Grammatical Metalinguistic Skills of Emerging Bilingual Children

A THESIS
SUBMITTED TO THE FACULTY OF
UNIVERSITY OF MINNESOTA
BY

Elizabeth Erin Yares

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
MASTER OF ARTS

Dr. Lizbeth H. Finestack, Ph.D., CCC-SLP

May 2013

Acknowledgements

There are many people who made this study possible. Above all, I am incredibly thankful for Dr. Lizbeth Finestack’s unwavering support and guidance. She has served as an invaluable role model throughout this entire process, both intellectually and professionally. Thank you to Dr. DeRuiter and Dr. Windsor for sitting on my thesis committee. Thank you to all of the “labbies” of the Child Language Intervention Lab; your assistance with data collection and scoring truly made this project possible. Finally, thank you to the families and children who participated in this study.

Abstract

Purpose. This study aimed to determine if emerging bilingual 5-to 7-year-old children demonstrate greater grammatical metalinguistic skills than their monolingual peers. This study also aimed to determine if these children perform differently on tasks requiring different levels of metalinguistic skills.

Method. Twenty-four 5- to 7-year-old children participated in this study, including 12 emerging bilingual children and 12 monolingual English speaking children. The 24 participants were taught two novel grammatical morphemes, a gender marking and an aspect marking. One marking was taught with explicit instruction, and the other with implicit instruction. The explicit instruction provided a higher level of metalinguistic support than did the implicit instruction. Learning of the target morphemes was assessed using generalization probes during which the participants were asked to apply the novel markings.

Results. The emerging bilingual children more successfully learned the gender marking with explicit instruction than did the monolingual children. Across both language groups, children more successfully learned the marking with explicit instruction compared to implicit instruction.

Conclusions. Study results suggest that emerging bilingual children demonstrate a language learning advantage when learning simpler grammatical forms with metalinguistic support. Study results also suggest that 5- to 7-year-old children more successfully learn language when provided metalinguistic support through explicit instruction, compared to implicit instruction that does not include this support.

Table of Contents

List of Tables

List of Figures

Introduction

There is evidence that bilingual children demonstrate advanced abilities on tasks of metalinguistic awareness when compared to monolingual children (e.g., Ben-Zeev, 1977; Bialystok, 1988; Cummins, 1978). Bialystok (1988) explains that the completion of metalinguistic tasks requires two components: control of processing and analysis of knowledge. Control is the ability to ignore irrelevant aspects of a problem, focusing only on the important factors. Control allows a child to attend to the relevant aspects of a situation (Bialystok & Majumder 1998). As Bialystok (1988) explains, control is essential to reading such that when reading, a child is simultaneously bombarded with linguistic, contextual, and semantic information. Control allows the child to focus on the relevant components of the information they are receiving to read fluently, while also comprehending the material. "Analysis is the process of restructuring mental representations so that they become more explicit, more formally organized, and eventually symbolic" (Bialystok & Majumder 1998, p. 71). Analysis begins with exposure to exemplars of a language target, followed by forming a mental representation of the rule guiding that target based on these exemplars and applying this mental representation to novel contexts.

There is an interdependent relationship between control and analysis during language learning. For example, an English-speaking child will hear adults and other children model the past tense –ed grammatical form during conversation. The child's control will allow the child to focus on the past tense –ed, ignoring semantic and grammatical elements which vary between models. The child will use analysis to create a mental representation of this rule based on the provided models. The child will further use analysis to apply this representation to a variety of verbs, not just those that have been modeled previously. In this sense, the child's knowledge of the regular past tense grammatical form moves from context-dependent, confined to previously modeled units, to context-independent, applicable to a variety of verbs and situations (Bialystok & Majumder, 1998).

Metalinguistic Skills of Bilingual Children

Bialystok (1988) examined the effect of second language learning on control and analysis. Specifically, Bialystok conducted two studies, which demonstrated that both emerging bilingual (i.e., English-speaking children who had attended a French immersion school for two years) and fully bilingual children (i.e., children who received very early exposure to French and attended a French school) performed significantly better on tasks of control, the first metalinguistic component, than did monolingual children. The effect was not as robust for the second component, analysis. The fully bilingual children demonstrated significantly higher analysis skills than did monolingual children, but the emerging bilingual children did not demonstrate this analysis advantage.

Bialystok's (1988) first study included 57 first-grade children. Twenty of these children were monolingual English speakers and 17 were fluently bilingual, speaking both English and French. The fluently bilingual children attended a French school. Children in this group also had received very early exposure to French, often through a parent or extended family members. Bialystok included a third group of 20 partially bilingual children. For these children, English was their primary language, yet they had attended a French immersion school for two years and had received formal literary instruction exclusively in French prior to the study. Examiners administered the *Peabody Picture Vocabulary Test* (PPVT; Dunn, 1965) in French to confirm that the fluently and partially bilingual groups significantly differed in their levels of French proficiency and thus, in their levels of bilingualism. The fluently bilingual group scored significantly higher on the French version of the PPVT than did the partially bilingual children ($p <$ .001), supporting the distinction between the two groups.

To assess the control component of metalinguistic skills, Bialystok (1988) utilized the sun/moon problem task developed by Piaget (1929) and revised by Ianco-Worrall (1972). This task assesses a child's ability to understand that the names of objects can be changed, while realizing that the properties of the objects themselves do not change. The first component of this task involved the sun and the moon. The examiner asked the participant to imagine that the names of the sun and moon were interchanged. The children were then asked, "What would you call the thing in the sky when you go to bed at night?" and "What would the sky look like when you're going to bed?" Both bilingual groups of children significantly outperformed the monolingual children on this sun/moon version of the task ($p <.03$). As Bialystok explains, this task required control of processing, as children had to suppress their previous knowledge about the properties of the sun and the moon to change the names of these objects, while holding their characteristics constant.

The second component of this task included a cat and a dog rather than a moon and a sun. Bialystok asked the children to "Imagine that the names of cats and dogs were changed around," then showed the participants a cat or dog picture and asked, "What would this animal's name be?" and "What sound would it make?" For example, when the child was shown a picture of a cat, the correct responses were that the animal was now called a dog, and that it meowed. This version of the task also required control, as the children had to change the names of objects without changing the characteristics of these objects. For the cat/dog task, Bialystok (1988) found no significant differences between any of the study groups. The monolingual group performed better on the cat/dog task compared to the sun/moon task, while both bilingual groups performed better on the sun/moon task compared to the cat/dog task. Bialystok explains that the cat/dog may have differed significantly from the sun/moon task in terms of abstractness. The sun/moon problem was more abstract, in the sense that children were asked about the celestial bodies, without visual input. However, the cat/dog task involved familiar and salient objects, with a visual component, thus making the task more concrete. Bialystok suggests that children may have been more reluctant to change the names of the familiar, concrete objects (i.e., cat, dog) than the less familiar, abstract objects (i.e., sun, moon) Thus, it is likely that the differences in performance across the two tasks can be attributed to task differences rather than to differences in the participants' metalinguistic skills (Bialystok 1988).

To assess the second metalinguistic component, analysis, Bialystok (1988) evaluated each child's word concept knowledge. This task was adapted from Papandropoulou & Sinclair (1974) and included two sections. First, examiners presented a 10-item list, which included five words and five phrases, to each child and then asked the child to judge if each item was a word and to explain why or why not. Secondly, the examiner asked each child, “What is a word?” and “How can you tell if something is a word?” While there were no significant group differences in the judgment portion of the task, the fluently bilingual children scored significantly higher on the defining section of the task compared to the monolingual group ($p < .05$). In contrast, the partially bilingual group did not demonstrate a significant advantage over the monolingual or the fluently bilingual children on the defining task.

To further assess each child’s analytic skills, Bialystok (1988) included a syntax correction task in her study. In this task, the examiner read 12 sentences to each child, each of which included a grammatical error. The examiner then asked the child to say the sentence the correct way. The fully bilingual group scored significantly higher on this task than did both the monolingual and partially bilingual groups ($p < .001$). The results of the two analytic tasks demonstrate that the partially bilingual children did not perform significantly higher on tasks of analysis than did monolingual children. This suggests that the analysis skill advantage demonstrated by fully bilingual children may not apply to children with lower levels of second language experience.

The second study conducted by Bialystok (1988) was a within-group designed study with children who came from Italian-speaking homes and attended English-speaking schools. All of these children were exposed to two languages, but varied in their degree of proficiency in Italian, and thus, in their degrees of bilingualism. Based on the findings from her first study, Bialystok hypothesized that, because all participants were bilingual to some extent, their levels of control would not differ significantly. However, Bialystok predicted that the more bilingually proficient children would demonstrate higher analytic abilities than the less bilingually proficient children. Study results confirmed these predictions.

In the Bialystok (1988) Study 2, each child's level of bilingualism was determined by their proficiency in Italian based on an Italian version of the PPVT. Each child completed the same tasks that were used in Study 1; however, Bialystok removed the cat/dog and syntax correction tasks, and added a grammaticality judgment task. Examiners administered this grammaticality task to each child twice, once in English and once in Italian. The task included "judge-incorrect" items that were semantically appropriate but included grammatical errors (e.g., "Why the dog is barking so loudly?"). The correct judgment of these sentences required analysis skills such that the child had to utilize knowledge of grammatical structure to make the appropriate judgment. This task also included "judge-anomalous" items that were grammatically correct, but semantically anomalous (e.g., "Why is the cat barking so loudly?"). A correct judgment of these sentences required control, as the child had to ignore the meaning of the sentence to deem it grammatically correct or incorrect. The task also included two types of filler sentences; sentences that included both grammatical and semantic errors, and sentences that were both grammatically and semantically correct.

Bialystok divided the children into two groups, based on their mean Italian PPVT scores. Performance on the sun/moon and the judge-anomalous tasks, which measured control, did not differ significantly between the two groups (ps = .07 and .32, respectively). Performance on the word concept and the judge-incorrect tasks, both which measured analysis, was significantly different between the two groups (*p*s < .02 and < .05, respectively), with the children with higher bilingual proficiency levels demonstrating significantly greater analysis skills. These results support Bialystok's results from Study 1, confirming that metalinguistic control of processing skills does not vary significantly as a function of bilingualism, but that analysis of knowledge skills do. As both of these components form metalinguistic skills, it appears that emerging bilinguals have not acquired the advanced metalinguistic skills that fully bilingual children demonstrate when compared to monolingual children.

Thus, Bialystok's (1988) results suggest that emerging bilingual children do not completely possess the heightened metalinguistic skills that fully bilingual children possess. To further examine the metalinguistic benefits of bilingualism, Yelland, Pollard, & Mercuri (1993) evaluated the metalinguistic skills of children with low levels of second language exposure. This study included four groups of children who were in their first and second years of school. All of the children included in this study were monolingual English speakers, but half of the children at both grade levels received 60 minutes of Italian instruction weekly.

Yelland et al. (1993) examined each participant's metalinguistic skills through a word awareness task, adapted from tasks included in Templeton and Spivey (1980), Bialystok (1986), and Kolinsky et al. (1987). Word awareness requires understanding that words are meaningful, distinct units and that words and their referents share arbitrary relationships (Yelland et al., 1993). The word awareness task used four types of stimuli: big objects with big names (e.g., "airplane"), small objects with big names (e.g., “caterpillar”), small objects with small names (e.g., “ant”), and big objects with small names (e.g., “whale”). Thus, half of the stimuli were congruous items, in that the size of the object matched the size of the name of that object, and half were incongruous. Participants viewed a picture of an object, named the object, and then stated if the name of the object was a “big word” or a “little word.”

The researchers administered the word awareness task to each participant on two occasions: two months and seven months after the school year had begun. The researchers analyzed participants’ responses for a “congruity effect,” defined as the difference in percentage of correct responses on congruous items versus incongruous items (Yelland et al., 1993) such that a smaller congruity effect indicated higher word awareness.

For the children in their first year of school, at the first assessment, two months after the school year began, there were no significant performance differences between the two groups of children. At this point, the children receiving Italian exposure had only received three hours of Italian instruction. At the 7-month assessment, however, the children who received Italian instruction demonstrated significantly higher word awareness skills than their peers who did not receive Italian instruction ($p < .10$). The performance of participants in their second year of school at the two month assessment point revealed no significant group differences. At the seven month assessment point, these participants’ performance was near ceiling; thus, there were no significant differences in word awareness performance for these children at either time point. By the second year of school, the word awareness difference between the marginally bilingual and monolingual children had disappeared.

Yelland et al. (1993) further investigated if the significant, although transient, advancement in metalinguistic skills demonstrated by children in their first year of school later affected reading ability. Examiners administered a written word recognition test to both groups of participants completing grade one at the end of the school year. Results from this assessment revealed that the marginally bilingual children demonstrated significantly higher word recognition skills than the monolingual children ($p < .05$). Yelland et al. posits that the marginally bilingual children received indirect metalinguistic instruction through their second language instruction, which positively influenced their word recognition skills. Yelland et al. further suggests that a minimal amount of second language exposure is sufficient to give children a metalinguistic advantage at the word level, although this advantage was not long lasting. Additionally, study results suggest that this exposure positively influenced learning in another domain: reading. The current study further examines the metalinguistic skills of emerging bilingual children using a novel grammatical language learning task.

Current Study

Previous investigations of metalinguistic skills of bilingual children have primarily included semantic and grammatical judgment tasks (Bialystok, 1988; Yelland et al., 1993). Although investigators have found these tasks to be sensitive to language proficiency group differences, there are several limitations to previously used metalinguistic tasks. First, the Yelland et al., (1993) study indicated a likely performance ceiling on such tasks; thus, the tasks are likely not suitable for children at all developmental levels. Second, the tasks largely rely on previous language skills and knowledge. Finally, these tasks do not capture a child's ability to activate their metalinguistic skills through learning and applying new information. With consideration of these limitations, the current study examined the metalinguistic skills of emerging bilingual children using artificial grammatical learning tasks that required different levels of metalinguistic skills.

The tasks used in Bialystok (1988) and Yelland et al. (1993) measured children's metalinguistic abilities based on their acquired knowledge of concepts, attributes, and grammatical structures. In contrast, the task used in the current study does not rely on acquired knowledge. Rather, this task assesses a child's metalinguistic skills through his or her ability to produce a novel grammatical form in novel contexts with differing levels of metalinguistic support. Specifically, examiners asked the children in the current study to learn two novel grammatical forms (a gender marking and an aspect marking). For each participant, examiners taught one form using an implicit, modeling approach and one approach using an explicit rule presentation plus modeling approach. The metalinguistic task used in this study was modeled after the teaching task used in a learning study conducted by Finestack and Fey (2009).

Both the implicit and explicit grammatical metalinguistic tasks in the current study require participants to exert metalinguistic control of processing and analysis of knowledge. Control is necessary for children to ignore irrelevant contextual and linguistic factors and focus on the key information guiding the novel marking. For example, in these tasks, children have to focus closely on the gender of the sentence subject (for the novel gender marking) and the continuity of the sentence subject's action (for the novel aspect marking) while disregarding the variation of specific animals, people, and actions across models. The implicit task requires a very advanced level of control, as children have to independently separate relevant and irrelevant aspects of the task to uncover the guiding pattern. The explicit task offers additional support, by providing the guiding pattern and alerting children to what they need to selectively attend (i.e., sentence subject, continuity of subject's action). Although both the implicit and explicit tasks require participants to exert metalinguistic control, the implicit task requires a higher level of control of processing than the explicit task.

Similarly, both the implicit and explicit tasks require analysis of knowledge skills. In both tasks, the children receive models of the target grammatical forms, and then complete probes to determine if they can use the novel marking in unfamiliar contexts. Successful performance requires that the children form a mental representation of the guiding pattern, access this representation, and appropriately apply the representation. In the implicit task, analysis is based solely on the children's exposure to models. In the explicit task, the children are not required to independently formulate a mental representation of the pattern guiding the novel grammatical forms. Instead, the examiner presents the pattern to be used as the representation to the children. Thus, the implicit task requires much more independent metalinguistic analytic skill than the explicit task.

These novel grammatical language learning tasks will reveal if emerging bilingual children do indeed possess heightened metalinguistic skills and if performance is influenced by the amount of metalinguistic support associated with the task. Using implicit and explicit metalinguistic tasks focused on grammatical language, the current study aims to answer each of the following questions:

1. Do 5-to 7-year-old children who have completed a 1-year Spanish immersion program demonstrate greater grammatical metalinguistic skills than monolingual children who have completed a traditional kindergarten program?
2. Do emerging bilingual children and monolingual children perform differently on tasks requiring different levels of metalinguistic skills?

Based on the findings of Bialystok (1988) and Yelland et al. (1993), we predicted that the children who completed 8 months of immersion kindergarten would demonstrate stronger metalinguistic skills than the monolingual children. Specifically, the emerging bilingual children’s advanced control of processing would provide them with an advantage robust enough to outperform the monolingual children during a language learning task. We predicted that the emerging bilingual children would outperform the monolingual children on both the implicit and explicit tasks for both the gender and aspect grammatical forms Additionally, in consideration of the ceiling effect identified by Yelland et al. (1993), we predicted that both groups of children would perform significantly better on the explicit metalinguistic task than the implicit task, due to the metalinguistic support provided via the explicit instruction condition.

Method

Participants

Twenty-four, 5- to 7-year-old children participated in this study, including 12 emerging bilingual children and 12 monolingual English speaking children. To participate in this study, each child had to meet inclusionary and exclusionary criteria. Each child in the emerging bilingual group had attended a Spanish language immersion program since the beginning of kindergarten (for 8 months at the time of the study) and lived in a home where English was the primary language, based on parent report. Each child in the monolingual group received 100% of their educational instruction in English and lived in a monolingual English-speaking home, based on parent report.

The following served as exclusionary criteria for both groups: (a) a history or indication of neurological disorders as reported by the participants' parents on a participant demographic form; (b) failed hearing screening (detect 20 dB at 1000, 2000, and 4000 Hz); or (c) failed a phonological probe of target phonemes used in this study's metalinguistic tasks. To control for the possible influences of language impairment or intellectual disability on performance, the researchers also required that all children score no lower than 1.5 standard deviations below the mean on both the *Preschool Language Scale, Fourth Edition, English* (PLS-4 English; Zimmerman, Steiner, & Pond, 2002) or the *Kaufman Brief Intelligence Test, Second Edition* (KBIT-2; Kaufman & Kaufman, 2004).

The PLS-4 English served as a measurement of each participant's language ability. The PLS-4 is designed for children birth through 6 years, 11 months of age. This assessment is used to gather information regarding both expressive and receptive language abilities, and provides normative data to compare a participant's performance to age-matched peers. The KBIT-2 Matrices nonverbal subtest served as a measurement of each participant's nonverbal intelligence. Items in this subtest require that participants recognize relationships presented visually, and then complete visual analogies based on these modeled relationships. Table 2-1 includes participant group characteristics and indicates that the groups did not differ significantly on key pre-experimental variables.

Table 2-1

Participant group characteristics

Pre-experimental Variable	**Emerging Bilingual Group**	**Monolingual Group**	***p***	***d***
Age (months)			0.671	-0.134
Mean	74.417	74.917		
SD	4.1661	3.2322		
Min-Max	68.0-82.0	70.0-80.0		
English Spoken Language Quotient[a]			0.799	0.033
Mean	109.917	109.583		
SD	9.4624	10.8163		
Min-Max	93-122	91-126		
Nonverbal Intelligence[b]			0.630	0.049
Mean	103.833	103.083		
SD	11.2317	18.4660		
Min-Max	89-121	83-141		
Female:Male	8:4	5:7	0.414	
White: Other race	10:2	10:2	1.00	

[a]Standard score with mean = 100, SD = 15 based on the PLS-4 English. [b]Standard score with mean = 100, SD=15 based on the KBIT-2.

In addition to the assessments used to determine study eligibility, all participants completed two metalinguistic subtests of the *Expressive Language Test, Second Edition* (ELT-2; Bowers, Huisingh, LoGiudice, & Orman, 2010). These subtests helped determine if metalinguistic skills, as measured by the ELT-2, significantly influenced a participant's performance on the study metalinguistic tasks or accounted for group differences in performance. The first metalinguistic subtest of the ELT-2 requires the participant to define various components of language (e.g., "What is a word?", "What is a verb?"), and the second subtest asks the participant to give an example of each of these components (e.g., "Tell me a word", "Tell me a verb").

Each child in the emerging bilingual group also completed the *Preschool Language Scale, Fourth Edition, Spanish* (PLS-4 Spanish; Zimmerman, Steiner, & Pond, 2002) in effort to quantify their Spanish language skills. A child's score on the PLS-4 Spanish did not affect his or her eligibility to participate in this study. Like the PLS-4 English, the PLS-4 Spanish is used to gather information regarding both expressive and receptive language abilities. The PLS-4 is administered completely in Spanish and was adapted to reflect Spanish language development. Because English was each child's home language, the researchers assumed that the participants' English skills would be stronger than their Spanish skills. Therefore, in effort to decrease possible retest influence, the emerging bilingual children completed the PLS-4 Spanish after the PLS-4 English.

Recruitment

All children in the emerging bilingual group attended a Spanish immersion charter school in a suburb of Minneapolis. Classroom teachers sent home information packets, which included a parent letter from the school principal, a consent form approved by a university human subjects institutional review board, and a demographic form. Families who wished to participate in the study returned the signed consent and demographic forms to the classroom teachers. The teachers or school administrator then gave these forms to the researchers.

Children in the monolingual group attended one of two schools in the Twin Cities metro area: a Montessori private school or a parochial private school. The classroom teachers sent home information packets with their students, including a parent letter from the school director or classroom teacher, an approved consent form, and a demographic form. Families who wished to participate returned the signed consent and demographic forms to the classroom teachers, who then gave them to the researchers. All parents in both groups received the researchers' contact information and had the opportunity to contact the researchers if they had any questions or concerns prior to or after giving consent for their child to participate in this study.

Treatment Group Assignments

Upon receiving parental consents, the researchers randomly assigned each participant to one of eight experimental sequences with Microsoft Excel's random number generator. The researchers pre-determined the randomization sequences to counterbalance the order of presentation of the grammatical markings (i.e., aspect-gender or gender-aspect) and the instruction (i.e., implicit or explicit) of the metalinguistic tasks. Thus, if a participant first received aspect marking instruction implicitly, he or she would then receive gender marking instruction explicitly. Each sequence also determined the phonological marking (/ʃ/ or /f/) of the target gender or aspect form. Table 2-2 outlines the possible sequences, descriptions of stimuli presentation in each sequence, and number of children assigned to each sequence.

Originally, the researchers assigned twenty-six children to sequences. Two children from the monolingual group did not meet inclusion criteria: one child did not meet the age requirement and one parent reported that their child had a diagnosis of Attention Deficit-Hyperactivity Disorder (ADHD). The researchers excluded these two participants from the study. One child in the emerging bilingual group had a history of seizures, but was no longer on medication or experiencing seizures; therefore, the researchers decided to include this child's data in the study analyses.

Table 2-2

Participant sequences

Sequence	**Game 1**	**Game 2**	**Gender Instruction**	**Gender Marking**	**Aspect Instruction**	**Aspect Marking**	**Bilingual Assignments**	**Monolingual Assignments**
A	Gender	Aspect	Implicit	/ʃ/	Explicit	/f/	2	1
B	Aspect	Gender	Explicit	/f/	Implicit	/ʃ/	2	1
C	Gender	Aspect	Implicit	/f/	Explicit	/ʃ/	2	2
D	Aspect	Gender	Explicit	/ʃ/	Implicit	/f/	2	2
E	Gender	Aspect	Explicit	/f/	Implicit	/ʃ/	1	2
F	Aspect	Gender	Implicit	/ʃ/	Explicit	/f/	1	1
G	Gender	Aspect	Explicit	/ʃ/	Implicit	/f/	1	1
H	Aspect	Gender	Implicit	/f/	Explicit	/ʃ/	1	2

Novel Grammatical Marking

Each child received instruction for both a gender marking and an aspect marking via a space-themed computer game. The game taught one marking using implicit instruction and one marking using explicit instruction. During implicit instruction, the participants listened to models of the target form and practiced producing the form. During explicit instruction, the participants listened to models of the target form and practiced producing the form as well. However, the children in the explicit instruction group also heard an explanation of the pattern underlying the target marking.

For the gender marking pattern, if the sentence subject was male, a marking, /ʃ/ or /f/, needed to be added to the end of the sentence verb. However, if the sentence subject was female, no marker needed to be added to the end of the verb. Each model sentence had the following syntactic structure: subject + *can* + infinitive form of the verb + (marking, if subject was male). Two examples of gender models include: *Jake can swim-f* (or *Jake can swim*- *ʃ*, depending on the sequence) and *Sara can swim*. To present this model, a computer displayed one cartoon graphic of a girl or a boy character performing an action. Some actions (e.g., *laugh*) included just the character performing the action, other actions required the inclusion of props to model the grammatical form (e.g., the graphic including *swim* included a pool). This marking and the model items are identical to those used by Finestack and Fey (2009). Figure 2-1 displays an example picture of a gender marking stimulus.

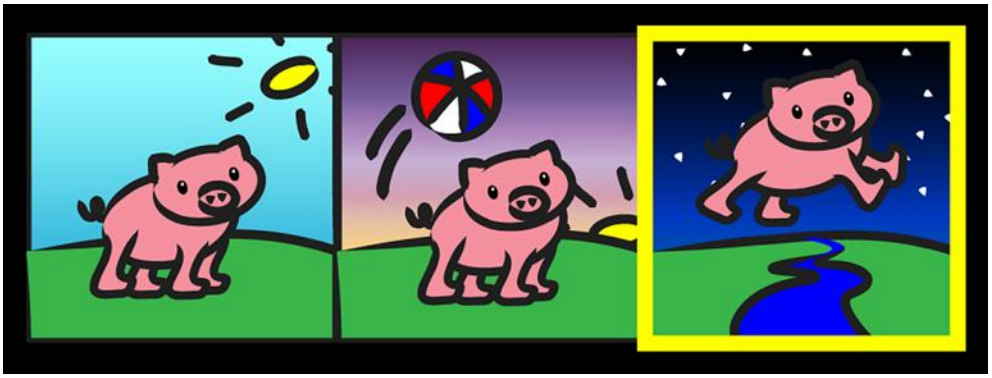
Figure 2-1

Example gender marking graphic to model “John can read-/f/ (/ʃ/)”

For the aspect pattern, if the sentence subject had been doing an action for a long period of time, a marking, /ʃ/ or /f/, needed to be added to the end of the sentence verb. If the sentence subject had only been doing an action for a short period of time, no marker needed to be added to the end of the verb. The model sentences had the following syntactic structure: *see the* + animal + infinitive form of verb + (marking, if action was habitual). Two examples of aspect models include: *see the cow jump-f* (or *see the cow jump- ʃ*, depending on the sequence) and *see the cow jump*. To present this model, the computer displayed a sequence of three pictures in a cartoon format. Each picture in the sequence depicted an animal doing an action in the morning, in the afternoon, and at night. The computer informed the participants that the model sentence always described the last picture, which was highlighted with a yellow box. Figure 2-2 displays an example picture of an aspect marking stimulus.

Figure 2-2

Example aspect marking graphic to model "See the pig jump"



The possible sentence subjects and verbs used in all sessions for both the aspect and gender markings are listed in Table 2-3. All subject stimuli names or versions of the names (e.g., Matthew/Matt, Madison/Maddy) used with the gender marking appeared on the Social Security's top 20 names list each year from 2000 to 2008 (Social Security Administration, 2013, April 21). All of the verbs used with both markings, except for *laugh*, appear on the *MacArthur-Bates Communication Developmental Inventory: Words and Gestures* (M-B CDI; Fenson et al., 1993). The M-B CDI is a language assessment tool designed for children 8- through16- months old. Thus, there is no reason to believe that the typically developing 5- to –7-year-old participants in this study would not have yet acquired these verbs. All of the verbs used with both markings were monosyllabic verbs.

Table 2-3

Subject and verb stimuli

	Subjects		**Verbs**	
Gender Marking	Mike Jake Sara Maddy	Matt John Ashley Emma	Dance Laugh Write Drink	Swim Cry Read Eat
Aspect Marking	Bear Cat Horse Sheep	Mouse Dog Cow Pig	Sit Jump Sleep Climb	Stand Hide Run Play

Experimental Sessions

Each child completed four experimental sessions. In two of the sessions, the metalinguistic task targeted the gender marking; in the other two sessions, the metalinguistic task targeted the aspect marking. Each participant learned one marking (gender or aspect) during Sessions 1 and 2, and the other marking during Sessions 3 and 4 (gender or aspect). Ideally, each participant completed Sessions 1 and 2 over two consecutive days and Sessions 3 and 4 over another two consecutive days. Twenty-one of the 24 children (87.5%) completed the two session blocks in this fashion. Two monolingual group participants completed Sessions 1 and 2 over three days, and two monolingual group participants completed Sessions 3 and 4 over three days. Examiners completed all sessions in participants' schools, homes, or daycares.

In Sessions 1 and 3, the metalinguistic task consisted of modeling teaching, recast teaching, and a generalization probe. In Sessions 2 and 4, the metalinguistic task consisted of a maintenance probe, modeling teaching, recast teaching, and a generalization probe. The stimuli used in modeling and recast teaching items consisted of four different sentence subjects and four different verbs. Each subject and each verb appeared at least once across eight modeling teaching items and at least once across the eight recast teaching items. No subject or action appeared more than twice consecutively. During modeling and recast teaching, each subject/verb combination only appeared one time across the 16 trials. The first ten items of the generalization probe included items identical to those used with modeling or recast teaching with each subject and action appearing at least once across these ten items. The latter ten items of the generalization probe incorporated four new subjects and four new verbs. Table 2-4 outlines the tasks and probes the children completed each day.

Table 2-4

Metalinguistic task components

Session 1 (Marking A)	**Session 2 (Marking A)**	**Session 3 (Marking B)**	**Session 4 (Marking B)**
	Maintenance Probe		Maintenance Probe
Modeling Teaching	Modeling Teaching	Modeling Teaching	Modeling Teaching
Recast Teaching	Recast Teaching	Recast Teaching	Recast Teaching
Generalization Probe	Generalization Probe	Generalization Probe	Generalization Probe

Note: Markings A and B were randomly assigned

Teaching

Modeling Teaching. During each session, the computer presented eight models of the target form to the participants. A space creature named Lele modeled the gender marking, and a space creature named Zuku modeled the aspect marking. At the beginning of the modeling teaching items, the narrator explained to the children that they did not have to say anything yet; they just had to listen carefully to the space creature speak. After the space creature’s introduction, the computer delivered an auditory prompt, which varied depending if the instruction was explicit or implicit. For the explicit task, the auditory prompt stated the pattern underlying the target marking. For the gender marking, the stated pattern was *When it is a boy, you have to add /ʃ/ (/f/) to the end; when it is a girl you don’t add anything to the end.* For the aspect marking, the stated pattern was *When the animal is always doing the action, you have to add /ʃ/(/f/) to the end; when the animal has been doing the action for a short amount of time, you don’t add anything to the end.* For the implicit task, the prompt was a filler statement: *Listen carefully so you can talk just like Lele (Zuku).* The computer presented the same auditory prompt three times during modeling teaching.

After the first auditory prompt, the participants viewed a series of four colored graphics. When teaching the gender marking, each graphic depicted a boy or girl completing an action. When teaching the aspect marking, each graphic depicted an animal doing three different actions; one in the morning, one in the afternoon, and one in the evening. While the graphic was displayed, the space creature (i.e., Lele or Zuku) described the picture in their language (e.g., *John can eat-f, See the cat jump- ʃ*). A 1500 ms pause separated each model presentation. After the participant received four different model presentations, the narrator restated the auditory prompt corresponding with the child's sequence. Subsequently, the child received four new model presentations, followed by a third presentation of the auditory prompt corresponding to their sequence. The examiner did not ask the participants to imitate the creature's productions at any point during the presentation of the modeling teaching items.

Recast Teaching. During recast teaching, the narrator told the participants that it was now their turn to talk like Lele or Zuku. Similar to modeling teaching, the participants received the auditory prompt a fourth time, and then viewed a series of four graphics similar to the modeling teaching items, although the subject/verb combinations were different than those presented in the modeling teaching items. The participants heard instructions explaining that the space creature would start the sentence, and that they should finish it. The subject in the auditory component of the recast presentation changed with each item to reflect the subject presented in the accompanying graphic. All gender marking graphics were accompanied by the auditory syntactic frame, "(subject) can…." (e.g., *Sara can*…, *Mike can*…). All aspect marking graphics were accompanied by the auditory syntactic frame, "See the (animal)…" (e.g., *See the cat*…, *See the cow*…). If the participant finished the space creature's sentence appropriately, the narrator told the child that the response was correct, and the space creature repeated the correctly produced sentence (e.g., *That was right! Listen to Lele again. Mike can jump-f*). If the child responded incorrectly, the narrator told the child that the response was not correct (e.g., *Oops, that isn't how Zuku talks, listen to Zuku again*), and then modeled the correct sentence (e.g., *See the mouse sit-f*). After the first series of four graphics, the child heard the auditory prompt a fifth time, which was followed by another series of four recast teaching trial items, and then a presentation of the auditory prompt for a final, sixth, time.

Generalization Probe

Following the eight recast teaching items, the participants completed a 20-item generalization probe. The narrator explained that, just as in the recast teaching items, the space creature would start the sentence, but this time the space creature would not say anything after the participant responded. The participants viewed 20 graphics accompanied by auditory prompts identical in structure to the recast teaching items (e.g., *Jake can*…, *See the cow*…). The first ten items of the generalization probe contained a familiar subject and verb combination from the teaching trials, such that ten of the 16 items used in the modeling and recasting teaching items were presented again. The last ten items incorporated new subjects and new verbs, which were not previously used in the modeling or recasting teaching items. Three of these 10 novel combinations contained a new subject and a familiar verb, three contained a familiar subject and a new verb, and four contained both a new subject and new verb. Table 2-5 summarizes the stimuli used for modeling teaching, recast teaching, and the generalization probe.

Table 2-5

Teaching and generalization probe stimuli

Modeling Teaching	Auditory prompt (1st presentation)
	4 pictures with auditory models
	Auditory prompt (2nd presentation)
	4 pictures with auditory models
	Auditory prompt (3rd presentation)
Recast Teaching	Auditory prompt (4th presentation)
	4 recast trials
	Auditory prompt (5th presentation)
	4 recast trials
	Auditory prompt (6th presentation)
Generalization Probe	10 items from the modeling and teaching tasks
	10 novel items
	▪ 3 new subject/familiar verb
	▪ 3 familiar subject/new verb
	▪ 4 new subject/new verb

Note: The auditory prompt was the stated pattern for explicit instruction and the filler statement for implicit instruction

Maintenance Probe

Sessions 2 and 4 began with a maintenance probe, which aimed to assess if the child could recall and apply the marking that he or she learned during the previous session. This probe consisted of 20 items identical to those presented in the generalization probe from the previous session. The order of the items as well as the content of the items remained the same. After the maintenance probe, the participant completed a session identical in structure to Session 1 (if Session 2) or Session 3 (if Session 4).

Scoring Responses

The examiners recorded each session using the internal microphone of a portable audio recorder (Marantz PMD661 or Marantz PMD620). A coder blinded to the participants' groups (emerging bilingual or monolingual) and sequence assignments then used these recordings to score each response. The coder scored each response as correct or incorrect. A response was correct if; (a) The child produced the correct verb and marking; (b) the child did not produce a verb, but produced the appropriate marking; or (c) the child added the marking to an object of the sentence (e.g., *John can read a book-ʃ*). The coder scored responses including a consistent phonetic distortion of the marking as correct as well. For example, a consistent lateral /s/ substitution for /ʃ/ received a correct code. The coder also scored a child's response as correct if the child used a consistent substitution of the target marking, other than / ʃ / or /f/. For example, if the child consistently used /k/ in place of /f/ (but not / ʃ /), the coder scored these responses as correct.

The coder scored all other responses as incorrect, including substitution of / ʃ / for /f/ or /f/ for /ʃ/, addition of the target phoneme to items that did not require the target phoneme (e.g., female subjects or non-habitual actions), production of a bare verb that required a marking (e.g., male subject or habitual action), or inconsistent substitution of a phoneme other than /f/ or / ʃ /. A response received a separate code if the utterance was inaudible or unintelligible.

A second blinded coder also independently scored each child's responses. Analysis of both coders' percent correct means revealed that the two coders were very reliable when scoring responses from both markings. Their mean percentages correct for the gender marking were 69.17% (Coder 1) and 69.48% (Coder 2) for the generalization probe. Their mean percentages correct for the aspect marking were 57.19% (Coder 1) and 56.77% (Coder 2) for the generalization probe. Further analysis revealed that the intraclass correlation coefficients (ICCs), using the absolute agreement definition, based on arcsine transformed values, were very high. The ICCs for the gender and aspect generalization probes were 0.95 and 0.99, respectfully. These ICC values indicate that the coders were responsible for only a small portion of the variance in participant performance.

Day 2 generalization probe audio was not available for one monolingual participant's session due to audio equipment malfunction. The researchers used data from the computer and the examiner's notes, which recorded if the child correctly responded to the prompts, to code this session. Computer data and examiner notes indicated that this participant produced the correct target form for 19 of the 20 generalization probe items. This performance pattern was consistent with his previous performance during the Day 2 maintenance probe and Day 1 generalization probe.

Statistical Design

The researchers used Session 2 generalization probe performance to classify each participant as a “pattern user” (PU) or a “non-pattern user” (Non-PU) for each novel marking. This categorical approach was adopted because inspection of the performance data revealed a non-normal distribution. Thus, the researchers completed all analyses using the nonparametric Fisher’s Exact probability test for 2 x 2 tables. The number of participants categorized as PUs served as the dependent variable. Phi (Φ) represented effect size. Phi values reach from 0 to 1.0 and indicate the strength of the relationship between two variables, with values of 0.10, 0.30, and 0.50 respectfully representing small, medium, and large effect sizes (Green & Salkind, 2003).

To meet PU criteria, participants were required to correctly respond to not significantly fewer than 90% of the 20 generalization probe items. Using this 90% benchmark to determine a score to differentiate the PUs and Non-PUs, the researchers calculated binomial p-values, using corresponding z-scores. This calculation indicated that scores with corresponding p-values greater than 0.95 were significantly less than 90%. Based on these values, participants who correctly produced the target form less than 16 times during the generalization probe scored significantly below the 90% mastery level. Therefore, participants who correctly responded to 16 or more items on the generalization probe met PU criteria; those who responded to 0-15 items correctly met Non-PU criteria.

Results

Study Question 1: Do 5-to 7-year-old children who have completed a 1-year Spanish immersion program demonstrate greater grammatical metalinguistic skills than monolingual children who have completed a traditional kindergarten program?

The researchers used participants' performances on the 20-item generalization probe at the end of Sessions 2 and 4 to determine pattern use of the target form; this was the final probe within each 2-day teaching set. Two children in the emerging bilingual group scored 100% on the generalization probe during their first session and scored 100% on the maintenance probe during the following session. Due to demonstration of mastery of the target form, the researchers determined it unnecessary to re-administer the teaching task.

Explicit Task

Gender marking. Every emerging bilingual child (6/6 participants) who received explicit gender marking instruction learned the pattern. In contrast, only 50% (3/6) of the monolingual children who received explicit gender marking instruction learned the pattern. Table 3-1 contains the number of children in each group who learned the gender pattern though explicit teaching. Results from the non-parametric Fisher's Exact test did not reveal a statistically significant difference between the number of monolingual and bilingual children who learned the gender pattern through explicit instruction ($p = 0.18$). However, the effect size of this comparison was large ($\Phi = 0.58$).

Table 3-1

Gender explicit instruction emerging bilingual and monolingual participant group comparisons

	Emerging Bilingual	Monolingual
PUs	6 (100%)	3 (50%)
Non-PUs	0 (0%)	3 (50%)

Aspect marking. Within both the emerging bilingual and monolingual groups, 50% (3/6) of the participants who received explicit instruction learned the aspect pattern. Table 3-2 contains the number of participants in each group who successfully learned the aspect marking through explicit instruction. Results from the non-parametric Fisher's Exact test did not demonstrate a statistically significant difference between the number of monolingual and emerging bilingual children who successfully acquired the aspect rule through explicit instruction (p = 1.00; Φ = 0.00).

Table 3-2

Aspect explicit instruction emerging bilingual and monolingual participant group comparisons

	Emerging Bilingual	Monolingual
PUs	3 (50%)	3 (50%)
Non-PUs	3 (50%)	3 (50%)

Implicit Task

Gender marking. One emerging bilingual child who received implicit gender marking instruction learned the pattern, while two monolingual children who received implicit gender marking instruction learned the pattern. Table 3-3 contains the number of children in each group who learned the gender pattern though implicit teaching. Results from the non-parametric Fisher's Exact test did not reveal a statistically significant difference between the number of monolingual and emerging bilingual children who learned the gender pattern through implicit instruction. This analysis was supported by a small effect size (p = 1.00 Φ = 0.19).

Table 3-3

Gender implicit instruction emerging bilingual and monolingual participant group comparisons

	Emerging Bilingual	Monolingual
PUs	1 (17%)	2 (33%)
Non-PUs	5 (83%)	4 (67%)

Aspect marking. No participant from either the monolingual or emerging bilingual groups successfully learned the aspect marking through implicit instruction. Thus, there was not a significant difference between the performance of the two groups in this area (p =1.00, Φ= 0.00). Table 3-4 contains the number of children in each group who learned the gender pattern though implicit teaching.

Table 3-4

Aspect implicit instruction emerging bilingual and monolingual participant group comparisons

	Emerging Bilingual	Monolingual
PUs	0 (0%)	0 (0%)
Non-PUs	6 (100%)	6 (100%)

Study Question 2: Do emerging bilingual children and monolingual children perform differently on tasks requiring different levels of metalinguistic skills?

Immersion Participants

Gender marking. All six emerging bilingual children who received explicit gender rule instruction successfully learned the marking. In contrast, only one of the emerging bilingual children who received implicit gender rule instruction successfully learned the marking. Results from the non-parametric Fisher's Exact test revealed a statistically significant difference between the explicit instruction and implicit instruction groups within the emerging bilingual group (p = 0.02), with a large effect size (Φ = 0.85). Table 3-5 presents the number of PUs in each instructional condition for the gender inflection.

Table 3-5

Gender pattern learning: emerging bilingual children

	Explicit Task	Implicit Task
PUs	6 (100%)	1 (17%)
Non-PUs	0 (0%)	5 (83%)

Aspect marking. Three emerging bilingual children who received explicit instruction successfully learned the marking. In contrast, none of the emerging bilingual children who received implicit instruction learned this marking. Results from the non-parametric Fisher's Exact test did not demonstrate a statistically significant difference between the explicit and implicit instruction groups within the emerging bilingual group (p = 0.18), but did demonstrate a large effect size (Φ = 0.58). Table 3-6 presents the number of emerging bilingual PUs in each instructional condition for the aspect inflection.

Table 3-6

Aspect pattern learning: emerging bilingual children

	Explicit Task	Implicit Task
PUs	3 (50%)	0 (0%)
Non-PUs	3 (50%)	6 (100%)

Monolingual Participants

Gender marking. Three monolingual children who received explicit gender rule instruction successfully learned the marking. Two monolingual participants who received implicit gender rule instruction successfully learned the marking. Results from the non-parametric Fisher's Exact test did not reveal a statistically significant difference between the number of PUs in the gender marking explicit instruction and implicit instruction groups within the monolingual group (p = 1.00) supported by a small effect size (Φ = 0.17). Table 3-7 presents the number of monolingual PUs in each instructional condition for the gender marking.

Table 3-7

Gender pattern learning: monolingual children

	Explicit Task	Implicit Task
PUs	3 (50%)	2 (33%)
Non-PUs	3 (50%)	4 (66%)

Aspect marking. Three emerging bilingual children who received explicit instruction successfully learned the marking. However, none of the monolingual children who received implicit instruction learned the marking. Results from the non-parametric Fisher's Exact test did not demonstrate a statistically significant difference between the monolingual explicit and implicit instruction groups learning the aspect marking (p = 0.18), but revealed a large effect size (Φ = 0.58). Table 3-8 presents the number of PUs in each instructional condition for the aspect inflection.

Table 3-8

Aspect pattern learning: monolingual children

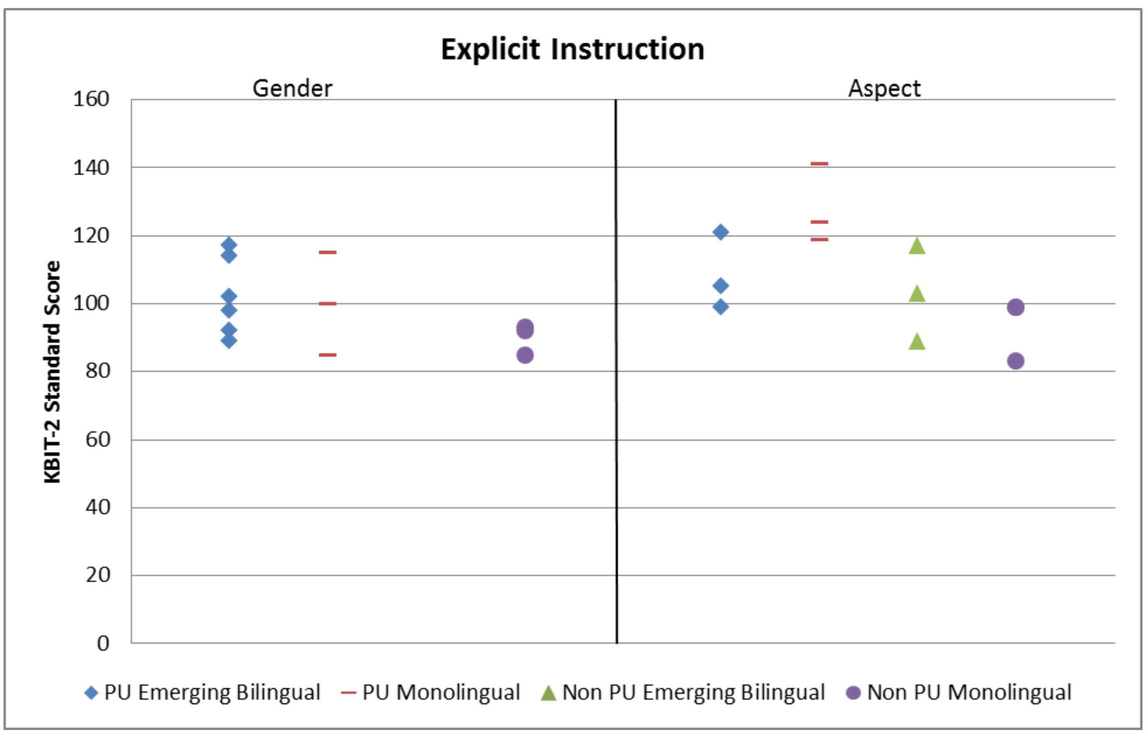
	Explicit Task	Implicit Task
PUs	3 (50%)	0
Non-PUs	3 (50%)	6

Post Hoc Analysis

The researchers completed visual inspections to analyze the influence of nonverbal intelligence, language ability, and metalinguistic knowledge on performance on the implicit and explicit metalinguistic tasks. Figures 3-1 through 3-8 display dot plots for both implicit and explicit instruction related to these measures. Visual analysis of these plots revealed a notable difference in the nonverbal intelligence scores of participants learning the gender marking with implicit instruction such that the two monolingual participants who were pattern users (PU) received higher scores on the Matrices nonverbal subtest of the KBIT-2 than did any of the other participants. Visual analysis also revealed that the three monolingual participants who acquired the aspect marking with explicit instruction received very high nonverbal subtest scores compared to their peers. Visual analysis did not reveal any other robust differences between participants who learned the novel markings (PU) and those who did not (Non-PU), when taught through the same method of instruction (implicit or explicit). Thus, differences in learning cannot be attributed to significant differences in language ability or metalinguistic skills as measured by the ELT-2. However, nonverbal intelligence, as measured by the KBIT-2 Matrices nonverbal subtest, may have influenced learning.

Figure 3-1

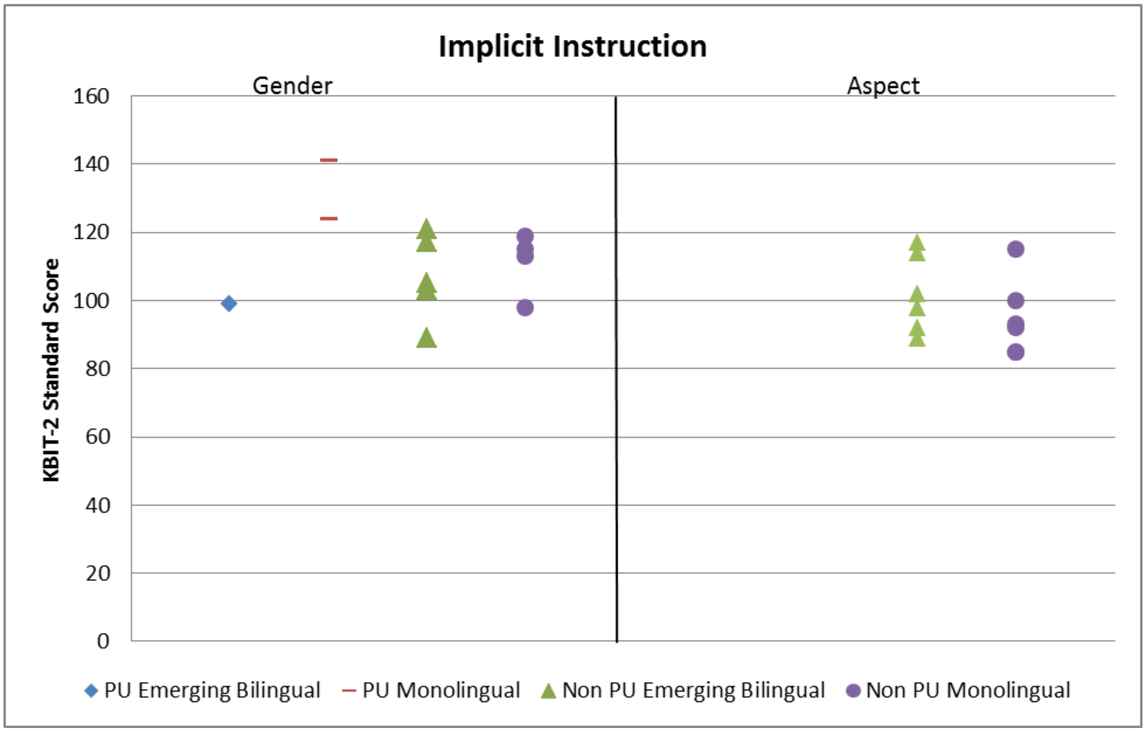
Nonverbal intelligence of participants receiving explicit instruction



Based on KBIT-2 with mean = 100, SD = 15

Figure 3-2

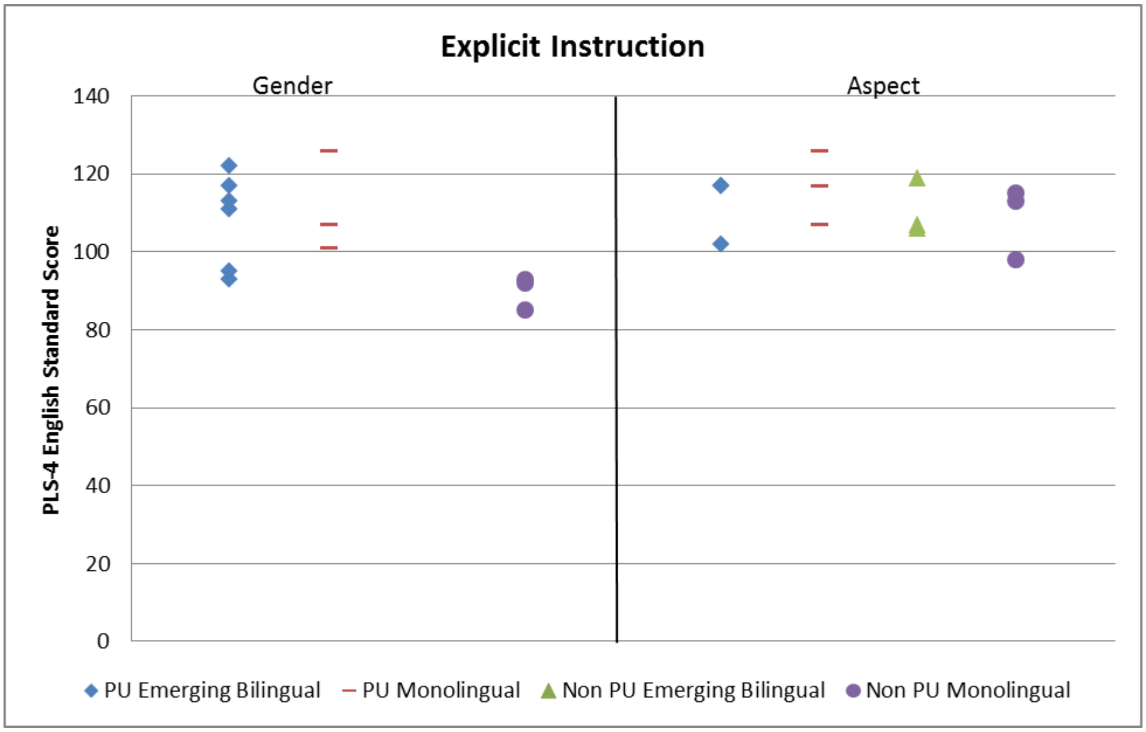
Nonverbal intelligence of participants receiving implicit instruction



Based on KBIT-2 with mean = 100, SD = 15

Figure 3-3

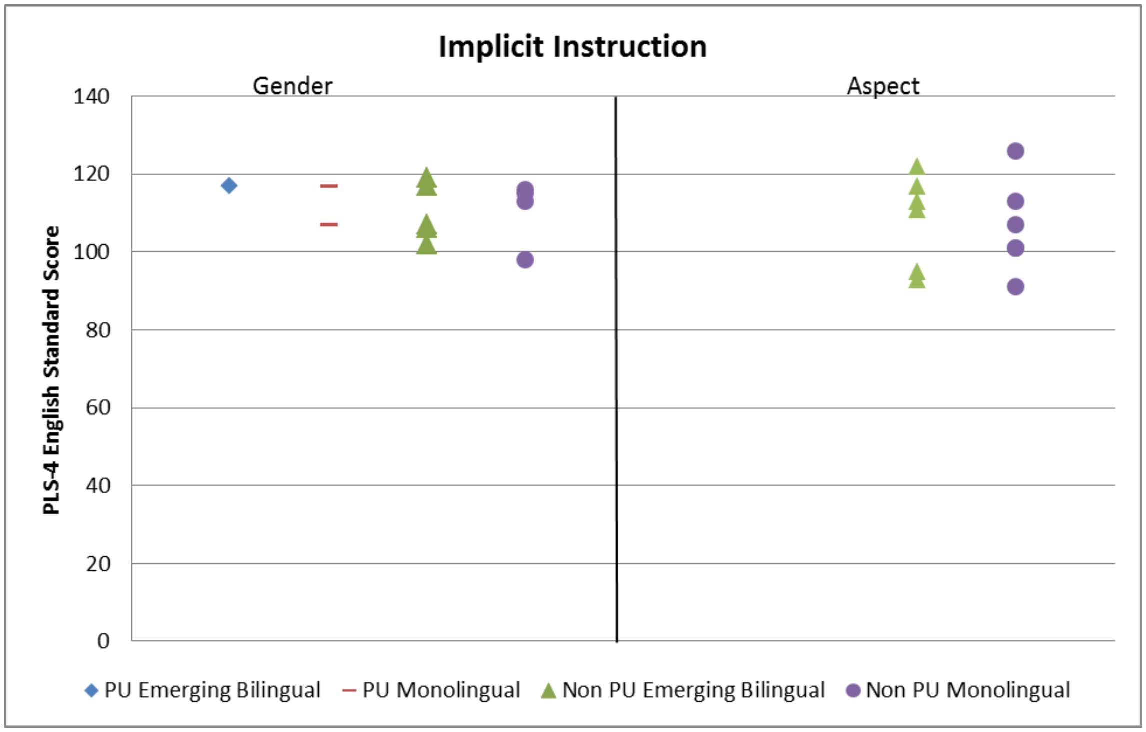
English language ability of participants receiving explicit instruction



Based on PLS-4 with mean = 100, SD=15

Figure 3-4

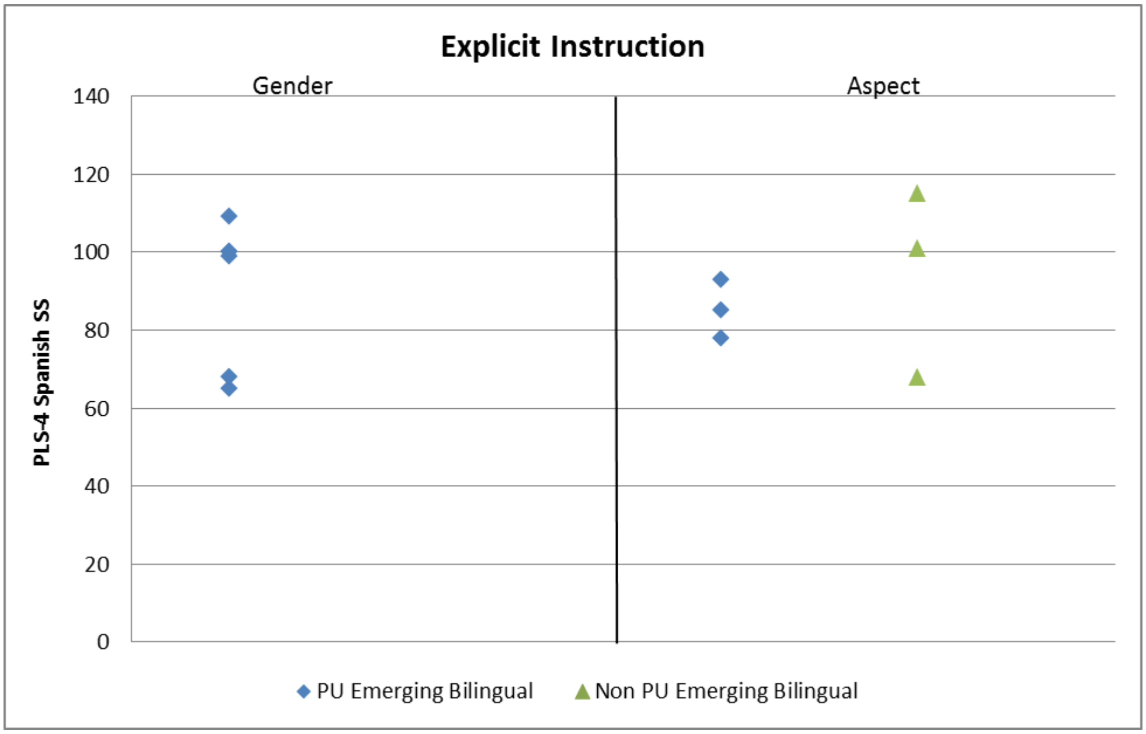
English language ability of participants receiving implicit instruction



Based on PLS-4 with mean = 100, SD=15

Figure 3-5

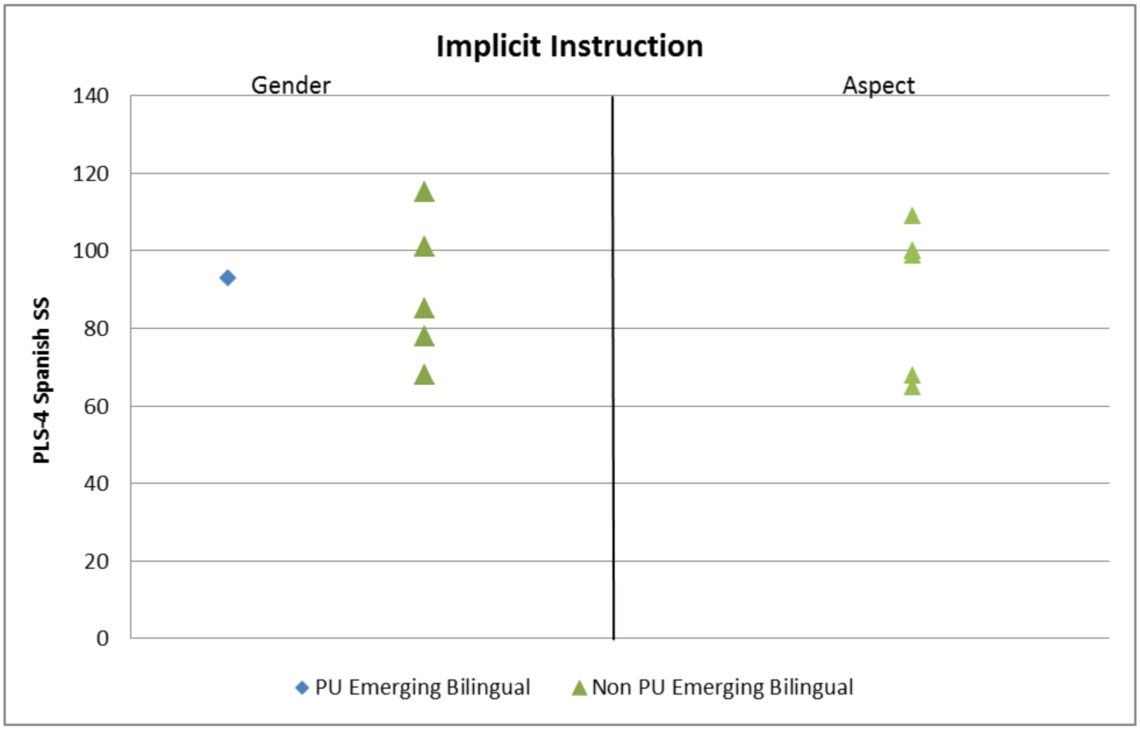
Spanish language ability of emerging bilingual participants receiving explicit instruction



Based on PLS-4 Spanish with mean = 100, SD=15

Figure 3-6

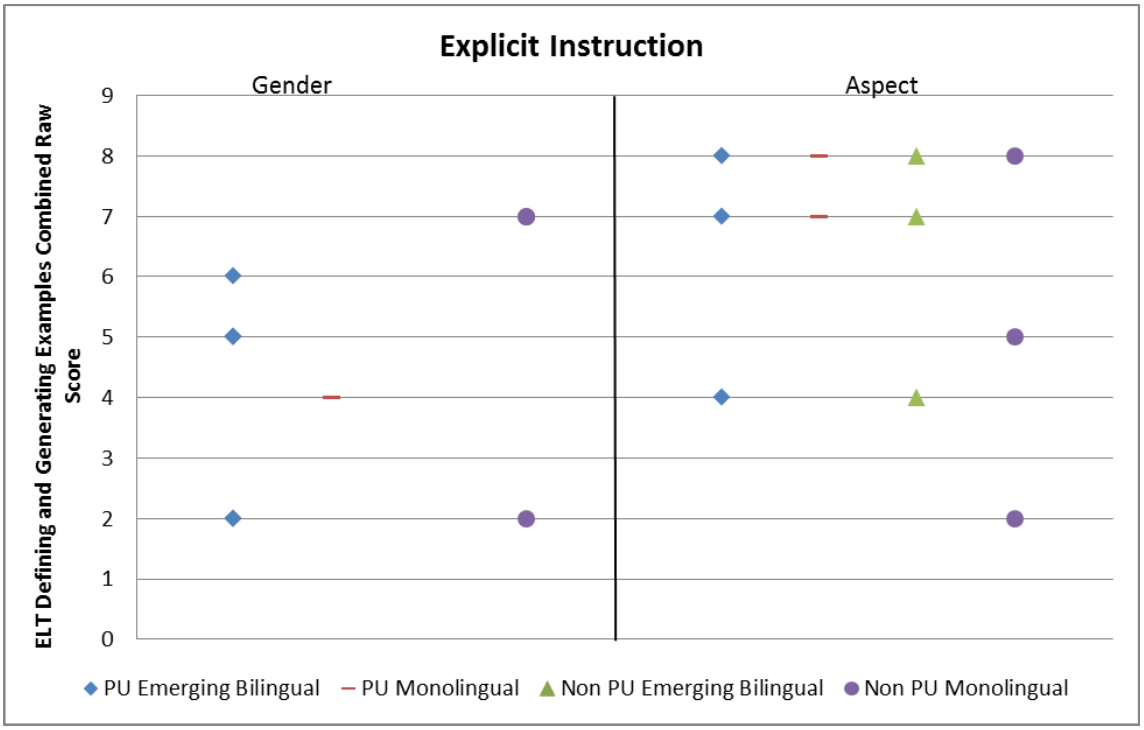
Spanish language ability of emerging bilingual participants receiving implicit instruction



Based on PLS-4 Spanish with mean = 100, SD=15

Figure 3-7

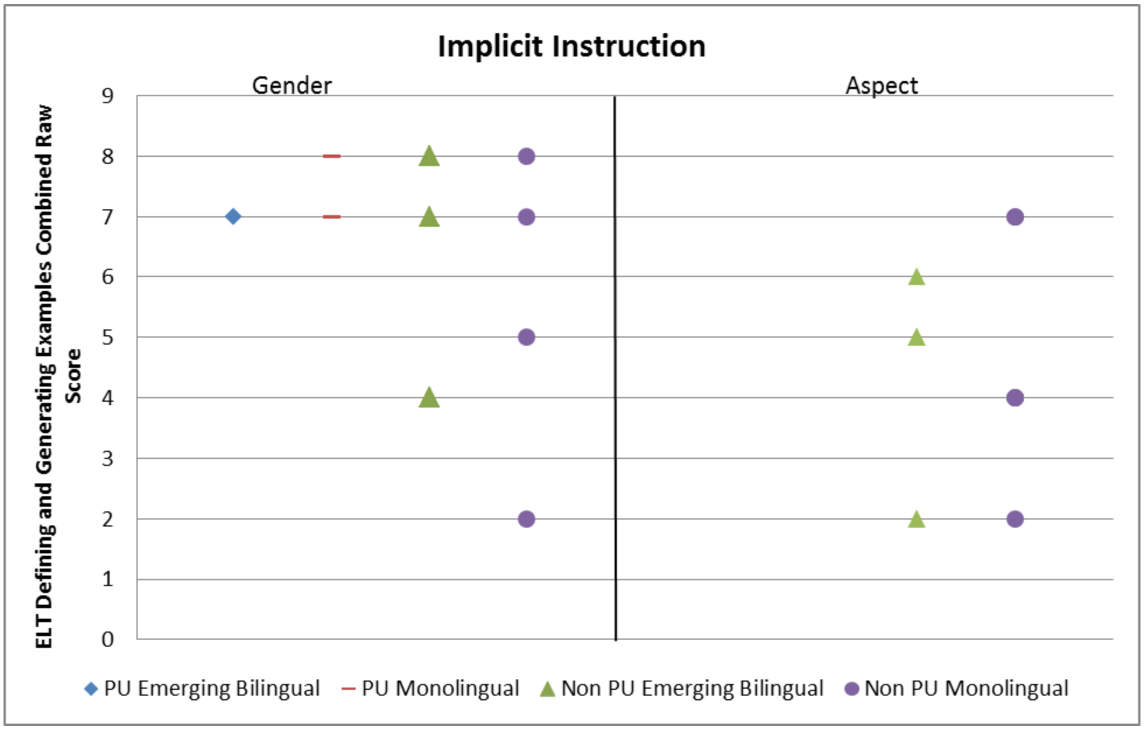
Metalinguistic skills of participants receiving explicit instruction



Based on combined raw scores on two metalinguistic subtests from ELT-2

Figure 3-8

Metalinguistic skills of participants receiving implicit instruction



Based on combined raw scores on two metalinguistic subtests from ELT-2

Discussion

The current study encompassed two goals. First, this study aimed to determine if emerging bilingual 5-to 7-year-old children demonstrated greater grammatical metalinguistic skills than their monolingual peers. Second, this study examined if these children performed differently on tasks requiring different levels of metalinguistic skills. This study assessed grammatical metalinguistic skills through an artificial language learning task, in which participants received instruction regarding two novel grammatical forms (marking gender or aspect) and attempted to produce the target forms. Each participant received implicit instruction for one marking and explicit instruction for the other marking. Learning these novel markings through either implicit or explicit instruction required metalinguistic skills. However, explicit instruction provided a higher level of metalinguistic support than did implicit instruction.

For the first study question, the researchers predicted that the emerging bilingual children would outperform the monolingual children on both the implicit and explicit tasks for both the gender and aspect grammatical forms. This outcome was predicted based on previous work (Bialystok 1988) indicating that emerging bilingual children demonstrate higher control of processing skills than monolingual children. The researchers predicted that the emerging bilingual participants' advanced control of processing would be sufficient to give them an advantage over their monolingual peers in language learning. Study results trended toward this prediction for the gender marking under the explicit teaching condition. Although the difference between the emerging bilingual and monolingual children successfully learning the gender marking through explicit instruction did not reach statistical significance ($p = 0.18$), the effect size was large ($\Phi = 0.58$). When learning the gender marking implicitly, the monolingual children slightly outperformed the emerging bilingual children ($p=1.00$, $\Phi = 0.19$). The emerging bilingual and monolingual groups did not demonstrate significantly different outcomes for the aspect marking with either implicit or explicit instruction. Thus, the overall performance of the emerging bilingual children was only marginally greater than the performance of the monolingual children. Consistent with Bialystok's findings, it appears that the emerging bilingual children possessed a higher control of processing skills. These skills provided the emerging bilingual children an advantage over their monolingual peers when learning the simpler gender marking with metalinguistic support via explicit instruction. However, the data suggest that this advantage was not robust enough to affect learning the more complex aspect marking with explicit instruction, or either marking with implicit instruction.

Unexpectedly, two monolingual children successfully learned the gender marking with implicit instruction, while only one emerging bilingual child successfully learned the marking in this condition. It is important to note however, that the two monolingual participants who did learn the gender marking with implicit instruction received exceptionally high nonverbal intelligence scores on the KBIT-2 Matrices nonverbal subtest. These two monolingual participants received standard scores of 124 and 141; the highest standard score achieved by any emerging bilingual participant was 121. Both the KBIT-2 Matrices subtest and the language learning task used in this study asked participants to first formulate a pattern based on models, and then apply this pattern. Thus, it is not surprising that the participants with the highest KBIT-2 scores performed very well on the language learning tasks, regardless of their language status.

High nonverbal intelligence scores may have also contributed to the lack of significant differences between the monolingual and emerging bilingual participants when learning the aspect marking through explicit instruction. The three monolingual children who successfully learned the aspect marking through explicit instruction all received high scores on the Matrices subtest (119, 124, 141); these were the three highest scores achieved among the 12 monolingual participants. It is possible that above average nonverbal pattern recognition skills provided these children with an advantage that set them apart from their monolingual peers. In effect, this advantage may have allowed these three monolingual children to perform equivalently to the three emerging bilingual children who also learned the aspect marking through explicit instruction, and collectively performed lower on the nonverbal subtest of the KBIT-2.

For the second study question, the researchers predicted that both the emerging bilingual and monolingual children would perform significantly better with explicit instruction than implicit instruction, due to the increased metalinguistic support provided during explicit instruction. Study results confirmed this prediction for the emerging bilingual children learning the gender marking (p=0.02; Φ = 0.85). Within the monolingual group, three children learned the gender marking through explicit instruction and two learned it through implicit instruction. This difference was not significant (p = 0.18; Φ = 0.17). A greater number of participants in both monolingual and emerging bilingual groups more successfully learned the aspect marking though explicit instruction, although this difference did not reach statistical significance for either group (both ps = 0.18). However, these differences did reveal a large effect size (both Φs = 0.58). No participants from either group successfully learned the aspect marking through implicit instruction.

One possible reason that no participants learned the aspect marking through implicit instruction is the high complexity of the aspect marking, compared to the gender marking. While the gender marking required that the child look at one graphic, the aspect marking presented three graphics to the child simultaneously. Compounding this additional visual information is the fact that the aspect marking required that participants consider temporal information, which is more abstract than gender information. Differences in gender, as used in this study, are salient and concrete, while time is an abstract, complex, concept. Given that the implicit instruction required offered less metalinguistic support than the explicit instruction, it is possible that this more taxing instruction approach, compounded with the increased complexity of the aspect marking, created a task that was too difficult for children at this stage of language and cognitive development to successfully complete.

Study Limitations

There are several limitations of the current study which must be taken into account when interpreting its findings. The first limitation is that metalinguistic skills were measured through one task, which did not separate analysis of knowledge from control of processing. Rather, the participants needed to access both of these skills to successfully learn the marking. Thus, it is unclear if children successfully learned markings due to higher control skills, higher analysis skills, or a combination of both. Future studies should implement language learning tasks that separately measure control and analysis skills to more clearly evaluate the roles of specific metalinguistic awareness skills in language learning.

A second limitation of this study is its limited number of participants. Study results revealed several trends supported by large effect sizes, yet they did not reach statistical significance. This lack of significance is likely due to the study being underpowered. A larger sample size would most likely yield a statistically significant difference between emerging bilingual and monolingual participants' performance on the gender learning task under explicit instruction. A larger sample size would also likely yield statistically significant differences between explicit and implicit instruction characterized by more successful language learning with explicit instruction compared to implicit instruction across both markings and participant groups.

A third limitation of this study is the difficulty of the aspect marking. No child successfully learned this marking through implicit instruction, indicating that this task may have been too difficult for the young children in this study. Because no child successfully acquired this marking, robust comparisons could not be made between emerging bilingual and monolingual group success learning this marking with implicit instruction, nor between explicit and implicit aspect marking instruction. A marking more difficult than the gender marking, but less complex than the aspect marking may have yielded stronger study results. Alternatively, increasing the number of aspect marking sessions or including an older group of children may have alleviated the flooring effect of the aspect marker and provided more robust study results related to the aspect marking.

Conclusion

This study examined the grammatical metalinguistic skills of both emerging bilingual and monolingual 5-to 7-year-old children, through the use of an artificial language learning task, which required control and analysis metalinguistic skills. Study results revealed that the emerging bilingual children possessed stronger metalinguistic skills than the monolingual children under limited conditions. These results are consistent with previous findings that emerging bilingual children demonstrate an advantage over monolingual peers on some metalinguistic skill measures. Yet, this advantage was not robust enough to yield performance differences across all conditions. Results from the current study support the continued exploration of the metalinguistic skills of bilingual and monolingual children and the impact of such skills on language learning.

References

Ben-Zeev, S. (1977). The influence of bilingualism on cognitive strategy and cognitive development. *Child development*, *48,* 1009-1018.

Bialystok, E. (1986). Children's concept of word. *Journal of Psycholinguistic Research, 15*, 13-32.

Bialystok, E. (1988). Levels of bilingualism and levels of linguistic awareness. *Developmental psychology*, *24*(4), 560-567.

Bialystok, E., & Majumder, S. (1998). The relationship between bilingualism and the development of cognitive processes in problem solving. *Applied Psycholinguistics*, *19*(01), 69-85.

Bowers, L., Huisingh R., LoGiudice, C., & Orman, J. (2010). *The Expressive Language Test 2.* East Moline, IL: LinguiSystems.

Cummins, J. (1978). Bilingualism and the development of metalinguistic awareness. *Journal of cross-cultural psychology, 9*(2), 131-149.

Dunn, L. M. (1965). *Peabody Picture Vocabulary Test.* Circle Pines, Minnesota: American Guidance Service.

Fenson, L., Dale, P. S., Reznick, J. S., Thal, D., Bates, E., Hartung, J. P., et al. (1993). *MacArthur-Bates Communicative Development Inventories.* San Diego: Singular Publishing Group, Inc.

Finestack, L. H., & Fey, M. E. (2009). Evaluation of a deductive procedure to teach grammatical inflections to children with language impairment. *American Journal of Speech Language Pathology*, *18*(3), 289-302.

Green, S. B., & Salkind, N. J. (2003). *Using SPSS for Window and Macintosh: Analyzing and Understanding Data* (Third ed.). Upper Saddle River, NJ: Prentice Hall.

Ianco-Worrall, A. (1972). Bilingualism and cognitive development. *Child Development*, *43*, 1390–1400.

Kaufman, A. S.,& Kaufman, N. L. (2004). *Kaufman Brief Intelligence Test, Second Edition*. Circle Pines, MN: American Guidance Services.

Kolinsky, R., Cary, L., & Morais, J. (1987). Awareness of words as phonological entities. *Applied Psycholinguistics, 8,* 223-232.

Papandropoulou. I. & Sinclair. H. (1974). What is a word? Experimental study of children's ideas on grammar. *Human Development. 17,* 241-258.

Piaget, J. (1929). *The child's conception of the world*. London: Routledge & Kegan Paul.

Social Security Administration. (2013, April 21). *Popular baby names*. Retrieved April 21, 2013, from http://www.ssa.gov/OACT/babynames/.

Templeton, S., & Spivey, E. (1980). The concept of word in young children as a function of level of cognitive development. *Research in Teaching of English, 14*, 265-278.

Yelland, G. W., Pollard, J., & Mercuri, A. (1993). The metalinguistic benefits of limited contact with a second language. *Applied Psycholinguistics, 14,* 423–444.

Zimmerman, I.L., Steiner, V.G., & Pond, R.E. (2002). *Preschool Language Scale, Fourth Edition.* San Antonio, TX: The Psychological Corporation.

Zimmerman, I.L., Steiner, V.G., & Pond, R.E. (2002). *Preschool Language Scale, Fourth Edition, Spanish.* San Antonio, TX: The Psychological Corporation.