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A Cross-Linguistic Comparison of Cognate Production in Bilingual Children With and Without Language Impairment

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A Cross-Linguistic Comparison of Cognate Production in Bilingual Children With and Without Language Impairment

by

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Thesis

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Abstract

A Cross-Linguistic Comparison of Cognate Production in Bilingual Children With and Without Language Impairment

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The University of Texas at Austin, 2014

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Purpose: The current study examined if bilingual children (English-Spanish) with language impairment(LI) and children in the low typical(LT) range display a cognate advantage as their typically developing(TD) peers do. Given the literature we posed two hypotheses; on one hand, learning cognates may be easier for bilingual children with language impairment over typically developing children, as their shared representations lend to overlap in input. Conversely, it is possible the children with SLI would exhibit a cognate disadvantage given that in early language development children reject lexical units with high competition.

Method: We examined whether 117 Spanish-English bilingual children (5;0 to 9;11) displayed a cognate advantage in oral production relative to their typically developing peers. The cognate and noncognate items were derived from the English and Spanish versions of the Expressive One-Word Picture Vocabulary Test. Children's average proportion of cognate and noncognate responses were compared across ability groups.

Results: TD bilingual children exhibited a cognate advantage, while the bilingual children with LI exhibited a cognate disadvantage. TD bilingual children produced a significantly higher proportion of cognates across their two languages, while LI children produced most of their cognates in Spanish only. The LT children performed similarly to the LI group in terms of overall proportion correct of cognate pairs over noncognate pairs, but performed similar to the TD group in terms of the language of response (only English, only Spanish, or both languages) of the cognate pairs.

Conclusion: Consistent with our second hypothesis, children with LI show a cognate disadvantage, while TD bilingual children show an advantage for cognate production. As expected, LT children's performance fell between the LI and TD groups. We discuss the theoretical and clinical implications of these findings.

Table of Contents

List of Tables

List of Figures

INTRODUCTION

Bilinguals have differentiated representations for a word and its translation equivalent at the level of the lexicon, but a common representation at the semantic level allowing for interaction. While many words share very little overlap (e.g., *perro* in Spanish and dog in English), languages with similar backgrounds often present with overlap (e.g. *tren* in Spanish and train in English). Words that present with overlap across languages are referred to as cross-linguistic cognates.

Cross-linguistic cognates give unique insight in understanding the bilingual lexicon, as the concepts and corresponding lexical representations of cognates overlap between the two languages of a bilingual. Cognates are words that share phonological and/or orthographic form, and are typically related semantically even though they are not always translation equivalents (Hall, 2002). For example the cognate pair in English and Spanish telescope- *telescopio*, share the same concept (a tool used to observe celestial bodies), phonology (i.e. sounds), morphology (i.e. word forms), and even orthography (i.e. written form). This overlap has been attributed as the source of an advantage for cognates over other word types in performance in processing, and production in both bilingual (Friel & Kennison, 2001) and monolingual adults (Kroll & Stewart, 1994).

Learners who utilize cognate similarities and perform better on cognates over noncognates are thought to display the *cognate facilitation effect*, or a cognate advantage. In typically developing populations, the cognate facilitation effect has been evidenced by higher accuracy performance on cognates relative to other word types (receptively and expressively), and through shorter naming and translation latencies, which arguably requires cognate awareness (Costa, Caramazza, & Sebastian-Galles, 2000; Dressler, Carlo, Snow, August, & White, 2011; Lemhöfer, Dijkstra, & Michel, 2004; Van Hell & de Groot, 1998; Dijkstra & Van Hell, 2003; Dijkstra, Miwa, Brummelhuis, Sappelli, & Baayen, 2010; Pérez, Peña, & Bedore 2010).

Cognate awareness refers to a metalinguistic skill in which an individual can recognize and maximize the link between the conceptual and lexical information that is consistent cross-linguistically. While typically developing bilingual children demonstrate the metalinguistic skill of distinguishing a word from its concept at an earlier age than monolingual children (Cummins, 1978), children with LI struggle with metalinguistic and executive functions (Hirschman, 2000; Kamhi, 1996; Miller, Kail, Leonard, & Tomblin 2001; Pratt & Grieve 1984a; 1984b; Smith-Lock, 1995; van Kleeck 1982; 1984). Although typically developing bilingual children show advantages in cognate performance it is yet to be determined if bilingual children with language impairment present with the advantage.

Certainly there are factors inherent to bilingualism and language impairment that may drive or interfere with cognate facilitation. For example, it is well established that bilingual children must share the input they receive across each of their two languages and as a result they do not receive the same amount of input in each of their languages as a monolingual does in their sole language (Kohnert, Bates, & Hernandez, 1999). This is because bilingual children receive each language in different contexts, and from different input sources which essentially divide the input they receive in each language. Given that children with LI require greater exposure to words than typically developing children do, cognates may serve to reinforce the distributed input that bilingual children with LI receive. On the other hand, bilingual children with LI have been evidenced to show biases for concreteness (Sheng & McGregor, 2010) and perform poorly on metalinguistic tasks which may result in a rejection of forms that are too similar, such as cognates (Hirschman, 2000; Kamhi, 1996; Miller, Kail, Leonard, & Tomblin; 2001; Pratt & Grieve 1984a, 1984b; Smith-Lock, 1995; van Kleeck 1982; 1984). The increased form and concept similarity competition may push children with LI to choose one lexical unit over another if their differences appear more salient as suggested by an extension of the competition hypothesis (MacWhinney, 1987; 2005). Therefore it is possible that characteristics of bilingualism and language ability may moderate the cognate facilitation effect in bilinguals with language impairment. Determining which bilingual populations display the cognate advantage can better inform our understanding of bilingual models of language interaction and memory. Additionally, there are clinical implications for populations that do not exhibit the advantage.

THE COGNATE ADVANTAGE

Bilingual adults present with higher accuracy and speed in processing spoken and written cognates over noncognates of similar length, and frequency (Costa, Caramazza, & Sebastian-Galles, 2000; Dressler, Carlo, Snow, August, & White, 2011; Lemhöfer, Dijkstra, & Michel, 2004; Van Hell & de Groot, 1998; Dijkstra & Van Hell, 2003; Dijkstra, Miwa, Brummelhuis, Sappelli, & Baayen, 2010). Costa, Caramazza, and

Sebastian-Galles (2000) found higher accuracy for cognates in a picture naming task. Response latencies are also shorter for cognates over noncognates using word association tasks (Van Hell & de Groot, 1998; Dijkstra & Van Hell, 2003). Furthermore, cognates are translated faster and more accurately than noncognates by bilingual adults (De Groot, 1992; De Groot & Keijzer, 2000; Ellis & Beaton, 1993; Hall, 2002; Kroll & Stewart, 1994; Sánchez-Casas, Davis, & García-Albea, 1992; Sánchez-Casas & García-Albea, 2005). For trilinguals, cognates that exist across three languages are recognized faster than cognates that exist across two languages (Lemhöfer, Dijkstra, & Michel, 2004). These findings provide support for the cognate facilitation effect (CFE) which posits that bilinguals produce and recognize cognates faster than noncognates (Costa et al., 2000; Dijkstra, Grainger, & Van Heuven, 1999; Schelletter, 2002.)

The cognate facilitation effect can be explained through the *Cascaded Activation Model* of word production which has two key stages (Garret 1975; 1976). In the first stage the concept of a word is activated, and in the second stage the phonological and syntactic elements of a word are retrieved. This model describes a shared conceptual store for both languages, while each language has a differentiated lexicon. For cognates, the cascading activation is strengthened by phonological redundancy as the overlapping phonemes are activated from two sources which facilitate faster retrieval.

COGNATES AND TYPICALLY DEVELOPING BILINGUAL CHILDREN

The literature provides conflicting evidence regarding children's ability to utilize cognates as a vocabulary learning tool in typically developing bilingual children.

Specifically, earlier studies did not find evidence for a cognate advantage in bilingual children. For example, Umbel, Pearson, Fernández, and Oller (1992) evaluated first graders performance on the *Peabody Picture Vocabulary Test-Revised* (*PPVT-R*) (Dunn & Dunn, 1981) and the *Test de Vocabulario en Imágenes Peabody-Adaptación Hispanoamericana* (*TVIP*-H) (Dunn, Padilla, Lugo, & Dunn, 1986) and found that children from monolingual Spanish and bilingual Spanish-English homes attained comparable overall scores on both tests and children responded correctly to cognates and noncognates relatively equally (68% vs. 67%). It was not reported if the cognates and noncognates were matched by level of difficulty. In a follow up study, Umbel and Oller (1994) tested first, third, and sixth graders using the same instruments. The rate of response was similar holding at 60% for the cognates and 65% for the noncognates. Based on these findings, Umbel and colleagues suggest that children do not demonstrate a cognate advantage. Although these studies used a language exposure questionnaire, raw data are not provided regarding exposure or the degree of variability in exposure. Furthermore, there is no report of linguistic output. Linguistic variability in input and use may have masked the presence of a cognate advantage.

In contrast, many recent studies have documented a cognate advantage in bilingual children ranging in age. For example, Pérez, Peña, & Bedore (2010) examined whether young bilingual children were able to recognize cognates of Spanish words. The researchers found that children who were exposed to more Spanish were more likely to recognize English cognates of Spanish words than children who were exposed to balanced amounts of Spanish and English, or more English. Older bilingual children have also demonstrated a strong receptive cognate advantage when tested on age appropriate items (Malabonga, Kenyon, Carlo, August, & Louguit, 2008). Consistent with Pérez et al. (2010), children's cognate scores correlated highly with their performance on the Spanish vocabulary measures, while scores on noncognate items were highly correlated with the students' performance on the English vocabulary measures. These findings suggest a transfer of receptive vocabulary knowledge from the students' first language to receptive vocabulary in a second language as early as kindergarten, and in older bilingual children as well. More recently, researchers (Kelley & Kohnert, 2012) investigated if 8-to 13-year-old Spanish-speaking English-language learners (ELLs) demonstrated a cognate advantage in expressive and receptive vocabulary. At the group level, children's test scores were higher for items that were classified as cognates as compared to noncognates of comparable difficulty. However, at the individual level, not all children demonstrated a cognate advantage. Interestingly, if the children did not demonstrate a cognate advantage they tended to not show it in both domains (expressive and receptive), suggesting that the advantage may be impacted by cognate awareness. Expressively, the cognate advantage has also been evidenced in older bilingual children through higher accuracy and shorter latencies regardless of varying levels of language proficiency (Schelletter, 2002).

Taken as a whole, the current research provides strong evidence for a cognate advantage in bilingual children. While two studies (Umbel, Pearson, Fernandez, & Oller, 1992; Umbel & Oller, 1994) did not report a cognate advantage, a greater number of more recent studies consistently show a cognate advantage in bilingual children. Reasons for the differences we observe from the conclusions of these studies may include insufficient information regarding language output and variability in linguistic input, differences in design and measures (for example both tests were administered in the same sitting), and the percentage (15%) of the overall sample's responses that were analyzed (Umbel et al., 1992; 1994). If the researchers had analyzed more of the data from the sample, or altered the administration it is possible they would have observed a cognate advantage. Furthermore, variability of linguistic input/output and dominance may have masked the presence of a cognate advantage in earlier studies. Overall the studies that report detailed information regarding children's linguistic input/output and dominance, and analyze the entire set of data show evidence of children's use of cognates as a tool (Schelletter, 2002; Pérez, Peña, & Bedore, 2010; Kelley & Kohnert, 2012). Further evidence in support of children's use of cognates for vocabulary has been demonstrated by ELL children learning about cognates through direct instruction, and being taught to employ strategies to look for cognate similarities (Bravo, Hiebert, & Pearson, 2005; Carlo, August, McLaughlin, Snow, Dressler, & Lippman, 2004; Nagy, Garcia, Durgunoglu, & Hancin, 1992; Proctor & Mo, 2009; Dressler, Carlo, Snow, August, & White, 2011).

PHONOLOGICAL SIMILARITY AND CHILDREN WITH LI

Admittedly, cognates may be more difficult for bilingual children with language impairment to acquire relative to their typically developing peers. Children with language impairment have been shown to present with a general delay in language development, as well as specific linguistic deficits (see Leonard, 2002 for a review). Furthermore, children with LI show deficits in metalinguistic and executive function abilities (Gregg, 1983; Hirschman, 2000; Kamhi, 1996; Miller, Kail, Leonard, & Tomblin; 2001; Pratt & Grieve 1984a; 1984b; Smith-Lock, 1995; van Kleeck 1982, 1984). Thus, it is reasonable to hypothesize that children with language impairment may present with traits of linguistic development typical of younger children. For example, in early bilingual lexical and conceptual development Clark's principle of contrast (1987) suggests "doublets" such as synonyms are not accepted by children as a function of their competition. This leads to rejection of both within and cross-linguistic synonyms in monolingual and bilingual children. Similarly, cognates may amplify competition as they present with many similarities across linguistic domains. Given that children with LI present with less mature linguistic abilities it is plausible that they may reject cognates due to their perceived increased competition. Due to deficits in metalinguistic abilities, it may be less effortful for children with LI to identify and focus on the small phonological differences between cognates (concrete), as opposed to the more abstract similarities (conceptual and phonological).

It is also plausible that learning cognates may be difficult for children with LI due to deficits in phonological memory, and semantic convergence. For example, monolingual children with language impairment are unable to differentiate newly learned words from similar sounding foils (Evans, Saffran, & Robe-Torres, 2009), and have showed marked deficits in phonological memory which is crucial for learning and storing vocabulary (Baddeley & Hitch, 1974; Baddeley, Gathercole, & Papagno 1989; Gathercole & Baddeley, 1989; 1990). This may be attributed to the fact that children with

LI have more holistic phonological representations relative to their TD peers, as well as sparser lexical-semantic connections (Mainela-Arnold, Evans, & Coady, 2010). In relation to cognates, it may be that cognates are too similar, and the differences too minute leading to the inability to differentiate the lexical units due to deficits in phonological memory.

One study has investigated the role of phonological similarity in monolingual English speaking children with LI (Kohnert, Windsor, & Miller, 2004). The aim of this study was to explore whether children who did not speak Spanish would use form similarity to deduce word meanings of Spanish words that have English cognates. For example, the researchers tested how well English speaking children with LI could use phonological similarity to tap into the meaning of the Spanish word *planta*, given the cognate pair of *plant* in English. Selected words were all high frequency and varied along a continuum in terms of phonological transparency and opacity relative to their English translation. Meaning, not all targets were cognate pairs, but shared differing levels of phonology (i.e. *papel*- paper). Consistent with the *Cascaded Activation Model* findings were that the degree of phonological overlap affected the children's performance, with more overlap leading to quicker and more accurate matching. Furthermore, language impairment reduced the children's ability to recognize meaningful phonological information in cognates, as a function of the disorder severity. Children with LI did not take advantage of cognates as evidenced by longer latencies and lower accuracy in comparison to their TD peers. Because target stimuli varied in the degree of phonological overlap, and children with LI displayed graded declines in performance that were proportional to those of the TD children, the difference in performance were proposed to be due to deficits in the phonological system and its relation to the lexical-semantic system. Based on these results, one might expect that younger bilingual children with LI would also display difficulty recognizing meaningful phonological information in cognates and may show differing levels of cognate production based on their ability status.

THE PRESENT STUDY

The literature assessing the interaction of cognate status in bilingual children is robust as most studies have consistently shown an advantage in children. It is suggested that ELL children (when given instruction or training) utilize the overlapping representation of cognates to bootstrap to their L2. In TD children the overlap between cognates outweighs the small phonological differences between the cognate pairs (Kelley & Kohnert, 2012; Pérez, Peña, & Bedore, 2010). There is a significant gap in the literature regarding cognates and how they are used by bilingual children with and without LI. Given that bilingual children with LI tend to display difficulties in converging semantic knowledge, it is not surprising speed and accuracy to recognize meaningful phonological information in cognates was lower compared to the TD bilingual children (Kohnert, Windsor, & Miller, 2004). The purpose of our study was to determine if children with a range of ability (language impaired, low typical and typical developing) display a cognate advantage in production. Our inclusion of the grouping of LT children was to examine the performance and awareness of cognates over noncognates for children who did not perform low enough to be qualified as presenting with language impairment, as other studies have seen differences in performance on the basis of severity of LI (Kelley & Kohnert, 2012). We considered that children who performed at the low end of normal may display distinct trends of cognate awareness and production, which may have clinical implications.

At the general level, we predicted that children's expressive language scores by group would relatively mirror their corresponding use and exposure, and that children in second grade would have a larger expressive language score than kindergartners. We also predicted that children would attain a higher proportion correct of cognates over noncognates across both languages (indiscriminate of group). Given the reviewed literature we posed two hypotheses regarding group performance; first, learning cognates may be easier for bilingual children with weaker language systems (LI and LT) compared to those with typical language systems (TD), as their overlapping meaning and form may outweigh the small differences and facilitate the learning of cognate pairs. If the effects of bilingualism are greater than the effects of impairment, then all children regardless of ability should present with the cognate advantage. On the other hand, we considered that learning cognates could be more difficult for bilingual children with weaker language systems (LI and LT) compared to those with typical language systems (TD) as their overlap increases competition thus causing children to focus on the small concrete differences, rather than the similarities. If the effects of impairment are greater than the effects of bilingualism, then children with impairment will show an overall linguistic disadvantage that may be more robust in the production of cognates. Thus, we expect bilingual children with LI to show a cognate disadvantage and a bias for concreteness relative to their TD peers.

METHOD

PARTICIPANTS

Participants were 117 Spanish-English bilingual children (5;4 to 8;9) along a range of linguistic ability and language experience who were tested as part of an ongoing study of linguistic outcomes in Spanish-English bilinguals. Children were grouped by three ability levels: language impaired (LI), low typical (LT), and typical developing (TD).

Prior to participation parents completed written consent forms. Children were recruited from local school districts in Central Texas, as approved by our institutional review board. All children had a minimum of 20% use and exposure in both Spanish and English at the time they entered the study. Parents and teachers completed phone interviews and reported on children's input and output in Spanish and English on an hour-by-hour basis on both weekdays and weekends to determine the percentage of input and output in each language (Gutiérrez-Clellen & Kreiter, 2003; *BIOS/ITALK*, Peña, Gutiérrez-Clellen, Iglesias, Goldstein, & Bedore, 2014). An average weighted percentage score of Spanish and English use and exposure was calculated based on the interview data. Table 1 displays the mean age and use/exposure composites for Spanish and English for each language ability group by grade. Repeated measures ANOVA was conducted to determine if there were grade or ability differences by exposure and use. There was a main effect for Language $F(1,111)=31.87, p<.001$, $\eta_P^{2}=.223$. Children on average had more Spanish use/exposure (60%) compared to English (40%). There was no main effect for Ability $F(2,111)=2.16$, p=.133, $\eta_P^2=.036$. However, there was a significant interaction for Grade by Language $F(1,111)=6.27$, p=.014, $\eta_P^2=.053$. Second grade children had relatively equal use/exposure in English (45.0%) and Spanish (55.0%) compared to kindergarten age children who had more use and exposure in Spanish (63.1%) over English (36.9%). Figure 1 displays the Grade by Language interaction. There was no interaction between Ability and Grade.

	Kinder			Second Grade		
Variables	LI	LT	TD	LI	LT	TD
N	13	16	28	12	14	34
Age in mos.	70.15 (3.49)	72.63 (5.60)	72.54 (3.82)	98.08 (4.36)	96.64 (5.12)	97.06 (3.10)
% Input Eng	33.54 (18.42)	43.12 (16.00)	34.14 (11.59)	47.54 (20.63)	46.41 (19.91)	40.93 (13.66)

Table 1. Comparison of Means by Language, Grade, and Ability

Exclusionary Criteria. All participants had normal hearing and passed an initial hearing screening or a follow-up hearing test conducted by the schools' nurses. Children who presented with a history of brain injury, severe social-emotional problems, or an autism spectrum disorder were excluded from the study. To rule out poor performance driven by cognitive ability, children who fell below a standard score of 75 on the *Universal Nonverbal Intelligence Test* (*UNIT*, Bracken & McCallum, 1998) were also excluded from the study.

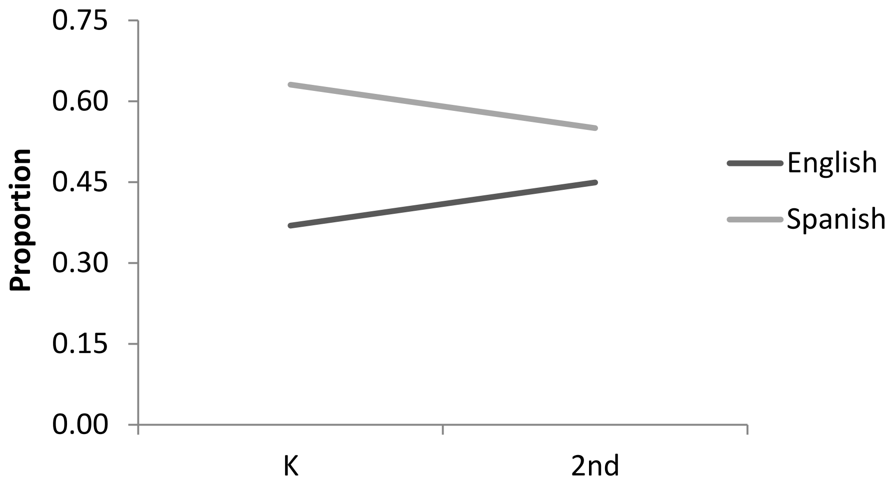

Figure 1. Average Exposure and Use by Language and Grade

MATERIALS

In order to determine language ability status, children were administered the following measures in both English and Spanish: two subtests of the *BESA* (Peña, Gutiérrez-Clellen, Iglesias, Goldstein, & Bedore, 2014) or *BESAME* (Peña, Bedore, Iglesias, Gutierrez-Clellen, Goldstein, in development): Semantics and Morphosyntax, and the *Test of Narrative Language* (*TNL*; Gillam & Pearson, 2004). All children also completed the *UNIT* (Bracken & McCallum, 1998). Children's parents and teachers completed a language-use questionnaire. The *EOWPVT*-3 and *EOWPVT- SBE* (Brownell, 2000, 2001) were administered to document vocabulary knowledge across Spanish and English. All measures were administered following the protocols provided in the testing manuals, with the exception of the *EOWPVT*s.

***BESA* or *BESAME*.** The *Bilingual English Spanish Assessment* (Peña, Gutiérrez-Clellen, Iglesias, Goldstein, & Bedore, 2014) and *Bilingual English Spanish Assessment-Middle Extension* (Peña, Bedore, Iglesias, Gutierrez-Clellen, & Goldstein, in development) were developed following the developmental patterns of each language of Spanish-English bilinguals, and do not contain direct translations. The *BESA* was used for children within the 4 to 6;11 age range, while the *BESAME* was administered to children within the 7-9;11 age range. The Semantic subtest scores are based on conceptual scoring which is more representative of bilingual children's knowledge (Bedore, Peña, García, & Cortez, 2005). The Morphosyntax subtests focus on structures that have been identified as hallmark deficits in bilingual children with LI (Bedore & Leonard, 2001; Gutierrez-Clellen, Restrepo, & Simón-Cereijido, 2006; Muñoz, Gillam, Peña, & Gulley-Faehnle, 2003).

***TNL*.** The *Test of Narrative Language* (Gillam & Pearson, 2004) is an assessment that tests narrative comprehension and production abilities of children ages 5; 0 to 11; 11. The Spanish version of the *TNL* was adapted from the English version of the *TNL*. The test includes three narrative elicitation tasks: the first is a story retell with no visual cues, the remaining two are story formulation tasks which are elicited by a single picture, as well as a sequence of pictures. The structures of the Spanish and English version of the *TNL* are similar. However they contain different stories, and thus are not direct translations.

UNIT. The *Universal Nonverbal Intelligence Test* (Bracken & McCallum, 1998) assesses the nonverbal intelligence of children from 5;0 to 17;0 years of age. The test manual reports high reliability coefficients for the Abbreviated Battery at .96.

Parent Teacher Language-Use Questionnaire. To determine children's input and output in each language, parents and teachers completed phone interviews that reported use and exposure of each language on an hour-by-hour basis on both weekdays and weekends using the *BIOS* questionnaire (*BIOS,* Peña et al., 2014). Parents and teachers were also asked to rate children's abilities in the following domains; comprehension proficiency, frequency of language use with peers and adults, vocabulary, speech, sentence production, and grammar using the *ITALK* (*ITALK*, Peña, et al., 2014).

EOWPVT. *The Expressive One-Word Picture Vocabulary Test- 3* (Brownell, 2000) and the *Expressive One-Word Picture Vocabulary Test- Spanish Bilingual Edition* (Brownell, 2001) are norm-referenced tests of single-word picture naming. The test consists of 190 items presented in developmental sequence, and items are organized from low to high English difficulty level. The items of the *EOWPVT*s are included in both test editions allowing for cross-linguistic comparisons of items across languages. The *EOWPVT- SBE* consists of translation equivalents and contains cross-linguistic cognates that are dispersed amongst the items.

CLASSIFICATION

Determination for the LI, LT, and TD groups was made on the basis of the following five indicators: participants' 1) *BESOS* morphosyntax and semantics screener scores, 2)

TNL scores in English and Spanish, the 3) Morphosyntax and 4) Semantics subtests of the *BESA* or *BESAME*, and 5) parent or teacher ratings of participants' language proficiency. For each language-paired measure (e.g., the Spanish and English version of the BESA) a concern was flagged (and scored as a 1) if the child performed more than 1SD below the mean in both languages. The BESOS screener given the year before confirmatory testing was scored as 1 if morphosyntax and semantics were below -1SD below the mean, .5 if morphosyntax or semantics in both languages was -1SD below the mean, and 0 if morphosyntax and semantics was above -1SD below the mean in either language.

The concern indicators were summed for a range of 0 to 5. Children were classified as LI if the concern indicator total score was between 4 to 5; children were classified as LT if their concern score total was between 2 and 3.5; and children were considered TD if their concern score total was between 0 and 1.5. Grouping of a LT group allows us to examine results of children who may have been at risk for LI, but presented with a lower level of severity in overall performance (Kelley & Kohnert, 2012).

PROCEDURE

The *EOWPVT- 3* and *EOWPVT- SBE* were given independently in Spanish and in English. Standard administration procedures were followed for the English *EOWPVT- 3*. However, in order to directly compare item-level results cross-linguistically from the English *EOWPVT-3*, administration procedures for the bilingual *EOWPVT-SBE* were modified. Specifically, administration for the *EOWPVT- SBE* was conducted in Spanish only, and children were asked to respond in only Spanish.

Children were required to name an object, action, or concept when provided with a picture and asked "What is this?" or ¿Qué es esto?" If children responded in the incorrect language during testing the response was recorded, and a response was elicited in the correct language. Both responses were recorded verbatim. Basal and ceiling rules described by the manual were followed, and test administration in each language was discontinued if the child was unable to reach a basal. Subsequent to reaching the recommended ceiling, 14 additional items were administered to allow for adequate item-level comparisons. Trained bilingual examiners (undergraduate and graduate students in the department of Communication Sciences and Disorders) administered the testing one-on-one and scored the items as correct or incorrect on-line.

Scoring. Items were included for analysis if 25% of the participant sample responded to that item. There were 69 items with sufficient data for analysis. Cognates on the *EOWPVT*s were identified as words that were phonologically and semantically related. We focused on phonological overlap as opposed to orthographic overlap as children were tested through verbal production. Identified cognates shared a minimum of three phonemes (Pérez et al., 2010). Of the 69 items, 22 (32%) were identified as cognates. The other 47 (68%) were identified as noncognates. Frequencies of cognates and noncognate pairs across languages were comparable, suggesting comparable difficulty levels. Table 2 displays the average frequency of the cognate and noncognate items in English and in Spanish obtained from the Corpus del Español and the Corpus of Contemporary American English (Davies 2002; 2008).

Language	Cognates	Noncognates
English Frequency	33.30	31.58
Spanish Frequency	23.93	15.89

Table 2. EOWPVT Item Frequencies Per Million Words

Item-level data for each test was entered into a Microsoft Excel spread sheet (2010) by trained graduate students. Raw scores were calculated by adding the number of items the child answered correctly for each version of the *EOWPVT*. Cognate and noncognate scores were calculated by taking the total of correct cognate and noncognate responses over the total items responded to by each child which yielded the proportion of correct responses for cognates and noncognates in each language. Formulas were utilized in excel to calculate all reported scores to minimize human error and maximize reliability in scoring.

Reliability. Inter-rater reliability was conducted by a trained research associate on 15% of the item-level data. The selected data from the *EOWPVT-3* and *EOWPVT-SBE* were double-scored through the use of audio-recorded responses. Item-level reliability for each version was high: 95.4% for the *EOWPVT*, and 93.8% for the *EOWPVT-SBE*.

Analyses. For our first analysis we conducted repeated measures ANOVA to examine whether performance on the *EOWPVT* in each of the subjects' languages interacted with their grade level, and impairment status. In order to compare performance of the three ability groups on cognate and noncognate items, repeated measures ANOVA were calculated for our second analysis. All analyses were conducted using SPSS software version 21 (SPSS Inc., Chicago, Illinois, U.S.A.). Our second analysis was co-varied by English due to variability in English input across grades (see Table 1).

RESULTS

EXPRESSIVE VOCABULARY IN SPANISH AND ENGLISH

In the first analysis we conducted repeated measures ANOVA to compare children's *EOWPVT* performance in each language by ability group, and grade. Our within-subjects factor was Language (English, Spanish), and our between-subjects factors were Ability (TD, LT, and LI) and Grade (K, 2).

Table 3 displays the means and standard deviations for language, grade, and ability. Results indicate a main effect for Language $F(1,110)= 21.11$, $p<.001$, $\eta_P^2=.160$; Grade $F(1,110)=66.96$, $p<.001$, $\eta_P^2=.376$; and Ability $F(2,110)=19.84$, $p<.001$, $\eta_P^2=.263$. Overall, children scored higher in Spanish (M = 41.50) than in English (M = 31.54). Second graders scored higher (M = 38.5) compared to children in kindergarten (M = 28.8). Children with typical development scored the highest overall (M = 38.5) followed by the LT children (M = 33.6), and the LI children scored lowest (M = 28.7). There was a significant interaction for Grade by Language $F(1,110)=9.73$, $p=.002$, $\eta_P^2=.081$. Overall, the kindergartners scored higher on average in Spanish than in English, while the second graders performed relatively equally across their two languages. There was no significant interaction of Language by Ability $F(2,110)=2.85$, p=.062, $\eta_P^2=049$.

	Kinder			Second Grade		
Variables	LI	LT	TD	LI	LT	TD
Eng EOW	11.62 (8.10)	27.50 (20.10)	23.10 (14.32)	35.92 (17.92)	42.71 (19.89)	48.44 (18.75)
Spn EOW	34.31 (9.76)	32.81 (9.09)	45.21 (7.71)	37.33 (10.04)	43.72 (14.56)	55.62 (10.97)

Table 3. EOWPVT Raw Scores by Language, Grade, and Ability

A GENERAL COGNATE ADVANTAGE

Next, we tested if there was a significant difference in the advantage of correct cognate responses indiscriminate of ability group. To do this we examined the distribution of correct and incorrect responses which were attempted in both languages. For this analysis Language of Response (English, Spanish, or both languages), and Cognate Status (cognate, noncognate) were the within subjects variables. Specifically, we examined if the children answered cognate vs. noncognate items correct across both languages, correct in only Spanish, correct in only English, or incorrect in both languages.

There was a main effect for Language of Response $F(2,108)=74.77$, $p<.001$, $\eta_P^2=5.80$ which we used to examine accuracy of response, and a main effect for Cognate Status $F(1,109)=.12$, $p=.728$, $\eta_P^2=.001$ which was unrelated to accuracy. Tests of within subjects factors indicated a significant interaction for Cognate Status and Language of Response, $F(2,108) = 21.49$, $p<.001$, $\eta_P^2 = .285$. Figure 2 displays the composition of the proportions of correct and incorrect items responded to by children in both languages. All children correctly answered a higher proportion of cognates (*M*= 41.8%) over noncognates (*M*= 23.5%) across both languages. Although children responded to fewer noncognate pairs, higher proportions of noncognates were responded to in Spanish (*M*= 41.7%, English *M*= 20.1%). Children answered a relatively even proportion of noncognates correct across both languages (*M*= 23.5 %), or incorrect in both languages (*M*=23.5%).

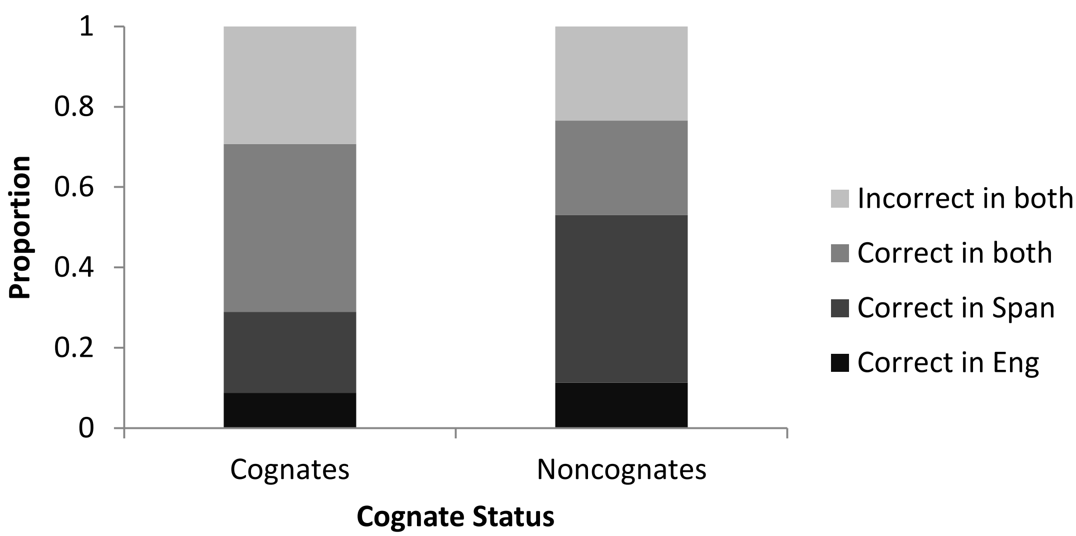

Figure 2. Composition of Correct vs. Incorrect Proportion Scores by Cognate Status

THE COGNATE ADVANTAGE AND LI

Finally, we addressed the question of whether bilingual children with LI demonstrate a cognate advantage over noncognates by comparing the average proportion of correct cognates to noncognates by ability. There was a significant interaction for Ability by Cognate Status, $F(2,109)= 3.88$, $p=.024$, $\eta_P^2=.066$. TD children answered a higher average proportion of cognate pairs (*M*= 25.6%) than noncognate pairs (*M*= 24.8%) correctly. In contrast, both the LT and LI groups showed the opposite trend of correctly responding to a higher average proportion of noncognate pairs (LT *M*=24.8%, LI *M*=26.9%) over cognates (LT *M*=22.2%, LI *M*= 22.9%). This suggests that children with LI show a cognate disadvantage as they more often responded correctly to noncognate over cognate pairs. The LT children performed similarly to the children with LI in terms of producing fewer cognates over noncognates, yet LT children performed similarly to the TD children in terms of their average proportion of noncognate production. Figure 3 displays the significant interaction.

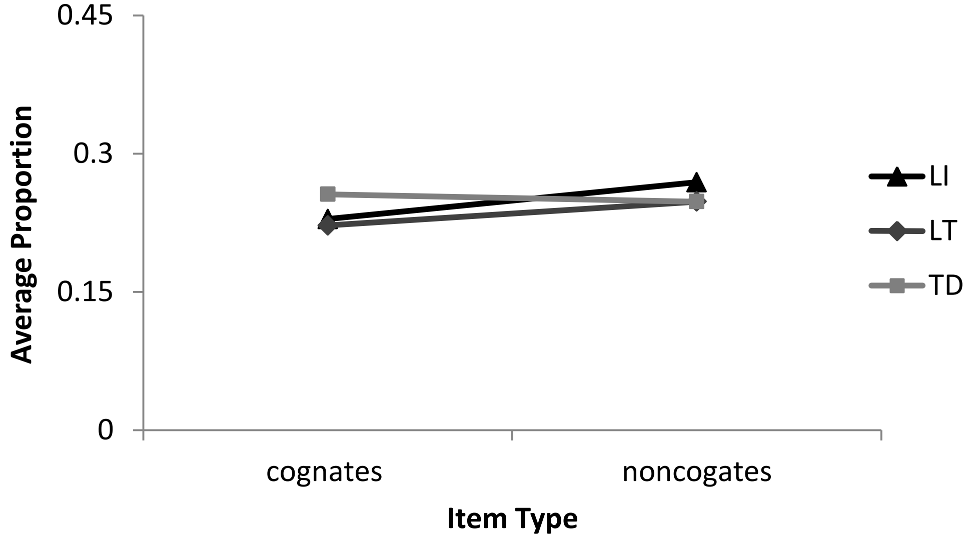

Figure 3. Cognate Status by Ability

To further address our research question we examined the average proportion of correct cognate responses by Language of Response and Ability. Results indicated a significant interaction for Ability and Language of Response, $F(4,218)= 3.66$, $p=.007$, $\eta_P^2=.063$, and Language of Response by Grade $F(2,108)=5.87$, $p=.004$, $\eta_P^2=.098$. Overall the three ability groups performed similarly in English (TD *M*= 8.3%, LT *M*= 11.4%, LI *M*= 10.5%), and relatively similar in Spanish for correct production on cognate items (TD *M*= 29.4%, LT *M*= 26.0%, LI *M*= 37.4%). However, the ability groups performed differently in terms of producing cognate pairs across their two languages (TD *M*=38.0%, LT *M*= 33.2%, and LI *M*=26.7%). Of the cognates answered correctly, a higher proportion was answered across languages for TD children (*M*= 48.0%), followed by Spanish (*M*= 29.4%), and lastly English (*M*=8.3%). The LT group performed similarly in

Spanish (*M*= 26.0) and across both of their languages (*M*= 33.2%). Interestingly, children with LI answered more cognates (*M*= 37.4%) in Spanish, followed by both languages (*M*= 26.7%), and lowest in English (*M*= 10.5%). Figure 4 displays the Ability by Language of Response interaction.

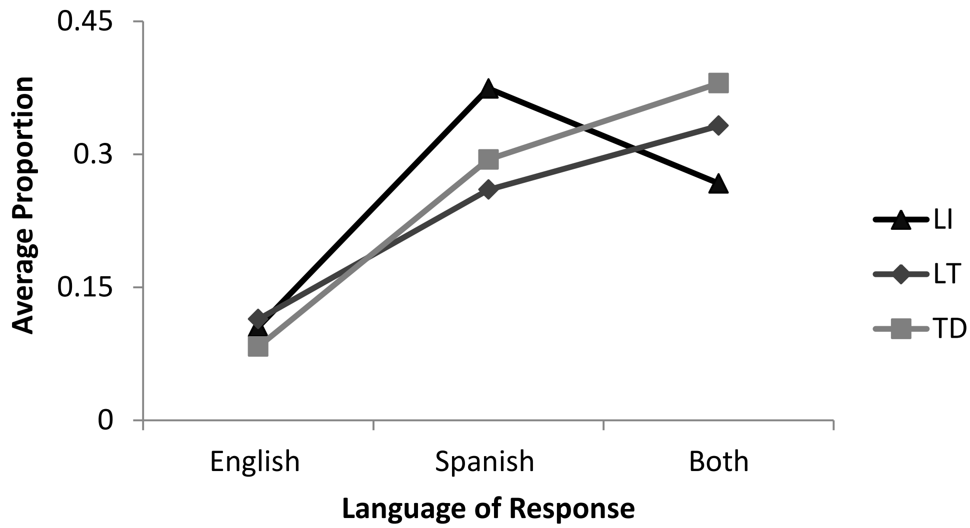

Figure 4. Cognate Language of Response by Ability

DISCUSSION

The current study adds to a small body of research examining cognate advantages in TD bilingual children's expressive vocabulary (Kelley & Kohnert, 2012; Malabonga et al., 2008; Schelletter, 2002) and reports the first examination of cognate production in bilingual children with LI. Variability in bilingual children's performance between and within ability groups is expected and has been documented in the literature (Kohnert, Kan, & Conboy, 2010; Pham & Kohnert, 2010; Peña, Bedore, & Rappazzo, 2003; Peña, Bedore, & Zlatic- Guinta, 2002). This variation is characteristic of the bilingual population and warrants generalization of our findings. Overall, we found that all children had higher cumulative experience in Spanish over English, and all groups show an advantage in Spanish over English in cognate, noncognate performance, and on their *EOWPVT* raw scores. Thus it was not surprising that children on average scored higher in Spanish over English, although the second graders showed relatively equal scores across languages. This suggests that the second graders were able to bootstrap from Spanish to English; however this finding needs to be replicated longitudinally. Nevertheless, the difference in kindergarten and second grade performance is supported by research suggesting that there is a developmental shift resulting in stronger L2 skills as children grow older (Kohnert, 2002).

We investigated the potential presence of a cognate advantage or disadvantage for bilingual kindergarten and second grade children with LI compared to TD bilingual children. We reasoned that cognate pairs which have overlapping meaning and form may be advantaged over noncognate pairs. If the effects of bilingualism are greater than the effects of impairment, all children regardless of ability should present with the cognate advantage. In contrast, we considered that learning cognates could be more difficult for bilingual children with weaker language systems (LI and LT) compared to those with typical language systems (TD) as the overlap between cognates leads to increased competition between similar cross-linguistic forms. If the effects of impairment are greater than the effects of bilingualism, then children with impairment would show an overall linguistic disadvantage that is more robust in the production of cognates.

As a group (including TD, LT, and LI) the participants in this study showed a cognate advantage obtaining a higher proportion of correct responses for cognates over noncognates. But, this advantage was moderated by language ability. Specifically, between group observations revealed that children with LI and LT were more likely to name pictures representing noncognates than cognates. Thus, findings from the present study were consistent with our second hypothesis.

Only the TD group of children produced cognates across both of their languages displaying the ability to harness the semantic and phonological similarities between the words. This is indicative of TD bilingual children's stronger metalinguistic and cognate awareness abilities. This finding provides additional evidence to the current body of literature suggesting a cognate advantage in expressive vocabulary for TD bilingual children consistent with previous findings (Kelley & Kohnert, 2012; Malabonga et al., 2008; Schelletter, 2002). On the other hand, the LI and LT groups of children did not appear to use their knowledge of Spanish to learn words with similar form-meaning mappings in English. Specifically, children with LI appeared to learn words primarily in

Spanish, but not English. Moreover, children with LI on average answered a smaller proportion of cognates vs. noncognates.

Overall, children with LI showed a cognate disadvantage, as they performed with a higher accuracy on noncognate over cognate pairs and displayed the inability to name cognates cross-linguistically. This is an interesting finding because much of the literature on bilingual children with LI suggests that bilingualism is not especially impacted by LI (Bedore, & Peña, 2008; Kohnert, 2010; Sheng, Bedore, & Fiestas, 2012). Thus, cognates may tax a specific skill that is decelerated due to increased competition that is vulnerable in bilinguals with weaker language systems.

The current findings are consistent with the *Cascaded Activation Model* (Garrett, 1975; 1976) which suggests a cascading activation of the retrieval of conceptual and phonological/syntactic information which facilitates word production (Costa, Caramazza, & Sebastian-Galles, 2000; Dressler, Carlo, Snow, August, & White, 2011; Lemhöfer, Dijkstra, & Michel, 2004; Van Hell & de Groot, 1998; Dijkstra, Grainger & Van Heuven, 1999). In cognates, the overlapping phonemes are activated from two sources facilitating faster retrieval. The *Cascaded Activation Model* supports that cross-linguistic bootstrapping between languages exists for TD bilingual children as evidenced by higher accuracy on cognate pairs. The inaccuracy of cognate production in LI and LT bilingual children suggests that influence between languages is not facilitative of production, and activation for this population may not cascade in the same manner as it does in TD populations.

One possible explanation for our findings stem from an extension of the *Revised Hierarchical Model* of bilingual memory and language learning which suggests that the children in the LI and LT groups spend more time in the early stages of L2 acquisition and rely on the lexical connections between L1-L2, whereas TD children display a higher level of mastery across their languages and learning cognates is facilitated by conceptual connections (L2-CS). This is supported by the finding that the LI and LT group performed similarly in terms of the composition of the average proportion of cognate vs. noncognates. Children with LI performed worst on cognate pairs across languages, with TD children showing a cognate advantage, and LT children performing between the LI and TD groups of children. Thus it is likely that the lexical connections may not be strong enough for LI children to attain awareness of cognates, and that cognate learning may be attributable to the mediation of cross-language semantic bootstrapping.

Another possible explanation considers the increased level of competition cognates provide in addition to deficits that children with LI exhibit in phonological memory. Phonological memory is vital in the learning and storage of new vocabulary (Baddeley, Gathercole & Papagno 1989, Gathercole & Baddeley, 1989; 1990; Gillam, 2002). In children with LI phonological memory is especially limited and has a relationship with the corresponding difficulty level of word learning (Stark & Tallal, 1981; Gathercole & Baddeley, 1989; 1990). In fact, children with LI perform developmentally lower on tasks that target phonological memory than on general language assessments (Gathercole & Baddeley, 1990). Additionally, Haynes (1982) found that children with LI more often chose phonological forms that were maximally different from target nonwords, suggesting they are less successful in storing partial phonological representations of nonwords than their vocabulary matched peers. Deficits in phonological memory may be due to rapid decay or general capacity limitations and may be more pronounced during tasks requiring many mental operations (Gillam, Cowan & Marler, 1998). Our findings were consistent with the research providing evidence that children with LI have impaired phonological working memory as they displayed a disadvantage in cognate production. Other researchers have found that children with LI are unable to differentiate newly learned words from similar sounding foils, (Evans, Saffran, & Robe-Torres, 2009). As a prerequisite for acquiring and producing cognate pairs, bilingual children with LI and LT children must be able to differentiate similar sounding words. It is likely that the similarities between cognates increase the competition between the lexical units, leading one of the units to be rejected.

As suggested by an extension of the competition hypothesis, bilingual children with LI have difficulty modulating salient cues, and integrating cues (MacWhinney, 1987; 2005). This explanation is consistent with our finding that bilingual children with LI produced a higher proportion of cognate items in Spanish, but did not produce the cognates cross-linguistically. Research also indicates that bilingual children with LI are less efficient in converging semantic knowledge in English, relative to their bilingual TD peers. Thus the cognate disadvantage displayed by the children with LI may partially be driven by children's difficulty in converging semantic knowledge across languages (Sheng, Bedore, Peña, & Taliancich-Klinger, 2012; Brackenbury & Pye, 2005).

The role of competition in word learning can be further explained by examination of neighborhood effects. In recent work Storkel & Lee (2011) examined 4-year-olds word learning through a picture naming task using nonwords, and a referent identification task to study the independent effects of neighborhood density and phonotactic probability. In the first experiment the researchers controlled for neighborhood density and allowed for the effects of phonotactic probability to be studied. The researchers found that children's responses to rare over common sound sequences was much more accurate, and was robust over time. This finding may be attributed to the rare sequences having fewer representations triggered as a result of phonotactic probability. Results from the second experiment showed that sparse neighborhoods showed an early advantage (consistent with triggering in the first analysis), but over time the dense neighborhoods showed improvement by the retention test without further training. This pattern may be attributed to the dense nonwords integration with many similar existing representations. Integration is thought to provide greater stability of the new representation, which led to the significant improvement in accuracy for dense nonwords at follow up testing. The researchers posit that this was due to differences in the underlying cognitive processes. Applied to cognates and noncognates it is possible that rare sound sequences (as instantiated in nonconates) are more salient than common sound sequences (cognates), and that words with dense neighborhoods (cognates) may become more stable due to integration with similar representations, although the initial gain is in sparse neighborhoods (noncognates) because there is no need for integration.

This low phonotactic probability advantage has also been found in a study of adult word learning (Storkel, Armbruster, & Hogan, 2006) and infant word learning (Storkel, 2009). Given these findings, it is likely that children with LI are less sensitive to both phonotactic probability and neighborhood densities, which may have effected children's production of cognates in this study. In terms of neighborhood density, it is plausible that children with LI would be more accurate in learning sparse sound sequences (noncognates) over dense sound sequences (cognates). Additionally, children with LI may present with protracted integration of information for dense sound sequences, causing the rare sound sequences to maintain higher retention. Meaning, saliency for children with LI is altered by perceptual processing deficits which cause children with LI to focus on the small concrete differences, rather than the abstract similarities, as evidenced in the current study.

One limitation of the present study was the sample's linguistic variability. Bilinguals by nature consist of a highly heterogeneous linguistic group. Specifically, the Spanish- English population presents with variability in cultural and linguistic levels of input and output (Goldstein, 2000). The present study consistently measured children's average input and output in each language per week. Overall, kindergarten children presented with a higher input/output score in Spanish, compared to second graders. Nevertheless, children did receive linguistic input in both languages and spoke both English and Spanish. Another limitation of the present study was that we did not report socioeconomic status. However it is important to note that this study's sample of young

Spanish-English bilingual children was recruited from schools in the same neighborhoods.

CONCLUSION

The present study's findings are consistent with previous studies, suggesting that a cognate advantage exists for TD bilingual children (Kelley & Kohnert, 2012; Pérez et al., 2010; Malabonga et al., 2008; Schelletter, 2002). One previous study that examined the facilitation of recognition based on phonological similarity found that monolingual English children with LI were less able to recognize meaningful phonological information in cognates, as a function of the disorder severity. Overall, children with LI did not take advantage of phonological similarity as evidenced by lower latency and accuracy in comparison to their TD peers (Kohnert, Windsor, & Miller, 2004), consistent with our findings with bilinguals.

The present study is an extension of the current literature as it is the first to examine cognate production accuracy in bilingual children with LI. Our study extends the findings of Kohnert et al. (2004) by testing bilingual as opposed to monolingual children with LI, and by specifically testing the cognate advantage as opposed to phonological similarity. Consistent with the finding that disorder severity negatively impacts cognate performance (Kohnert et al., 2004), we found that children's ability to produce cognates displayed graded declines in performance as a function of language impairment status (TD to LT to LI). It is evident from these findings that bilingual children with LI present with a cognate disadvantage possibly as a result of their deficits in metalinguistic abilities, semantic convergence, perceptual processing, phonological memory, and possible reliance on lexical over conceptual connections.

The cognate disadvantage observed in children with LI and LT children has important clinical implications. Clinical implications of these findings may drive goals in intervention for bilingual children with LI or bilingual children at risk. Goals may include training cognate awareness, and using cognate pairs as target items to improve language skills across languages. These strategies have been efficient and successful for TD, ELL students (Bravo, Hiebert, & Pearson, 2005; Carlo, August, McLaughlin, Snow, Dressler & Lippman, 2004; Nagy et al., 1992; Proctor & Mo, 2009; Dressler, Carlo, Snow, August & White, 2011). Future studies need to be conducted in order to examining the effect of cognate training in young bilingual children with LI to assess treatment effectiveness. Furthermore, cognate status should be taken into consideration when designing assessment tools for bilingual children. Cognate status could impact the item level difficulty of assessments and inappropriately alter basal and ceiling rules. On one hand, cognates would advantage TD bilingual children thus it would be appropriate to administer items beyond the recommended ceiling to truly assess the abilities of TD bilingual children (Pérez et al., 2010). On the contrary, cognates would disadvantage bilingual children with LI, and those who are LT which could lead to an underestimation of their overall linguistic abilities. Studies should be conducted to determine if cognate unawareness is a hallmark of bilingual children with LI at various ages, or if the process of attaining cognate awareness is purely due to maturational delay.

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