Supporting Language Skills in Immigrant Pre-Schoolers: An Intervention Study

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Abstract:

New York City has a large Spanish-speaking immigrant population coming from Latin American countries, especially from Mexico, Colombia, and Ecuador. The children of these immigrant families grow up bilingual but attain lower levels of skills in their L1 and L2 than those expected in children their age. In addition, they show comparatively low literacy achievements as early as first grade, and continue to lag behind their English-speaking peers. The purpose of the study reported here is to support and reinforce the development of the cognitive-linguistic skills central to the acquisition of reading, by enhancing the language input to which Spanish/English bilingual pre-kindergarten children are exposed. This intervention was designed to bring this population to higher levels of linguistic proficiency and skills, thus fostering children's optimal reading readiness levels.

Keywords: bilingual literacy, pre-school children, syntactic ability, reading readiness, L1 Spanish/L2 English

1. Introduction

This paper describes an ongoing intervention study designed to improve the reading skills of Spanish/English bilingual pre-kindergartners. The general question we asked was whether explicit instruction of syntactic structures would have a positive impact on the development of reading skills. The pedagogical aim of the study was to create a set of game-like language activities that would strengthen academic reading skills, a goal that is relevant not only to the education of Hispanic children in New York, but applicable to Hispanic pre-schoolers in the nation as a whole. We begin with a brief summary of the issues addressed in this and related studies on the relationship between knowledge of syntax or sentence structure and the development of reading in the bilingual child.

2. Background

English language learners from Spanish speaking homes tend to have comparatively low literacy achievements as early as first grade and continue to lag behind their English speaking peers throughout the school years, even when instructed and assessed in Spanish (CTB/McGraw Hill, 1982, 1988; De la Rosa and Maw, 1990; Orfield, 1986). This lag in

reading skills manifested in the earlier grades becomes particularly acute in later grades and throughout high school, when it is critical for students to understand and manipulate large volumes of written text to learn content. Children who have trouble reading in early grades are affected by what is known as "the fourth grade slump", a phenomenon documented by Chall and Jacobs (1996) where reading scores begin to dramatically decrease.

For inner city bilingual and bidialectal children, learning to read is particularly complex, as they have to negotiate two linguistic systems, acquire reading skills in a language not spoken at home, and face the challenges of an overburdened public school system (New York Times, March 28, 2002). It was in the spirit of addressing the developmental reading problem in Spanish/English bilingual children that RISLUS began a literacy project investigating the role of the two languages, L1 Spanish and L2 English in the development of L2 English reading skills. In a previous study, we asked whether bilingual children with a strong knowledge base in their L1 Spanish acquire reading skills in the L2 English better than children with weaker L1 knowledge. The hypothesized relationship between a strong knowledge base in the first language and the development of reading skills in a second language has been proposed by many researchers on bilingualism, notably J. Cummins (see Cummins, 1976, 1979, 1981) , and remains controversial today. A much more widely accepted idea is that a strong base in the L2 English would serve the child well in developing reading skills in the same L2. In the following section we describe the original research study investigating the relative contribution of the L1 and the L2 to reading.

2.1. Previous study on the relationship between syntax and reading

Research on the relationship between language development and reading has focused primarily on skills underlying the ability to decode words, such as phonemic awareness, orthographic knowledge, phoneme-grapheme correspondence and vocabulary. In contrast, very little has been done on the relationship between higher level skills, such as syntactic processing and reading comprehension, even though it is generally acknowledged that syntax must contribute to good reading skills. In this first study we asked the following questions:

1. What is the role of syntax in the development of reading comprehension, and in particular, reading in the L2?
2. What is the role of the first language?
3. What is the role of the second language?
4. Is there parallel development in the two languages?

In the figure below you see the components of reading we were concerned with: development of syntax in the first language, Spanish; development of syntax in the second language, English; and reading abilities in the L2, English.

Figure 1: The interaction between first and second languages and L2 reading

L1 Scaffolding
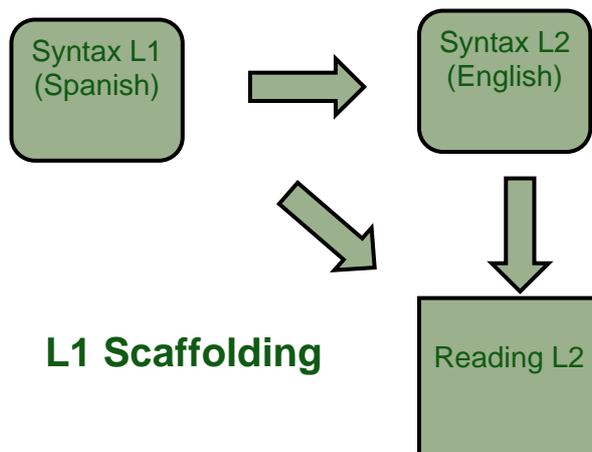
One way of predicting the relationship between these components is that the development of the L1 first affects development in the L2 (i.e. that syntactic skills are transferred from the L1 to the L2) and that the L2 syntax then supports reading skills in that same L2. Another possible relationship is a more direct one between development of the first language and reading in the second language. Such a direct relationship would provide an argument for L1 scaffolding in the L2 classroom, where L2 reading skills are supported by language instruction in the L1.

The syntactic abilities we tested are based on research in child language development, namely the comprehension of complex sentence structure, coordination and subordination. These structures are considered milestones in syntactic development as coordination develops before subordination both in first and second language development.

We tested three types of coordinated structures in the L1 Spanish and the L2 English: Subjects, as seen in 1. Objects, as seen in 2. and sentence coordination, as seen in 3.

1. Coordinated Subject (NP + NP V intransitive)
The dog and the cat sleep.
El perro y el gato se duermen

2. Coordinated Object (NP V transitive NP + NP)
The cat kisses the dog and the monkey.
El gato acaricia al perro y al mono.

3. IP coordination (NP V intransitive + NP V intransitive)
The cat jumps and the bear runs.
El gato salta y el oso corre.

For subordination we tested relative clauses and temporal adverbial clauses as you can see below:

4. <u>Relative clause with intransitive verb</u>
The dog kisses the bear who runs.
El perro acaricia al oso que corre.

5. <u>Relative clause with transitive verb</u>
The cat punches the dog who touches the box.
El gato golpea al perro que toca la caja.

6. <u>Adverbial clause with intransitive verb</u>
The monkey pushes the dog before dancing.
El mono empuja al perro antes de bailar.

7. <u>Adverbial clause with transitive verb</u>
The bear hugs the dog before pushing the box.
El oso abraza al perro antes de empujar la caja.

To test children's understanding of these sentences we used an Act Out task, where children heard the sentence and were asked to show it to the researcher with toys. The same children were then given a reading measure, the Gates-MacGinitie, which is a normed and standardized test of emergent reading skills. Their performance on the syntax test were then compared to their performance on the reading test through correlations.

2.1.1. Results of previous study
We found significant relationships between performance on the syntax tests and performance on the reading tests in both the L1 and the L2. In particular, we found significant correlations between the overall syntax score in Spanish and overall reading in English (r = 0.6, $p = 0.019$). Furthermore, we found significant relationships between accuracy on both subordination structures, relative clauses and temporal adverbials, and accuracy on an important subsection of the reading test, listening comprehension. Listening comprehension is a known precursor skill to reading comprehension. The correlation coefficient for Spanish was (r = 0.9, $p = 0.000$) and for English (r = 0.7, $p = 0.007$). Finally, we found a significant relationship between the syntactic development of the L1 Spanish and the L2 English (r = 0.5, $p = 0.05$). This indicates that there is parallel development in the two languages, suggesting that better knowledge of syntax in one language leads to better knowledge of syntax in the other.

3. The intervention study.
Based on the above results, we designed an intervention study which provides a program of instruction for pre-kindergarten children using some of the same coordination and subordination structures. Unlike in a purely experimental setting, an intervention relies on close interaction between the researcher and the child, in the form of prolonged practice and/or correction of items.

<u>Participants</u>
In total, forty pre-kindergarten children from three New York City schools in Brooklyn and Manhattan were included in the study. Some of these children were Spanish-dominant, some were English-dominant and some were balanced in their language proficiency, as tested

by the Pre-IDEA Proficiency Test (Pre-IPT, 1999), a standardized language test for bilingual children. Their ages ranged from 3 years 11 months to 4 years 10 months, prior to the intervention and 4 years 6 months to 5 years 5 months at the end of the study. In this paper we report results for a subset of these children, whose data have been fully analyzed. This group consists of seven Spanish/English bilinguals who were English dominant. These children received the instruction part of the intervention in English only. Their ages range from 3:11 to 4:9 at the beginning and 4:6 to 5:4 at the end of the study.

<u>Structures</u>

Two syntactic structures were selected as the target of instruction, namely coordination and subordination. As in the previous study, the coordination structures included Subject-NP (i), Object-NP (ii) and IP- coordination (iii).

(i) Subject-NP Coordination: <u>The cat</u> and <u>the monkey</u> dance.
(ii) Object-NP Coordination: The bear hugs <u>the mouse</u> and <u>the dog</u>.
(iii) Sentence (IP) Coordination: <u>The frog swims</u> and <u>the monkey jumps</u>

The subordination structures included Relative Clauses with Intransitive (iv) or Transitive (v) Verbs, as seen below.

(iv) Relative Clauses with Intransitive Verbs: The bear touches the frog <u>who jumps</u>.
(v) Relative Clauses with Transitive Verbs: The bear hugs the frog <u>who touches the box</u>.

<u>General Design of the Study</u>

First we tested our participants on their initial pre-reading and syntactic abilities. Next, we administered the intervention, which consisted of five instructional sessions in the comprehension and production of our targeted structures. Last, we post-tested our participants' syntactic abilities to see if any improvement had taken place. All participants were taught the vocabulary included in the syntax pre- and post-tests and in the intervention sessions.

a. Standardized Testing

The participants' pre-reading skills were measured with a standardized pre-reading test, the Metropolitan Readiness Test (MRT, 1995), administered in both Spanish and English.

This Test is designed to assess children's emerging levels of literacy concepts and language skills such as the ability to discriminate among visual symbols, to distinguish among the initial sounds in words, to identify letters that correspond to particular sounds in words and to understand a story (listening comprehension), essential areas for predicting reading development.

b. Syntax Pre/Post-Tests

In order to test our participants' initial knowledge of coordination and subordination, we administered a pretest that immediately preceded the intervention. To test the effectiveness of our intervention, we gave a post-test following the intervention. The tests consisted of a picture-pointing task, where the child was asked to point to the picture that matched the

sentence the researcher read, and an Act-Out task, where the child performed the sentence by using toys and props.

c. The Intervention

The Intervention consisted of five instructional sessions. In the first four sessions the researchers taught participants the syntactic structures, appropriately embedded in contexts of very short stories (two sessions on coordination and two sessions on subordination). The last session consisted of review and practice of the targeted structures.

Procedure

The presentation of structures to the child followed the developmental order attested in the acquisition literature. As a whole, the acquisition of coordination precedes the acquisition of subordination. Martohardjono et al. (in press) suggests that Subject NP-coordination is acquired before Object-NP and IP-coordination, and that the acquisition of Relative Clauses with Intransitive verbs precedes those with Transitive verbs. The intervention sessions considered this developmental order for the presentation of these structures to our participants.

All the intervention sessions were 30-minute long and included both comprehension and production tasks during which we provided continuous feedback to the children and monitored their understanding of the structures we were teaching them.

Throughout each session we increased the child's participation level. For example, initially the teacher acts out a sentence or shows pictures, then she helps the child in the act-out task, and finally the child acts the sentence out on her own.

The intervention moved from a more controlled to a less controlled type of interaction between the teacher and the participant in the provision of feedback. Initially the teacher provided as much feedback as needed. Later, in the practice session, the feedback was reduced to a minimum.

In order to make sure that we captured the child's attention and in order to increase the effectiveness of the intervention, we designed a more personalized type of intervention and so we limited the number of participants who worked with each researcher to two.

Materials and Tasks

We used varied materials such as pictures, storybooks, and toys, carefully selected in order to capture the child's attention. In all three tasks were used in the intervention: a picture-selection task, a cut-out manipulation task and an act-out with props.

In the picture-selection task participants had to select one out of a group of three pictures that the researcher presented to them while reading a short story as the one below:

This is the playground. There's a swing. Look! *[Show pic]*. The bear is pushing the frog. They are laughing! Look now! *[Show pic]*. The bear is pushing the dog. They all laugh! Look at this! *[Show pic]*. The bear is pushing the dog and the frog. [Repeat]

Now show me: *The bear is pushing the dog and the frog.*

The cut-out manipulation task required that children find a cut-out hidden in a storybook the teacher was reading and place it in a box. Next, the child had to select one out of two cut-outs and place it on a felt-board with Velcro. The instructions to the child included the targeted relative clause, e.g. *Find the monkey who's closing the book.*

In the Act-Out task the researcher and the participant manipulated identical sets of stuffed animals. The researcher modeled an action while interacting with the participant and finally asked the participant to act out the sentence with toys. The participant would hear:

We have a cat and a dog. The cat is pushing the dog. Like this. *[Modeling].* And the dog is sleeping. Like this. *[Modeling]* Look, The cat is pushing the dog who is sleeping. *[Modeling]* Let's do it together now!

4. Results
4.1. Time 1 (Pre-Intervention Syntactic Development)

The scores from the pre-intervention syntax measure were analyzed in order to ascertain the stage in development for the 7 children prior to the intervention. Table 1 shows the mean percent correct scores on the pre-intervention syntax measure for the group; the scores are also broken down by task type, construction type, and given in total. A 2 X 2 Factorial Analysis revealed a significant main effect for construction type ($F_{(1, 6)} = 55.546$, $p = .000$), but no main effect for task type ($F_{(1, 6)} = 1.228$, $p = .310$), and no interaction between the two ($F_{(1, 6)} = .009$, $p = .929$). These results suggest that while the children were performing differently on the two construction types, the performance on each task type was similar.

*Table 1: Pre-intervention Results (N = 7) in Mean Percent Correct						
	Complex Construction Type				Total	
	Coordination		Subordination			
	*Mean	Range	Mean	Range	Mean	Range
Picture Point Task	**81** (17)	67 – 100	**46** (26)	25 – 100	**67** (18)	50 – 100
Act Out Task	**71** (20)	33 – 100	**36** (19)	0 - 50	**57** (19)	20 – 80
Total	**76** (14)	50 - 92	**41** (17)	25 – 75	**63** (14)	40 – 85
*All raw scores have been converted to percentages. Standard deviations in brackets appear below the mean.						

Further analysis comparing the mean total scores from coordination and subordination revealed a significant difference in performance ($F_{(1, 6)} = 55.564$, $p = .000$). Specifically, the group's performance on coordination far surpassed performance on subordination. These results are also reflected in the performance on each task type. In both the picture point (PP) task and the act out (AO) task, performance on coordination was significantly better than subordination

(PP: $F_{(1, 6)}$ = 13.143, p = .011; AO: $F_{(1, 6)}$ = 36.008, p = .001). These general developmental results, irrespective of task type, suggest that the children are at a point in development where knowledge of coordination is at or near ceiling, but knowledge of subordination is still developing. Moreover, the general patterns found here are similar to those attested in the L1 literature as well as the patterns obtained in Martohardjono et al. described in section 2.1.

4.2. Time 2 (Post-intervention Syntactic Development)

The scores from the post-intervention syntax measure were analyzed in order to ascertain whether the 7 children were performing in a similar or different manner from their performance on the pre-intervention measure of syntax. Table 2 shows the mean percent scores received on the post-intervention syntax measure by construction type, task type and in total. A 2 X 2 Factorial Analysis revealed a significant main effect for task type ($F_{(1, 6)}$ = 103.397, p = .000), but no main effect for construction type ($F_{(1, 6)}$ = 2.243, p = .185, *ns*), and no interaction between the two ($F_{(1, 6)}$ = 2.163, p = .192, *ns*). These results suggest that overall the children were performing equally on both types of complex constructions at time 2, but differently with respect to the task types.

*Table 2: Post-intervention Results (N = 7) in Mean Percent Correct							
	Complex Construction Type					**Total**	
	Coordination			**Subordination**			
	Mean	**Ra nge**	**Me an**	**Ran ge**		**Mea n**	**Ra nge**
Picture Point Task	**95** (12)	67 – 100	**93** (12)	75 – 100		**94** (11)	70 – 100
Act Out Task	**71** (15)	50 – 83	**50** (28)	25 – 100		**63** (12)	40 – 80
Total	**83** (12)	58 - 92	**71** (18)	50 - 100		**79** (11)	55 – 90
*All raw scores have been converted to percentages. Standard deviations in brackets appear below the mean.							

Further analysis comparing the mean total scores from the picture point task and act out tasks revealed a significant difference between the two task types ($F_{(1, 6)}$ = 145.200, p = .000) with better performance on the picture point task. The significant differences between task types were also observed for the mean scores on coordination ($F_{(1, 6)}$ = 23.087, p = .003) and subordination ($F_{(1, 6)}$ = 22.737, p = .003), again, with performance on the picture point task exceeding performance on the act out task. These results suggest that while performance on the two construction types were equal performance on the act out task was not equal to that of the picture point task. Moreover, the patterns discovered at time 2 with respect to both construction type and task type were different from those found for time 1.

4.3. Intervention Results

The effect of the intervention was measured by comparing the scores obtained on the syntax measure at time 1 (pre-intervention syntax test) to the results obtained at time 2 (post-intervention syntax test). Table 3 shows the mean percent scores received on the pre- and post-intervention syntax measure by construction type, task type and in total. A 2 X 2 X 2 Factorial analysis revealed significant main effects for all three factors: construction type ($F_{(1, 6)} = 31.205$, p = .001), task type ($F_{(1, 6)} = 17.726$, p = .006), and time ($F_{(1, 6)} = 12.326$, p = .013), and a significant interaction between task type and time ($F_{(1, 6)} = 6.594$, p = .042, *ns*).

*Table 3: Intervention Results (N = 7)							
	Test Time						
	1 (Pre-intervention)			2 (Post-intervention)			
	Construction Type			Construction Type			
	Coordination	Subordination	Total	Coordination	Subordination	Total	
Picture Point Task	81	46	67	95	93	94	
Act Out Task	71	36	57	71	50	63	
Total	76	41	63	83	71	79	
*All raw scores have been converted to percentages. Standard deviations in brackets appear below the mean.							

Further analysis comparing the mean total scores received at time 1 to time 2 found a significant increase in overall performance ($F_{(1, 6)} = 12.798$, p = .012). However, comparing performance on coordination from time 1 to time 2, there was no difference ($F_{(1, 6)} = 4.502$, p = .078, *ns*). In contrast, significant improvement in the scores were obtained for subordination from time 1 to time 2 ($F_{(1, 6)} = 9.633$, p = .021). While similar results were also reflected in both the picture point and act out tasks across coordinate structures and time (PP: $F_{(1, 6)} = 4.500$, p = .078, *ns*; AO: $F_{(1, 6)} = .000$, p = 1.000, *ns*), performance on subordinate structures differed depending on task type. For the picture point task there was a significant improvement demonstrated from time 1 to time 2 ($F_{(1, 6)} = 21.125$, p = .004), but for the act out task the performance between time 1 to time to was not different ($F_{(1, 6)} = 1.171$, p = .321, *ns*).

The lack of improvement on coordinate structures from time 1 to time 2 most likely reflects the fact that the children were already performing well at time 1 with respect to coordination, and the overall improvement from time 1 to time 2 was due to the children's increased performance on subordinate structures. However, further analysis demonstrated that the increase in mean scores was a result of the children's performance on the picture point rather than the act out task. This difference in the results probably reflects the performance demands associated with the act out task rather than poor abilities on the construction type itself. In general these results suggest that there was an effect on the performance from time 1 to time 2 by the intervention that targeted these syntactic skills, specifically those that targeted subordinate structures.

4.4. Reading and Syntax Relationship Results

The following results are based on the 7 English dominant Spanish/English bilingual children who completed the MRT English reading readiness test and the English pre-intervention syntactic test. On the reading measure the children's total scores ranged from 42% to 64% and on the syntax measure they ranged from 40% to 85%. Although the relationship between these two variables is not significant, there is a strong positive correlation between them ($r = .629$, $p = .130$, *ns*). Furthermore, there is both a very strong and significant positive relation between the scores obtained on relative clauses with transitive verbs (range = 42% – 64%) and the total scores on the reading measure (range = 40% – 85%) ($r = .757$, $p = .049$) as well as a very strong positive significant correlation between the total scores on the syntax test and the scores on the beginning reading skills (range = 27% – 50%) section of the reading measure ($r = .764$, $p = .046$).

5. Conclusion

In this paper we reported the preliminary results of an intervention study which was part of a larger literacy project investigating and supporting the emergent reading skills in bilingual, Spanish/English pre-schoolers in New York City. Having observed a significant relationship between the mastery of complex sentences (coordination with "and" and relative clause subordination) and performance on pre-reading skills in kindergarten children, we designed and administered an intervention study for pre-kindergarten children using the same syntactic structures. While the results are in general positive, we have to be cautious in generalizing the interpretation, as at this time we have statistics only for a small number of children (7 Spanish-dominant).

In summary, we observed a statistically significant improvement in the mastery of complex sentence structure in the L2 English between Time 1 and Time 2. Furthermore, we observed a relationship between scores on the syntax pre-test and scores on the reading test. In particular, we noted significant correlations between one type of subordination (relative clauses with transitive verbs) and total reading score, as well as between total scores on the syntax test and one section of the reading test, beginning skills. Taken together these results suggest that the explicit teaching of syntactic structures may have a positive influence on the development of reading skills in a second language.

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