefficient and effect sizes. Bonferroni-adjusted post-hoc tests were calculated for the significant main effects in analyzing the differences. Additionally, Bonferroni-adjusted post-hoc comparisons were computed for the interactions.

Results

Internal Reliability Analysis

In order to determine the internal consistency of this new measure, reliability analysis using Cronbach's alpha was calculated for each of the tests in each language at all three time points. For the English assessment, the 26 test items showed moderately high consistency at all three time points, with between 238 and 240 subjects ($\alpha = 0.81, 0.86, \text{ and } 0.85$). For the Spanish assessments, the 26 test items showed moderate consistency at all three time points, with between 237 and 241 subjects ($\alpha = 0.78, 0.79, 0.74$). The internal reliability of this measure in both languages and throughout the three time points allows us to proceed confidently with the statistical analysis of this measure using mean scores.

Confirmatory Factor Analysis

Both face validity and content validity were taken into consideration when creating the measure in each language. The measure was created based on developmental theory regarding phonological awareness and its developmental progression. Of additional interest was an empirical investigation of how well the subtests that make up the test across languages stand together and fit within the hypothesized model. A confirmatory factor analysis using EQS software tested the models for each time point. Goodness of fit statistics for each model determined the appropriateness of each model. This was done at each of the three time points individually in observing the effect of development of both language and phonological abilities on the subtests.

The model represented in Figure 1 is the hypothesized model for Time 1. The model has a statistically significant goodness of fit index ($\chi^2 = 91.71, p < .001$; GFI = .93, CFI = .89,

NNFI = .84, RMSEA = .10, SRMR = .07), with four factors being defined at this stage (Kline, 1998). The four factors are Spanish Skills, English Segmenting, English Recognition, and Rhyme Production. The Spanish Skills factor includes the following Spanish subtests: rhyme recognition, initial phoneme, sentence segmenting, and syllable segmenting. The English Skills were divided into two factors: sentence and syllable segmenting; and rhyme recognition and initial phoneme. Rhyme Production in English and Spanish constitutes the final factor.

The model represented in Figure 2 is the hypothesized model for Time 2. The model has a statistically significant goodness of fit index ($\chi^2 = 92.06$, $p < .001$; GFI = .93, CFI = .87, NNFI = .82, RMSEA = .09, SRMR = .07), with three factors being defined at this stage (Kline, 1998). The three factors are Spanish Skills, English Skills, and Rhyming. Spanish Skills in Figure 2 contain the same variables as Figure 1. English Skills includes initial phoneme, along with the two English segmenting tasks. Rhyming is made up of the two English rhyming tasks and Spanish rhyme production.

The model represented in Figure 3 is the hypothesized model for Time 3. The model has a statistically significant goodness of fit index ($\chi^2 = 70.82$, $p < .001$; GFI = .94, CFI = .92, NNFI = .88, RMSEA = .09, SRMR = .06), with three factors being defined at this stage (Kline, 1998). The three factors are Segmenting, Initial Phoneme, and Rhyming. Spanish Sentence Segmenting was removed from the model at this time point, as this skill is no longer considered a task of phonological awareness at this level in Spanish, due to the phonological make-up of the language (Jimenez-Gonzalez & Haro-Garcia, 1995).

Repeated Measures Multivariate Analysis of Variance

Measures of central tendency are reported in Table 1. A three-way MANOVA (language \times time \times subtest) was conducted on the data to determine whether significant change occurs cross-linguistically, across subtests, over time.

The MANOVA resulted in significant main effects for language ($F(1, 237) = 22.05$, $p < .001$, $h_p^2 = .09$), time ($F(2, 236) = 814.48$, $p < .001$, $h_p^2 = .87$), and subtest ($F(4, 234) = 440.82$, $p < .001$, $h_p^2 = .88$). Significant interactions also were evident for language**time* ($F(2, 236) = 65.77$, $p < .001$, $h_p^2 = .36$), language**subtest* ($F(4, 234) = 37.06$, $p < .001$, $h_p^2 = .39$), time**subtest* ($F(8, 230) = 46.46$, $p < .001$, $h_p^2 = .62$), and language**time***subtest* ($F(8, 230) = 14.44$, $p < .001$, $h_p^2 = .33$).

Post Hoc Comparisons

Pairwise comparison of the language main effect is unnecessary, as the indication of a significant main effect points to significant differences across the two languages. Pairwise comparisons were calculated for the time main effect in determining whether significant differences existed across the three timepoints. Accounting for Bonferroni adjustments, Time 1 is significantly different from Times 2 and 3 ($ps < .001$). Additionally, Time 2 is significantly different from Time 3 ($p < .001$).

Pairwise comparisons were calculated for the subtest main effect in determining whether significant differences in performance existed across the five subtests. Accounting for

Bonferroni adjustments, the children performed significantly different in subtest 1 (rhyme recognition) in comparison with each of the other four subtests ($ps < .001$). The same held true for subtest 2 (rhyme production), subtest 3 (initial phoneme), subtest 4 (sentence segmenting), and subtest 5 (syllable segmenting). Children performed significantly different across all subtests ($ps < .001$).

Posthoc pairwise comparisons also were calculated for the individual interactions, using a Bonferroni adjustment. Pairwise comparisons for the time*language interaction indicate a significant improvement in both English and Spanish at each time point ($ps < .001$). Additionally, there is a significant difference in performance by language at Time 2 ($p < .001$) and Time 3 ($p < .001$), with Spanish dominating at Time 2 and English dominating at Time 3. Further analysis of the subtest*language interaction indicates that, overall, children performed better in Spanish on rhyme recognition (approximating significance) and significantly better in English on rhyme production ($p < .001$) and sentence segmenting ($p < .001$). Posthoc analysis of the subtest*time and subtest*time*language interactions indicates that children performed significantly better as they got older on all subtests ($ps < .001$) in each language ($ps < .01$).

Discussion

The purpose of this study is threefold. First, it is necessary to identify a reliable measure of phonological awareness for a Spanish/English bilingual preschool sample. Second, it is important to identify how these children progress on their phonological skills in both English and Spanish as they proceed through preschool and kindergarten. Third, because these children are interacting with two languages, it is necessary to understand how they are developing each of these phonological skills in both languages, as well as cross-linguistically.

Phonological awareness has been the focus of many investigations in the last few years, and its role in the development of literacy has brought it to the forefront in early literacy curricula. Past studies have begun identifying phonological awareness in children as young as 3 years old (Bryant et al., 1990). However, measuring these abilities in low-income preschool children has been a challenge. Taking into account the developmental progression hypothesis (Anthony & Lonigan, 2004; Cisero & Royer, 1995) and using a more efficient and comprehensive version of the phonological sensitivity task used by López and Greenfield (2004a, 2004b), the Phonological Awareness Test, created for use in the Early Childhood Study, has shown to be a reliable task for emergent bilinguals with moderate internal consistency at all three time points in both languages. The children's performance on this task also improved significantly as they increased in age and moved through school. This indicates the task's ability to measure growth in rhyme awareness, initial sound awareness, and segmenting abilities.

Confirmatory factor analysis provided an indication of how these tasks fit into the model taking into account age and language proficiency. Phonological awareness tasks develop at different stages, have overlapping properties, and for this population, interact across languages. This finding is in agreement with the growing phonological awareness literature

pointing to the influence of instruction on the development of these skills for monolingual low-income children (Torgesen & Davis, 1996). Researchers have shown the effect of intervention on the growth of these skills for both monolingual and bilingual children (Quiroga et al., 2002; Troia, 2004).

The additional factor present in this study is the presence of a dual language component as early as preschool. Research in the realm of cross language transfer has pointed to the high transferability rate of phonological awareness in dual language learners (Durgunoglu, 2002). A significant variable in aiding this transfer is that of language proficiency. Children who have obtained proficiency in at least one of their languages gain the metalinguistic capacity to transfer. This is shown in this study as the change in the model across the three time points is demonstrating the influence of school and the interaction of cultures, along with their growth in language proficiency, on their phonological skills.

At the beginning of their preschool program, when the children were 4, and coming into school from homes where Spanish is spoken, all of the Spanish phonological skills combine into one factor. At this time point the children are beginning to develop their English skills. The English tasks were divided into two factors, segmenting and recognition. At this level in children's development, recognition skills are more developed than segmentation skills.

By the end of preschool, it is expected that children were exposed to some phonological awareness instruction in their classrooms. However, at this stage one would still expect there to be a distribution of skills by language as previous research has shown the limited oral language proficiency of low-income children in preschool (Tabors, Pérez, & López, 2003). This was represented by two distinct language factors, English and Spanish. A third factor included skill of rhyme recognition in English, as well as rhyme production in both Spanish and English. Although rhyme production is a more difficult task, this skill is being emphasized in the preschool classrooms. Both rhyme production and rhyme recognition in English play an important part in literacy instruction during the preschool day. It is therefore of no surprise that these variables come together in this factor, along with Spanish rhyme production. The appearance of Spanish rhyme production in this factor may be a result of cross-language transfer of rhyming, the easiest of the phonological skills (López & Greenfield, 2004b). The phonological skills remain language specific throughout preschool (Time 1 and Time 2), with only rhyming standing out.

At the end of kindergarten, it is expected that children will have been exposed to a significant amount of instruction with regard to phonological awareness. The hypothesized factors are no longer language specific, but instead show the three types of phonological awareness being measured by the task, rhyme awareness, initial sound, and segmenting. This result is indicative of the instruction the children have received and their dual language abilities in these tasks, as well as the cross-language transfer ability of phonological awareness. On the other hand, Spanish sentence segmenting does not appear to be as appropriate a measure of phonological awareness in Spanish as it is in English. Spanish is a syllabic language in which sounds are segmented at the syllable level and not at the word level (Jimenez-Gonzalez & Haro-Garcia, 1995). This is a function of the sound system; therefore, it is not an easy task for children in Spanish. As Spanish is a language in which

children develop the ability to divide sounds by syllables early on, it makes sense, then, not to fit this task in with the other tasks in the segmenting factor.

The development of phonological skills identified in this emerging bilingual population brings in to play the context these children are living in. The sociocultural knowledge of language they bring with them into the preschool classroom is evident in the findings from the beginning of preschool. These children have an understanding of their home language that has emerged as they have come to observe and take part in language interactions within their community (Rogoff, 2003; Siegel & Lukas, 2008). As English becomes part of the children's language repertoire, the development of the two systems in tandem influence each other. Development in each language is neither linear nor is it identical, yet these children have the capacity to interact and manipulate with sounds within and across the two languages (Genishi & Goodwin, 2008; Valdés, 2001).

As was indicated by the MANOVA, the children's performance in both languages significantly increased on all of the tasks as they went through the two years of schooling (see Figure 4). Children started off performing best on rhyme recognition, doing slightly better in Spanish than in English. This is also in agreement with past research, in which rhyming was shown to be the easiest phonological task for young children to accomplish. Matching tasks also have been found to be easier for young children than oddity tasks (Lopez & Greenfield, 2004a).

It is interesting to note that the progression of skills from easiest to hardest stays almost intact as children are finishing kindergarten, with the exception of syllable segmenting in Spanish and sentence segmenting in English. While children are also improving on the rhyme production task, this remains the most difficult task for them to complete at Time 3. This is in agreement with Anthony and Lonigan's (2004) finding that rhyme production is too difficult a task for many children to complete, even by age 6. By the end of two years of schooling, children are also doing better on the phonological tasks in English. This may be a result of their instruction being predominantly in English in both language and pre-literacy skills. The increase in instruction in English being experienced by these children may increase their rate of growth in English over Spanish. Garcia (2009) refers to the interchange in growth of English and Spanish skills as dynamic bilingualism. There is no linear growth, but instead the growth is complex and interrelated.

Other language researchers consider the rapid development of English to incur Spanish loss, also known as L1 attrition (Genesee, Paradis, & Crago, 2004). Taking into account this perspective, one would say that attrition is already visible in these children as they attend their first year of formal schooling, when the instructional emphasis in the United States moves from allowing first language instruction to requiring English instruction for these L2 learners. This is evident as the children perform significantly better on these skills in Spanish at Time 2, yet perform significantly better in English at Time 3. These children will continue to develop their English skills and abilities as they are schooled in English. Yet, as pointed out by Garcia and Kleifgen (2010), "Emergent bilinguals are increasingly being educated in mainstream classrooms with little specialized educational support either in English or in their home languages" (p. 55). It would be necessary to follow these children

further in their schooling to determine whether they are experiencing the effects of dynamic bilingualism or L1 attrition.

It is also likely, based on the cross-language hypothesis (Durgunoglu, 1998, 2002), that those children who are still receiving Spanish input at home and immersed in their home culture within their community (Rogoff, 2003) will be able to transfer the skills they have learned in English to Spanish. However, if they are no longer receiving any language input in Spanish at home or in their communities, it will be very difficult for them to continue to show any gains in their Spanish abilities from this point on. It will be important to look at the input these children are receiving at home and at school when tracking their skills in order to determine whether this reverse transfer will occur. Future research should continue studying the developmental progression of phonological awareness in bilingual children, taking into account the child's exposure to each language, and noting the differences in the continuum across languages. This information will help in determining the best way to instruct English language learners with regard to these skills while supporting them as emergent bilinguals.

This study does show that these children are improving in their phonological awareness abilities, with rhyme recognition being the easiest task at the preschool level, and initial phoneme and segmenting skills improving through the end of preschool and kindergarten. Also evident are differences in progression of skills across languages. For example, segmenting syllables is an easier task for children to do in Spanish than is segmenting sentences, while the reverse is true for English. Although these children come from homes where Spanish is spoken, it is important to note that their skills in English surpass their Spanish skills after being exposed to only two years of schooling. While they have not yet lost some of their abilities in Spanish, reduced exposure to the language may result in significant Spanish loss for this population.

Implications

The findings reported on in this study provide three major implications for practitioners and researchers working with young dual language learners. First, the importance of assessing children exposed to two languages in both of their languages should not be left unsaid. While much discussion pertaining to this issue is available in the literature (e.g., Pearson, Fernandez, & Oller, 1993), this study provides further evidence for the need to understand the influence of each language on the other language and on the assessed skill. The metalinguistic interaction across languages provides the necessary information in grasping the child's abilities, disabilities, and progression with regard to language.

This information leads to the second set of implications with regard to the findings presented here. The information regarding the progression of phonological awareness skills for bilingual, low-income children provides the educational team a better understanding of what should be expected of the child in each of his or her languages. Research has indicated that impairments in language abilities are not specific to one language, unless that skill occurs only in that language (Genesee, Paradis, & Crago, 2004). Consequently, when diagnosing a child with a language impairment, it is imperative that the diagnostic information be obtained in the first language. Therefore, a child exhibiting difficulties with phonological

awareness tasks in the first language will exhibit similar difficulties in the second language. The findings presented here provide a guide as to what normally developing, bilingual low-income children are capable of accomplishing in each of their languages during preschool and their first year of formal schooling.

The final implication points to the phonological awareness intervention research. This research has shown the effectiveness of phonological awareness training for non language-impaired students (Torgesen & Davis, 1996). This training is as imperative for dual language learners as it has been shown to be for monolingual speakers (Quiroga et al., 2002). Conducting the training in the language the child know best will likely stimulate performance across languages as the skill becomes more metalinguistic and less language specific. It is evident that the children participating in this study obtained most of the training once they entered formal schooling. Providing more systematic and explicit training earlier in their first language, while enhancing their oral language skills in this first language through exposure at home and at school to that language, may serve beneficial to these children in their transition to English.

Conclusion

Findings from this study introduce a new reliable measure of phonological awareness for Latino children under the age of 5. More importantly, however, the developmental progression theory for phonological awareness often discussed with monolingual populations is also valid with dual language learners, taking into account a cross-linguistic approach. Dual language learners are moving from being successful at language-specific skills to being successful at specific skills, cross-linguistically. Overall, it is important to note that young dual language learners perform better on phonological awareness skills as they get older and transition from better Spanish to better English performance as they complete kindergarten.

References

- Anthony JL, Lonigan CJ. The nature of phonological awareness: Converging evidence from four studies of preschool and early grade school children. *Journal of Educational Psychology*. 2004; 96(1):43–55.
- Anthony JL, Solari EJ, Williams JM, Schoger KD, Zhang Z, Branum-Martin L, Francis DJ. Development of bilingual phonological awareness in Spanish-speaking English language learners: The roles of vocabulary, letter knowledge, and prior phonological awareness. *Scientific Studies of Reading*. 2009; 13(6):535–564.
- Bialystok E, Majumder S, Matin MM. Developing phonological awareness: Is there a bilingual advantage? *Applied Psycholinguistics*. 2003; 24:27–44.
- Bialystok E, McBride-Chang C, Luk G. Bilingualism, language proficiency, and learning to read in two writing systems. *Journal of Educational Psychology*. 2005; 97(4):580–590.
- Branum-Martin L, Mehta PD, Fletcher JM, Carlson CD, Ortiz A, Carlo M, Francis DJ. Bilingual phonological awareness in students and classrooms: Multilevel construct validation among Spanish-speaking kindergarteners in transitional programs. *Journal of Educational Psychology*. 2006; 98(1):170–181.
- Bryant PE, MacLean M, Bradley LL, Crossland J. Rhyme and alliteration, phoneme detection, and learning to read. *Developmental Psychology*. 1990; 26:429–438.
- Calfee RC, Norman KA. Psychological perspectives on the early reading wars: The case of phonological awareness. *Teachers College Record*. 1998; 100(2):242–274.

- Chard DJ, Dickson SV. Phonological awareness: Instructional and assessment guidelines. *Intervention in School and Clinic*. 1999; 34:261–270.
- Cisero CA, Royer JM. The development and cross-language transfer of phonological awareness. *Contemporary Educational Psychology*. 1995; 20:275–303.
- Dickinson DK, McCabe A, Anastopoulos L, Peisner-Feinberg ES, Poe MD. The comprehensive language approach to early literacy: The interrelationships between vocabulary, phonological sensitivity, and print knowledge among preschool-aged children. *Journal of Educational Psychology*. 2003; 95(3):465–481.
- Durgunoglu, AY. Acquiring literacy in English and Spanish in the United States. In: Durgunoglu, AY, Verhoeven, L, editors. *Literacy development in a multilingual context*. Mahwah, NJ: Lawrence Erlbaum Associates; 1998. 135–146.
- Durgunoglu AY. Cross-linguistic transfer in literacy development and implications for language learners. *Annals of Dyslexia*. 2002; 52:189–204.
- Durgunoglu AY, Nagy WE, Hancin-Bhatt BJ. Cross-language transfer of phonological awareness. *Journal of Educational Psychology*. 1993; 85:453–465.
- García, O. *Bilingual education in the 21st century: A global perspective*. West Sussex, England: Wiley-Blackwell; 2009.
- García, O, Kleifgen, JA. *Educating emergent bilinguals: Policies, programs, and practices for English language learners*. New York, NY: Teachers College Press; 2010.
- Genesee, F, Paradis, J, Crago, MB. *Dual language development & disorders: A handbook on bilingualism & second language learning*. Baltimore, MD: Brookes Publishing; 2004.
- Genishi, C, Dyson, AH. *Language assessment in the early years*. Norwood, NJ: Ablex Publishing Corporation; 1984.
- Genishi, C, Goodwin, AL. *Diversity in early childhood education: Rethinking and doing*. New York, NY: Routledge; 2008.
- International Reading Association. *Phonemic awareness and the teaching of reading. A position statement from the board of directors of the International Reading Association [Brochure]*. Newark, DE: Author; 1998.
- Jimenez RT, Garcia GE, Pearson PD. Three children, two languages, and strategic reading: Case studies in bilingual/monolingual reading. *American Educational Research Journal*. 1995; 32(1):67–97.
- Jimenez-Gonzalez JE, Haro-Garcia CR. Effects of word linguistic properties on phonological awareness in Spanish children. *Journal of Educational Psychology*. 1995; 87(2):193–201.
- Juel C. Learning to read and write: A longitudinal study of 54 children from first to fourth grades. *Journal of Educational Psychology*. 1988; 80(4):437–447.
- Kline, RB. *Principles and practice of structural equation modeling*. New York, NY: Guilford Press; 1998.
- Lindfors, JW. *Children's language and learning*. 2nd ed.. Englewood Cliffs, NJ: Prentice-Hall; 1987.
- Lipka O, Siegel LS. The development of reading skills in children with English as a second language. *Scientific Studies of Reading*. 2007; 11:105–131.
- Lonigan CJ, Barker TA, Burgess SR, Anthony JL. Relations between language, phonological awareness, and reading development in two- to six-year-old children. *Society for Research in Child Development Abstracts*. 1995; 10:529.
- Lonigan CJ, Burgess SR, Anthony JL, Barker TA. Development of phonological sensitivity in 2- to 5-year-old children. *Journal of Educational Psychology*. 1998; 90:294–311.
- López LM, Greenfield DB. The identification of pre-literacy skills in Hispanic Head Start children. *NHSA Dialog*. 2004a; 7(1):61–83.
- López LM, Greenfield DB. The cross-language transfer of phonological skills of Hispanic Head Start children. *Bilingual Research Journal*. 2004b; 28(1):1–18.
- Miccio, AW; López, LM; Hammer, CS. In: Solé, MJ; Recasens, D; Romero, J, editors. *Bilingual phonological acquisition of preschool children of Puerto Rican descent; Proceedings for the 15th International Congress of Phonetic Sciences; Barcelona, Spain: The 15th ICPhS Organizing Committee; 2003 Aug. 1549–1552.*

- Muter V, Hulme C, Snowling M, Taylor S. Segmentation, not rhyming, predicts early progress in learning to read. *Journal of Experimental Psychology*. 1997; 65:370–396.
- Nation K, Hulme C. Phonemic segmentation, not onset-rime segmentation, predicts early reading and spelling skills. *Reading Research Quarterly*. 1997; 32(2):154–167.
- National Institute of Child Health and Human Development. Report of the National Reading Panel. Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction (NIH Publication No. 00-4769). Washington, DC: U.S. Government Printing Office; 2000.
- Pearson BZ, Fernandez SC, Oller DK. Lexical development in bilingual infants and toddlers: Comparison to monolingual norms. *Language Learning*. 1993; 43(1):93–120.
- Quiroga R, Lemos-Britton Z, Mostafapour E, Abbott RD, Berninger VW. Phonological awareness and beginning reading in Spanish-speaking ESL first graders: Research into practice. *Journal of School Psychology*. 2002; 40(1):85–111.
- Raz IS, Bryant P. Social background, phonological awareness, and children's reading. *British Journal of Developmental Psychology*. 1990; 8:209–225.
- Rogoff, B. Cultural nature of human development. Oxford, UK: Oxford University Press; 2003.
- Siegel, M, Lukas, S. Room to move: How kindergartners negotiate literacies and identities in a mandated balanced literacy curriculum. In: Genishi, C, Goodwin, AL, editors. Diversity in early childhood education: Rethinking and doing. New York, NY: Routledge; 2008. 29–47.
- Stahl SA, Murray BA. Defining phonological awareness and its relationship to early reading. *Journal of Educational Psychology*. 1994; 86:221–234.
- Tabors PO, Pérez MM, López LM. Dual language abilities of Spanish-English bilingual four-year-olds: Initial findings from the Early Childhood Study of Language and Literacy Development of Spanish-speaking Children. *NABE Journal of Research and Practice*. 2003; 1:70–91.
- Torgesen JK, Davis C. Individual difference variables that predict response to training in phonological awareness. *Journal of Experimental Psychology*. 1996; 63:1–21.
- Treiman R, Zukowski A. Children's sensibility to syllables, onsets, rimes, and phonemes. *Journal of Experimental Child Psychology*. 1996; 61(3):193–215. [PubMed: 8636664]
- Troia, GA. Phonological processing and its influence on literacy learning. In: Stone, CA, Silliman, ER, Ehren, BJ, Apel, K, editors. Handbook of language and literacy: Development and disorders. New York, NY: The Guilford Press; 2004. 271–301.
- Troia GA, Roth FP, Graham S. An educator's guide to phonological awareness: Assessment measures and intervention activities for children. *Focus on Exceptional Children*. 1998; 31(3):1–12.
- Valdés, G. Learning and not learning English: Latino students in American schools. New York, NY: Teachers College Press; 2001.
- Wagner, RK, Torgesen, JK, Rashotte, CA. The comprehensive test of phonological processing. Austin, TX: PRO-ED; 1999.
- Whitehurst GJ, Lonigan CJ. Child development and emergent literacy. *Child Development*. 1998; 69:848–872. [PubMed: 9680688]
- Yopp HK. The validity and reliability of phonemic awareness tests. *Reading Research Quarterly*. 1988; 23(2):159–177.

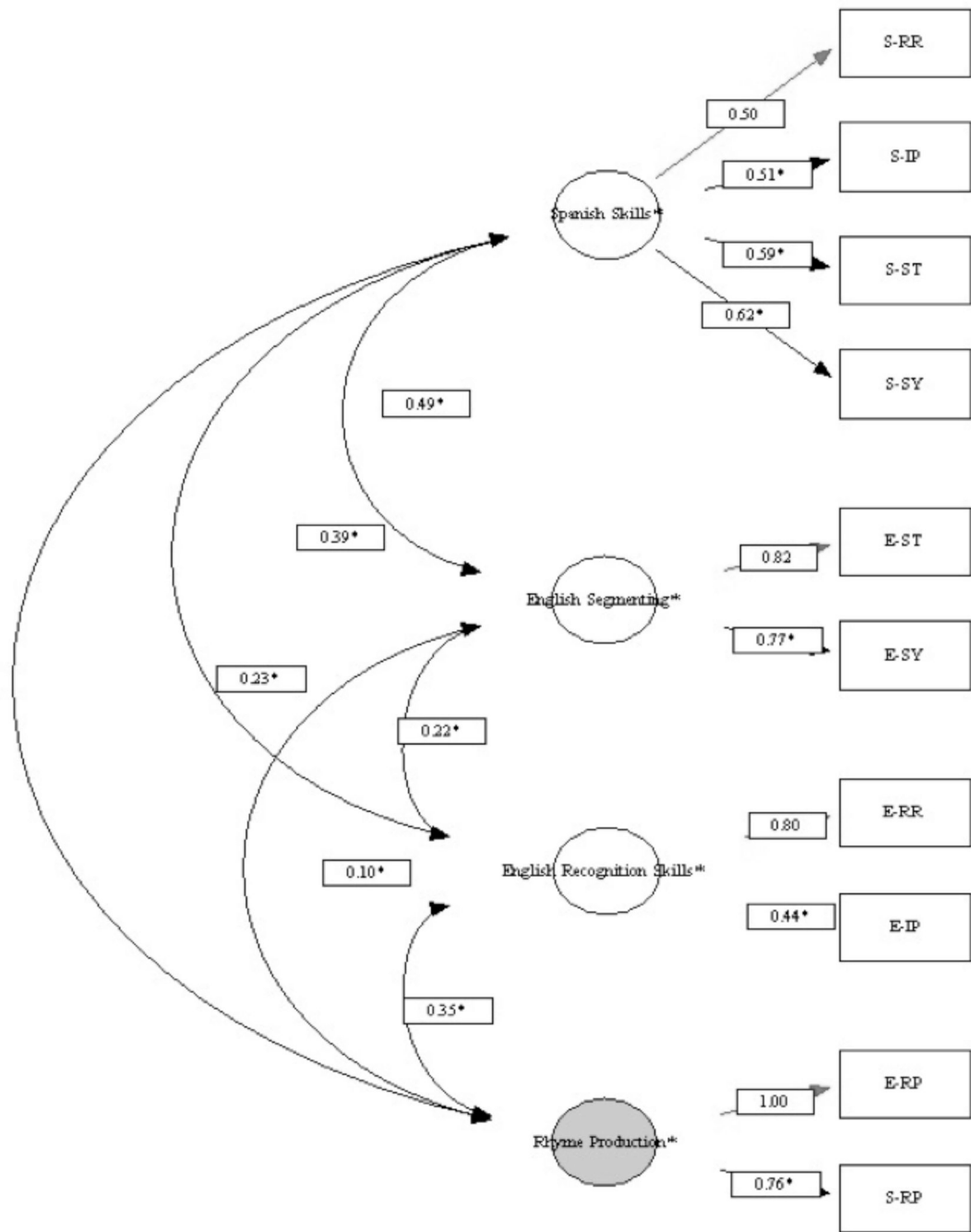


Figure 1.
Confirmatory Factor Analysis model at Time 1.

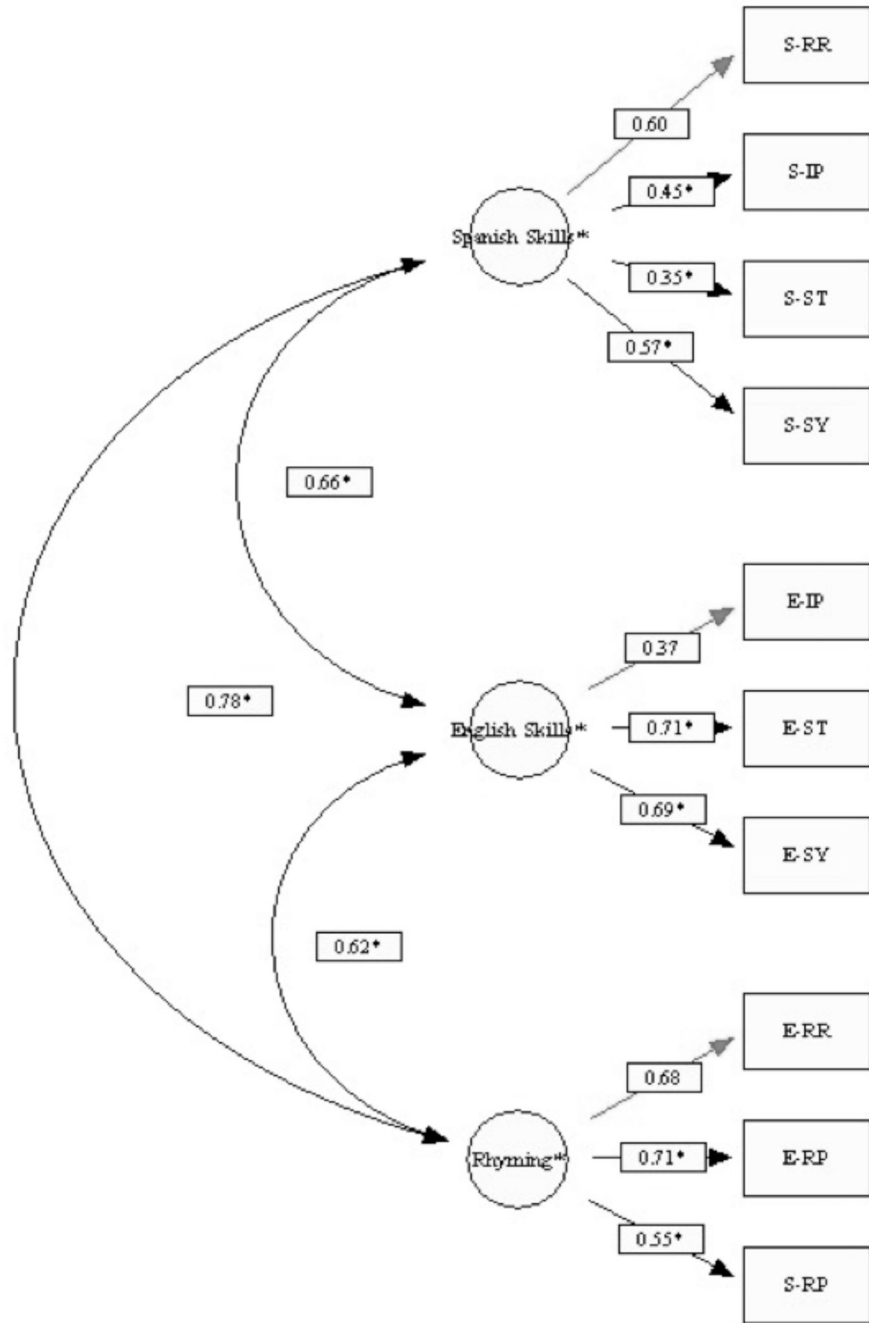


Figure 2.
Confirmatory Factor Analysis Model at Time

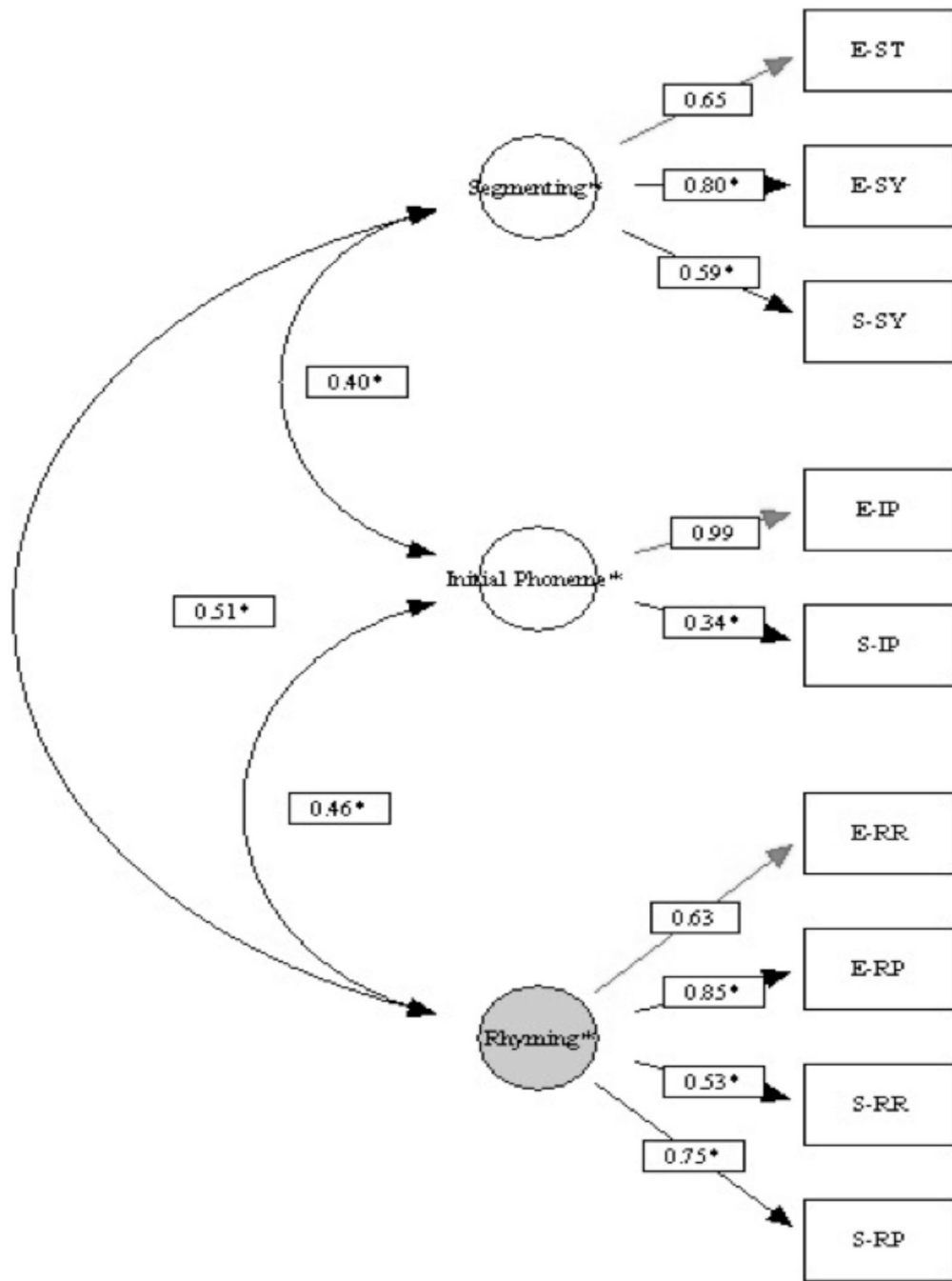
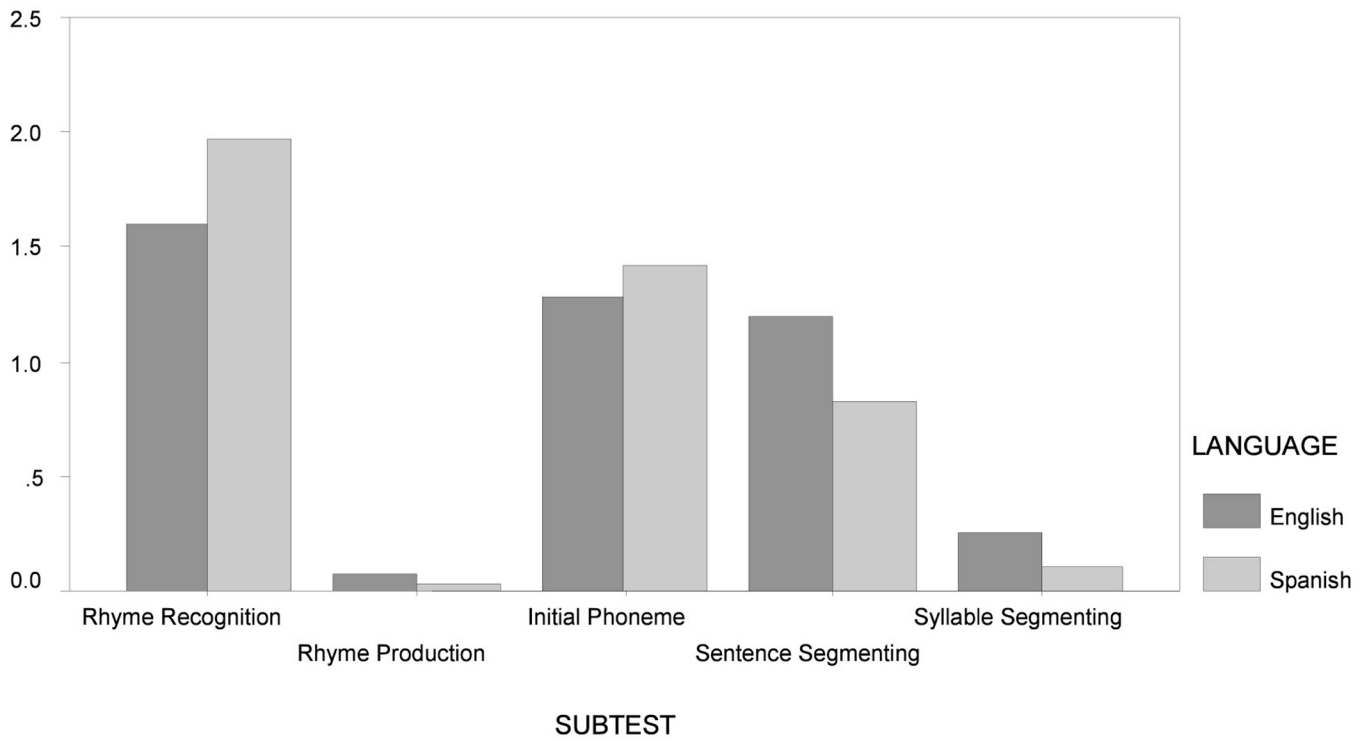
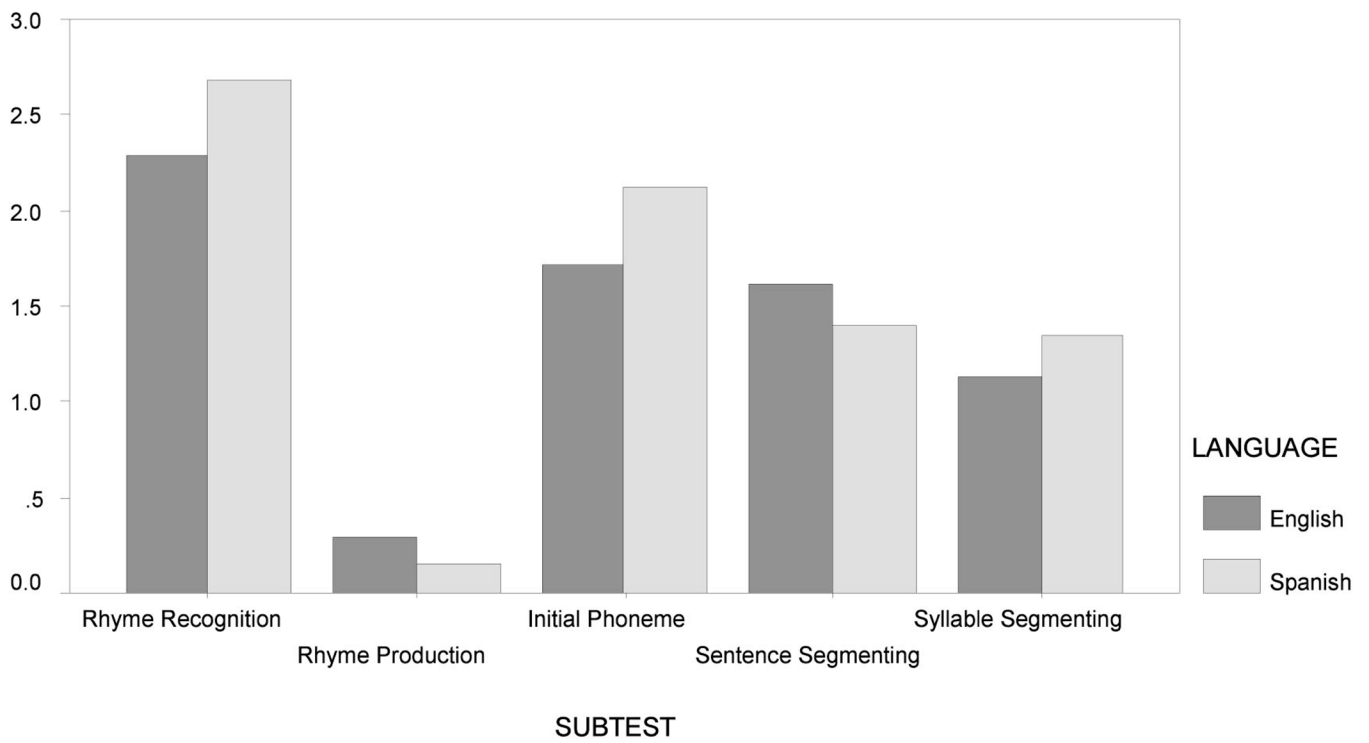


Figure 3.
Confirmatory Factor Analysis Model at Time 3.

TIME = 1 (beginning of prek)



TIME = 2 (end of prek)



TIME = 3 (end of K)

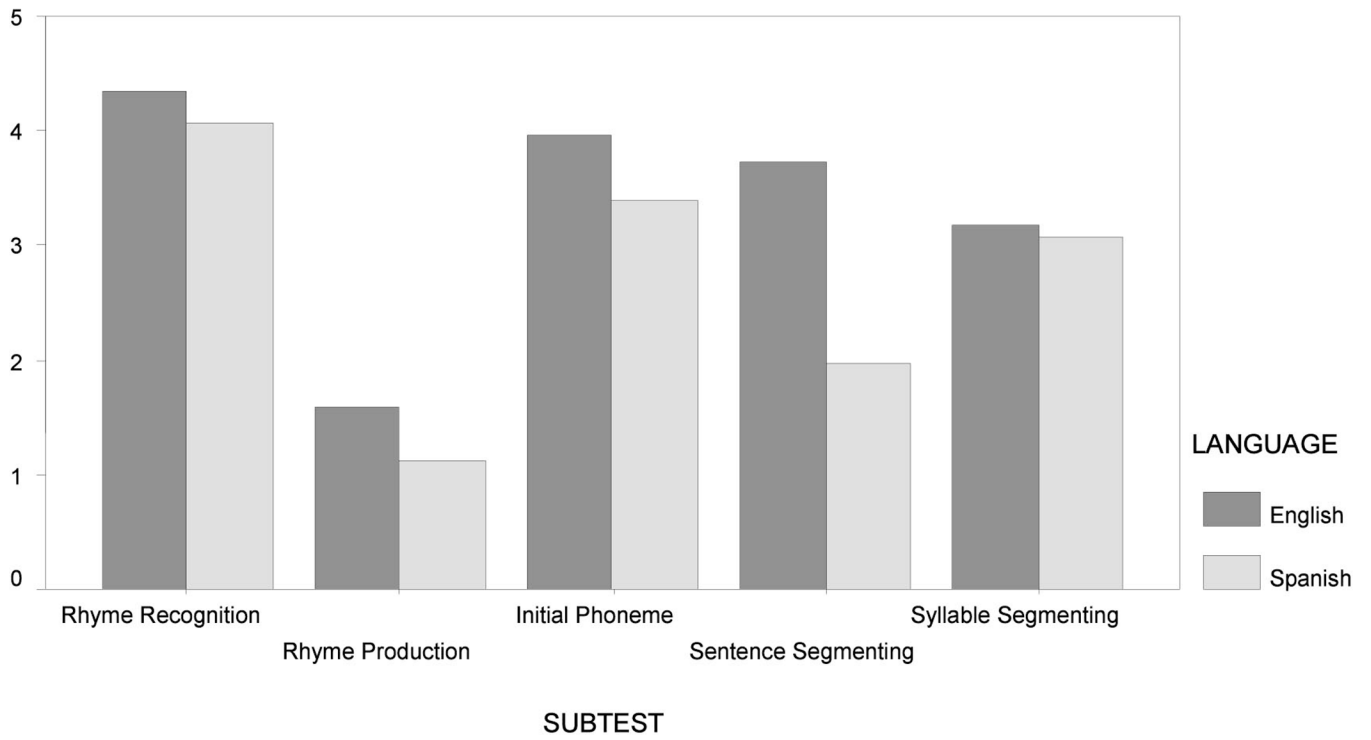


Figure 4.
Mean bar graphs of subtest performance by language by time.

Table 1
Means and Standard Deviations for the Five Subtests and the Total Score of the Phonological Awareness Test (N=241)

	English		Spanish		English		Spanish	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Rhyme	1.60	1.97	1.97	2.26	2.68	4.33	4.06	4.06
Recognition	(1.83)	(1.69)	(2.03)	(1.87)	(1.55)	(1.59)		
Range (0-6)								
Rhyme	.07	.03	.29	.15	1.57	1.10		
Production	(.48)	(.28)	(.94)	(.61)	(1.74)	(1.49)		
Range (0-4)								
Initial	1.28	1.41	1.72	2.12	3.95	3.38		
Phoneme	(1.46)	(1.64)	(1.66)	(1.69)	(1.62)	(1.40)		
Range (0-6)								
Sentence	1.19	.81	1.60	1.38	3.71	1.96		
Segmenting	(1.28)	(.98)	(1.36)	(1.17)	(1.27)	(1.46)		
Range (0-5)								
Syllable	.25	.10	1.12	1.34	3.17	3.07		
Segmenting	(.90)	(.52)	(1.37)	(1.44)	(1.50)	(1.57)		
Range (0-5)								