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Research Article

Cross-Linguistic Cognate Production in Spanish–English Bilingual Children With and Without Specific Language Impairment

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Purpose: Bilinguals tend to produce cognates (e.g., *telephone* in English and *teléfono* in Spanish) more accurately than they produce noncognates (*table/mesa*). We tested whether the same holds for bilingual children with specific language impairment (SLI).
Method: Participants included Spanish–English bilingual children (aged 5;0 to 9;11 [years;months]), 25 with SLI and 92 without, who had comparable language experience. Cognate and noncognate items were taken from English and Spanish versions of the Expressive One-Word Picture Vocabulary Test (Brownell, 2000, 2001).
Results: Although bilingual children with language impairment named fewer items correctly overall, they accurately named cognates more often than noncognates, as did typically developing children. Independent of language ability, accurate naming of a cognate in one language strongly predicted accurate naming in the other language.
Conclusion: Language impairment appears unrelated to the mechanism that produces a cognate advantage in naming accuracy. Given that correct performance for a difficult word in one language is associated with knowing its cognate in another, cognates may be particularly viable targets for language intervention in bilingual children with SLI.

Cognates are translation equivalents that overlap in semantic meaning and phonological form (e.g., *telephone* in English and *teléfono* in Spanish). Bilinguals generally perform better on tasks involving cognates compared to noncognate translation equivalents (e.g., *table* in English and *mesa* in Spanish) in what is called a "cognate facilitation effect" or a "cognate advantage" (e.g., Caramazza & Brones, 1979; Costa, Carmazza, & Sebastian-Galles, 2000). In bilingual adults, this cognate advantage has been exhibited by shorter naming and translation latencies (e.g., Sánchez-Casas, Davis, & García-Albea, 1992; Van Hell & de Groot, 1998; see Tokowicz, 2014, for a review). In bilingual children, the focus has been on whether accuracy is higher for cognates than noncognates on expressive and receptive vocabulary tests.

Early studies of typically developing Spanish–English bilingual children found no cognate advantage (e.g., Umbel & Oller, 1994; Umbel, Pearson, Fernández, & Oller, 1992). For example, Umbel et al. (1992) evaluated first graders' performance on the Peabody Picture Vocabulary Test–Revised (in English and Spanish; Dunn & Dunn, 1981) and found that children from monolingual Spanish and bilingual Spanish–English homes identified pictures representing cognates and noncognates in both languages with equal accuracy. In contrast, studies that have divided children by language dominance have found cognate advantages evidenced by higher accuracy for cognates in the weaker language relative to other word types. This pattern is documented for receptive picture identification tasks (e.g., Pérez, Peña, & Bedore, 2010), expressive confrontation naming tasks (e.g., Malabonga, Kenyon, Carlo, August, & Louguit, 2008; Schelletter, 2002; Sheng, Lam, Cruz, & Fulton, 2016), and through children's ability to implement a targeted strategy in interpreting the meaning of cognate items during reading (e.g., Dressler, Carlo, Snow, August, & White, 2011;

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see Otwinowska, 2015, for a discussion on cognates and vocabulary).

Studies examining a cognate advantage in children have focused on bilingual children with typical development (TD). In this study, we test whether bilingual children with specific language impairment (SLI) demonstrate similar advantages for cognates over noncognates, using responses from a vocabulary test that was part of an ongoing longitudinal study.

Specific Language Impairment

An area of difficulty in school-age children with SLI is word learning (Cirrin & Gillam, 2008, Kan & Windsor, 2010; Leonard, 2014; Nash & Donaldson, 2005). Studies comparing children with SLI and TD have found that children with SLI require more exposures to new words to comprehend or produce them (Weismer & Hesketh, 1998). Moreover, results from experimental studies examining lexical learning suggest that children with SLI learn fewer words relative to their typically developing peers (Alt, 2011; Alt, Plante, & Creusere, 2004; Gray, 2004, 2006; Oetting, Rice, & Swank, 1995; Rice, Cleave, & Oetting, 2000; Rice, Oetting, Marquis, Bode, & Pae, 1994). Children with SLI also exhibit difficulties with word retrieval (Gray, 2004; Gray & Brinkley, 2011; Kambanaros, Michaelides, & Grohmann, 2015; McGregor, Newman, Reilly, & Capone, 2002), demonstrate naming errors (Dollaghan, 1998; Sheng & McGregor, 2010; Spaulding, 2010), and exhibit reduced depth in their definitions of words (McGregor, Oleson, Bahnsen, & Duff, 2013). The nature of word learning deficits in children with SLI is likely multifactorial in nature, with contributions from weak semantic knowledge, phonological short-term memory, and syntax (such that children with SLI are less able to use syntactic structure to aid in word learning; see Nation, 2014, for a review; Conti-Ramsden, 2003; Mainela-Arnold, Evans, & Coady, 2010).

In bilingual language development, word learning may be influenced by the fact that the linguistic input in any one language is reduced for bilinguals relative to their monolingual peers as a result of divided input (Hoff et al., 2012; Patterson & Pearson, 2004; Pearson, Fernández, Lewedeg, & Oller, 1997). This reduction in input frequency for words may sensitize bilingual children with SLI to the phonological similarity between translation equivalents in their two languages for cognates, as has been observed in typically developing bilingual children (Dressler et al., 2011; Pérez et al., 2010; Schelletter, 2002). If bilingual children with SLI also show an advantage for cognates relative to noncognates, the redundancy that is provided from phonology may offset difficulties with vocabulary learning for this word type that is unique to bilinguals. This is especially true given that children with SLI typically require more exposure to learn vocabulary (Gray, 2003; Weismer & Hesketh, 1998); thus, bilinguals with SLI should benefit from the two-for-one exposure that cognates may provide.

Accounting for Cognate Facilitation

The cognate facilitation effect in adults is often explained by cascaded activation models of word production (e.g., Costa et al., 2000). Here, in the first stage of word production (e.g., Caramazza, 1997; Dell, 1986; Harley, 1993; Humphreys, Riddoch, & Quinlan, 1988), the concept to be expressed activates lexical representations that compete for selection, which in turn activate phonological representations. Models of bilingual language processing complement this notion by positing a shared conceptual store for both languages with a distinct lexicon for each language (Costa & Caramazza, 1999; Costa, Miozzo, & Caramazza, 1999; Roelofs, 1998). For cognates, a shared concept activates lexical representations in both the language that the speaker intends to speak and in the unintended language. Activation cascades from these lexical representations to their shared phonological segments. Only lexical representations within the same language are assumed to compete during production, so there is no cost to activating words in more than one language. The advantage arises from segments associated with cognates receiving a boost of activation that segments of noncognates do not, allowing them to be more quickly retrieved. In models that permit bidirectional spread of activation (e.g., Dell, 1986; Harley, 1993), the lexical representations of cognates also receive a boost in activation from their shared segments, which allows speakers to select them more quickly and accurately (Costa et al., 2000). Evidence for this account has also been observed in children. For example, across varying levels of German and English language proficiency, bilingual 8- to 9-year-olds showed higher accuracy and shorter latencies in naming of cognate than noncognate items in both languages (Schelletter, 2002). This result is consistent with attributing cognate advantages to cascaded activation in children as well as adults.

Cascaded activation models assume existing lexical representations rather than attempting to account for the acquisition of new vocabulary. However, many studies indicate that young English language learning children (when given instruction or training) utilize the overlapping representation of cognates to bootstrap to their second language (Bravo, Hiebert, & Pearson, 2007; Carlo et al., 2004; Dressler et al., 2011; Nagy, Garcia, Durgunoglu, & Hancin-Bhatt, 1993; Pérez et al., 2010; Proctor & Mo, 2009). In fact, in receptive language tasks, the cognate advantage may appear larger for typically developing children with little exposure to the language of testing. For example, Pérez and colleagues (2010) found that Spanish-speaking children (kindergarten-age and first grade–age) who did not have much exposure to English recognized more cognates than noncognates in English. However, children who were exposed to more English recognized more noncognates than children who were exposed to less English, diminishing the relative advantage for cognates. Consistent with Pérez et al. (2010), Malabonga et al. (2008) found that, for children in fourth and fifth grades who had Spanish as a first language, scores for cognates in English correlated highly with their performance on Spanish vocabulary measures, whereas scores on noncognate items were highly correlated with the students' performance on the English vocabulary measures. These findings suggest that typically developing children as young as 5 years of age can use knowledge of their first language to comprehend cognates presented in their second language.

More recently, researchers (Kelley & Kohnert, 2012) investigated whether 8- to 13-year-old Spanish-speaking English language learners would demonstrate a cognate advantage in both 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, children who did not display a cognate advantage were likely to present with the absence both expressively and receptively. This pattern suggests that cognate awareness may be a prerequisite for demonstrating a cognate advantage in learners, counter to the automaticity accounts based on cascaded activation.

Therefore, in addition to spreading activation, in the early stages of second language learning, cognate awareness may play an important role. One study found that monolingual English-speaking children with SLI were significantly slower and less accurate in recognizing Spanish words (with varying levels of phonological overlap to English words) relative to their typically developing monolingual English-speaking peers in a picture identification task (Kohnert, Windsor, & Miller, 2004). Bilingual children with SLI may also be less likely to use cognates to bootstrap their second language vocabulary. To the extent that a cognate advantage in early bilinguals relies on bootstrapping that is lacking in children with SLI, one would expect a smaller cognate advantage in bilinguals with SLI relative to their typically developing peers.

During receptive language tasks, the magnitude of cognate effects varies with relative language exposure. For example, in the Kohnert et al. (2004) study discussed above, they also found that typically developing children who were exposed to more Spanish were more likely to recognize English cognates of Spanish words than children who had more exposure to English. In contrast, children exposed to more English recognized more of the noncognates than children exposed to more Spanish. Older bilingual children (third, fourth, and fifth grade–age) have also demonstrated a strong receptive cognate advantage when tested on age-appropriate items (Malabonga et al., 2008). Consistent with Pérez et al. (2010), children's cognate scores correlated highly with their performance on Spanish vocabulary measures, whereas scores on noncognate items were highly correlated with the students' performance on the English vocabulary measures. These results provide additional evidence that first language knowledge can be used to comprehend cognates in a second language. Moreover, given that the literature suggests a cognate advantage in typically developing children, it is reasonable to expect that bilingual children with SLI would also show an advantage on cognate items relative to noncognates.

Cognates as Intervention Targets

Examining factors that promote word processing has implications for selecting treatment targets when working with bilingual children with SLI. In terms of speech-language intervention, exposure to a cognate in one language may increase vocabulary across both languages, which would grant cognates a baseline advantage in treatment. To date, one study has reported the effects of a naming treatment containing only cognates that was administered to a multilingual 8-year-old girl with SLI (Kambanaros, Michaelides, & Grohmann, 2017). At baseline, the child did not demonstrate an advantage for cognate items (Kambanaros et al., 2015). Treatment was provided in English, and post-treatment assessment revealed increased accuracy of the same cognate words in Greek and Bulgarian. The use of cognates allowed for cross-linguistic transfer of treatment gains in this individual's native (Bulgarian) and dominant (Greek) language, with maintenance of these effects at 1-month post-treatment. Because noncognate words were not treated in this study, it is difficult to ascertain whether a true cognate advantage was present. Although this study demonstrated that, with treatment, cognates can facilitate cross-language transfer, it is unknown if children with SLI demonstrate difficulties or advantages with cognates at the group level. Therefore, in the current study, we seek to address the gap in the literature regarding cognate production in bilingual children with and without SLI.

This Study

The purpose of our study was to determine if bilingual children with and without SLI who were in kindergarten or second grade displayed a cognate advantage in production. To address this question, we compared predicted probabilities of cognate and noncognate performance by ability and language of response (English, Spanish, both, or neither language) from children's responses on the Expressive One-Word Picture Vocabulary Test–Third Edition (EOWPVT-3; Brownell, 2000, 2001) in our first analysis.

In our second analysis, we examined whether a correct response in one language was influenced by a correct response in the other language (Spanish to English and English to Spanish) or by difficulty rank by both cognate status and ability status. Difficulty rank was defined by the item number associated with each target on the EOWPVTs (items on the EOWPVTs are ordered from the lowest to the highest difficulty level). On the EOWPVTs, item difficulty was determined by analyzing the number of individuals who responded correctly to the item during test development and subsequently items were rank-ordered. The purpose of this analysis was to determine whether performance in one language would bolster the ability to name a cognate item in the other language and to examine whether difficulty rank influenced this outcome. We examined whether naming an item in one language increased the likelihood of naming the item in the other language. We hypothesized that accuracy in one language would be associated with performance in the other language for cognate items relative to noncognate items. More specifically, we hypothesized that children with SLI would demonstrate difficulty with transferring knowledge in both directions for noncognates (English to Spanish and Spanish to English) due to the lack of form similarity for these word types. We considered that cognates might show a greater advantage from Spanish to English for children with SLI, given that children in this study spoke Spanish at home and English in an academic setting. For this same reason, we predicted that children with SLI would demonstrate reduced bootstrapping from English to Spanish.

Method

Participants

Participants were 117 Spanish–English bilingual children (5;4 to 8;9 [years;months]; see Bedore, Peña, Griffin & Hixon, 2016). Children were drawn from a larger longitudinal study during the confirmatory phase of testing. Each year for 3 years, approximately 500 children were invited to participate in the screening phase of the study when they were in preschool, first grade, or third grade. In the first 2 years, 302 preschool children and 521 first graders were screened. All children who fell into the risk range on the screening measure (below the 25th percentile on the Bilingual English Spanish Oral Screener [BESOS]) as well as two age, socioeconomic status, and language exposure-matched peers who fell into the typical range were invited into the confirmatory phase of the study. This process ensured that we had an adequate sample of children with language impairment in the longitudinal phase of the study. We obtained permission for a total of 151 kindergarten and second-grade children in Years 1 and 2 for the confirmatory phase of the study. Children were selected into the current study if they were bilingual Spanish–English speakers with at least 20% exposure to each language, had complete confirmatory testing data, and had completed the EOWPVT in both languages.

Children were recruited from local school districts in central Texas, as approved by the institutional review board at the University of Texas at Austin. Parents completed written consent forms prior to children's participation. Children who were in second grade were also provided a written assent form that was read to them by the examiner. Children were grouped into two ability levels, SLI or TD, as described below.

Parents and teachers completed phone interviews or were interviewed in person 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; Peña, Gutiérrez-Clellen, Iglesias, Goldstein, & Bedore, 2014). An average weekly weighted percentage score of Spanish and English use and exposure was calculated based on the interview data. Children were recruited to the study if they had a minimum of 20% use and exposure in both Spanish and English. Table 1 displays the mean age and use/exposure composites for Spanish and English for each language ability group by grade. The distribution of exposure for SLI and TD groups was roughly proportional by grade.

Inclusionary Criteria

Children were screened to identify individuals at risk for developing language impairment and to determine eligibility for participation in this study. Therefore, although our SLI sample may appear to exceed the prevalence (approximately 7% of the population) reported by Tomblin et al. (1997), we oversampled our groups of children with SLI in order to have adequate statistical power for our analyses. Specifically, children were asked to participate if they scored below the 25th percentile in their higher language in either the Morphosyntax or Semantics subtest of the BESOS (discussed in the Materials section; Peña, Bedore, Iglesias, Gutiérrez-Clellen, & Goldstein, 2008). To rule out poor performance driven by cognitive ability, only children who received a standard score of 70 or greater on the Universal Nonverbal Intelligence Test (UNIT; Bracken & McCallum, 1998) were invited to participate in the study. Subsequently, children who scored in the typical range (those who scored above the 25th percentile on the BESOS) and who were matched in age, sex, and language use were also invited to participate in the study. All participants had normal hearing and passed an initial hearing screening or a follow-up hearing test conducted by the schools' nurses. Children who met the aforementioned criteria and did not have a history of brain injury, severe social–emotional problems, or an autism spectrum disorder were invited to the study.

Materials

BESOS

The BESOS consists of a subset of items derived from the Morphosyntax and Semantics subtests of the Bilingual English Spanish Assessment (BESA; Peña et al., 2014) and is used to discriminate children (ages 4;0 and 6;11) who may have SLI from those who are typically developing (Lugo-Neris, Peña, Bedore, & Gillam, 2015). A different version of the BESOS is used with children ages 7;0 to 9;11 (Peña et al., 2008). The morphosyntax items (17 in English, 16 in Spanish) provide a measure of children's expressive grammar (grammatical markers such as possessives and third-person singular in English and direct object clitics and subjunctive forms in Spanish), whereas items targeting semantic development (11 in English, 12 in Spanish, such as semantic association tasks) provide a measure of expressive and receptive knowledge.

Table 1. Means (and standard deviations) by language, grade, and ability.

	Grade					
	Kindergarten			Second		
Variable	SLI	TD	*p*	SLI	TD	*p*
n	13	44		12	48	
Age in months	70 (3)	73 (4)	*ns*	98 (4)	97 (4)	*ns*
% Input English	34 (18)	37 (14)	*ns*	48 (21)	43 (16)	*ns*
Mean age English exposure (in months)	42 (19)	36 (24)	*ns*	29 (18)	42 (19)	*ns*

Note. SLI = group of children with specific language impairment; TD = typically developing children; *ns* = not significant as determined by a two-sided two-sample *t* tests with alpha set at .05.

Correlations between the BESOS and BESA Morphosyntax subtests suggest a strong relationship in each language (.826, Spanish; .893, English; Greene, Peña, & Bedore, 2013), as well as for the Semantic subtests (.855, Spanish; .887, English; Summers, Bohman, Peña, Bedore, & Gillam, 2010). This suggests that performance on the BESOS may help to predict performance on the BESA. Preliminary analysis demonstrates that a composite score of −1 *SD* on the BESOS has a sensitivity and specificity of > .85.

BESA or Bilingual English Spanish Assessment–Middle Extension

The BESA (Peña et al., 2014) and the Bilingual English Spanish Assessment–Middle Extension (BESA-ME; Peña, Bedore, Iglesias, Gutierrez-Clellen, & Goldstein, n.d.) were developed following the developmental patterns of each language of Spanish–English bilinguals, and the two language versions are not direct translations. The BESA was used for children within the 4 to 6;11 age range, whereas the BESA-ME was administered to children within the 7 to 9;11 age range. The BESA was normed on bilingual children and contains individual subtests for phonology, semantics, and morphosyntax in English and Spanish.

The Semantic subtest scores are based on conceptual scoring, which is more representative of bilingual children's knowledge (Bedore, Peña, García, & Cortez, 2005), and for balanced bilingual children, this subtest has 85% classification accuracy when both languages are considered together using a −1 *SD* cut-point (Peña, Bedore, & Kester, 2016). The Semantics subtest contains receptive and expressive items that range from testing children's knowledge of semantic categories to requiring children to provide semantic associations as well as definitions. The Morphosyntax subtests focus on structures that have been identified as hallmark deficits in bilingual children with SLI (Bedore & Leonard, 2001; Gutiérrez-Clellen, Restrepo, & Simón-Cereijido, 2006; Muñoz, Gillam, Peña, & Gulley-Faehnle, 2003) and has an overall classification rate of 89% (Peña et al., 2014). The Morphosyntax subtest includes grammatical markers such as articles, present progressive and subjunctive forms, and direct object clitics in Spanish, whereas markers such as possessives, third-person singular, regular past tense, present/past auxiliary forms, copula, negatives, and passives are targeted in English. The BESA manual suggests that empirically derived cut-points at about −1 *SD* are the optimum for maximizing classification accuracy (> 85%). Similarly, preliminary data on the BESA-ME show classification rates above 80% using an empirically derived cut-point of −1 *SD*.

Test of Narrative Language

The Test of Narrative Language (TNL; Gillam & Pearson, 2004) is an assessment that tests narrative comprehension and production abilities of children ages 5;0 to 11;11. Hispanic children represent 12% of the norming sample, and it has been validated for use with bilingual children (Gillam, Peña, Bedore, Bohman, & Mendez-Perez, 2013).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, and the remaining two are story formulation tasks, which are elicited by (a) a single picture and (b) a sequence of pictures. The structures of the Spanish and English versions of the TNL are similar; however, they contain different stories and thus are not direct translations.

Parent–Teacher Language Use Questionnaire

To determine children's input and output in each language, teachers and parents completed in-person or phone interviews that reported use and exposure of each language on an hour-by-hour basis on both weekdays and weekends using the Bilingual Input Output Survey (Peña et al., 2014). Parents and teachers were also asked to rate children's abilities in the following domains using the Inventory to Assess Language Knowledge (ITALK; Peña et al., 2014): comprehension proficiency, frequency of language use with peers and adults, vocabulary, speech, sentence production, and grammar. Parents and teachers were allowed to select the language of interview, and response options were provided on a 5-point Likert scale, with responses ranging from 1, which indicated minimal proficiency in this area, to 5, which indicated high proficiency in this area. The ratings in each language were averaged to derive a Spanish and English score based on these reports.

The test manual suggests a cut-point of 4.18 (average score) as an indicator of possible impairment.

UNIT

The UNIT (Bracken & McCallum, 1998) assesses the nonverbal intelligence of children from 5;0 to 17;0 years of age, and no spoken language is required by either the examiner or the examinee during administration. The UNIT provides a fair assessment for individuals with different cultural or language backgrounds (see Ortiz & Ochoa, 2005, for a discussion on cultural and linguistic loading) and has been normed with a sample that includes students who were receiving English as a Second Language Services or bilingual education. The test manual reports high reliability coefficients for the Abbreviated Battery at .96.

EOWPVT

The EOWPVT-3 (Brownell, 2000) and the Expressive One-Word Picture Vocabulary Test–Third Edition: Spanish-Bilingual Edition (EOWPVT-3 SBE; Brownell, 2001) are norm-referenced tests of single-word picture naming. The EOWPVT-3 consists of 170 items, organized from low to high English difficulty level. The EOWPVT-3 SBE contains a subset of the items existing on the EOWPVT-3. For both test versions, the developers selected items that were highly imageable, were not culturally biased, had good name agreement, and had comparable item difficulties (i.e., items were included if the deviation of the difficulty index of each paired item was < .10).

The majority of the items on the EOWPVTs are included in both test editions, allowing for cross-linguistic comparisons of items across languages. The EOWPVT-3 SBE (first edition of the bilingual version; Brownell, 2001) consists of translation equivalents and contains cross-linguistic cognates (65 in total) that are dispersed across difficulty levels. The more recent Expressive One-Word Picture Vocabulary Test–Fourth Edition: Spanish-Bilingual Edition (EOWPVT-4 SBE; second edition of the bilingual version; Martin, 2012) contains almost all the same items as the initial version, but the items have been reordered to reflect item difficulty based on a normative sample of Spanish–English bilinguals. For this reason, we utilized the item order from the second edition of the SBE version (EOWPVT-4 SBE) to determine difficulty rank for the Spanish responses reported in this study. Table 2 displays participants' raw EOWPVT scores by group.

Classification Procedure

Children completed the aforementioned battery of measures to determine language ability, nonverbal IQ, and language exposure and to obtain developmental information. In order to determine language ability status, children were administered the following measures in both English and Spanish: the BESOS screener, the Semantics and Morphosyntax subtests of the BESA (Peña et al., 2014) or BESA-ME (Peña et al., n.d.), the TNL (Gillam & Pearson, 2004; Experimental Spanish Version of TNL, Gillam, Peña, Bedore, & Pearson, n.d.), and the UNIT (Bracken & McCallum, 1998). In addition, parents and teachers were interviewed using the Bilingual Input Output Survey and the ITALK from the BESA (Peña et al., 2014). 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 EOWPVTs where children were tested 14 items beyond the ceiling to provide sufficient item-level data for comparison across languages. We chose to administer these versions of the EOWPVTs due to their inclusion of translation equivalents, which are presented in the same order, whereas the newest version of the EOWPVT SBE (Martin, 2012) has a different order of items as compared to the English order.

Empirically derived diagnostic standards have shown that cutoffs ranging from 1 *SD* to 1.25 *SD*s below the mean distinguish children with SLI from their typically developing peers, depending on the language measure (Aram, Morris, & Hall, 1993; Peña, Spaulding, & Plante, 2006; Records & Tomblin, 1994; Spaulding, Plante, & Farinella, 2006; Tomblin, Records, & Zhang, 1996). Similarly, the BESA and BESA-ME manual and preliminary data have reported empirically derived cut-points at −1 *SD* across the subtests. Therefore, children were classified as presenting with SLI if they scored below 1 *SD* from age norms in both languages on the (a) BESOS Morphosyntax and Semantics screener scores, (b) Morphosyntax and (c) Semantics subtests of the BESA or BESA-ME, (d) TNL, and (e) received below average (M = 4.25, total possible = 5) parent or teacher ratings of language performance on the ITALK. Accordingly, of the five total measures, children were determined to have SLI if they were below 1 *SD* in at least one of their languages on four of five aforementioned measures. Twenty-five children met these criteria for SLI. Children were determined to have typically developing language if they scored within 1 *SD* from the mean on two or more of the measures in at least one of their languages (e.g., within 1 *SD* on two of the five measures in one language). Ninety-two children met the criteria for TD.

Procedure

Stimuli

All stimuli were derived from the EOWPVTs. Cognates on the EOWPVTs were identified as words that shared phonology across languages and that were semantically related. We focused on phonological overlap as opposed to orthographic overlap as children were tested through spoken production. Identified cognates shared a minimum of three phonemes that occurred in any position of the word (e.g., dentist and *dentista*; Pérez et al., 2010). Afterwards, a bilingual Spanish–English-speaking speech-language pathology graduate student rated the items' cognate status. Subsequently, two bilingual Spanish–English-speaking

Table 2. EOWPVT raw score means (and standard deviation) by language, grade, and ability.

	Grade			
	Kindergarten		Second Grade	
Variables	SLI	TD	SLI	TD
English EOWPVT	11.62 (8.07)	24.68 (16.56)	35.92 (17.92)	46.77 (19.05)
Spanish EOWPVT	34.31 (9.76)	40.71 (10.13)	37.33 (10.04)	52.15 (13.16)

Note. EOWPVT = Expressive One-Word Picture Vocabulary Test; SLI = group of children with specific language impairment; TD = typically developing children.

researchers/speech-language pathologists identified each item as a cognate or a noncognate. The cognate status for the items was reached upon consensus. Of the 67 items (see the Scoring section for selection criteria for these 67 items), 22 were identified as cognates (see the Appendix for a list of the cognate items). The other 45 were identified as noncognates. Table 3 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). Paired *t* tests revealed that average frequencies of English and Spanish cognates, $t(42) = 0.47$, $p = .68$, and noncognates, $t(90) = 0.62$, $p = .73$, were not significantly different from each other.

Administration

The EOWPVT-3 and EOWPVT SBE were given independently in English and in Spanish, and the two administrations occurred on different days. The order of the language of administration was blocked and counterbalanced across participants. For some participants, the interlocutor was the same individual for both administrations (English and Spanish administrations), and for other participants, the interlocutors varied for each administration. 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-4 SBE was conducted in Spanish only, and children were asked to respond in only Spanish, although responses given in the other language were recorded.

Children were required to name an object, action, or concept (hereafter referred to simply as "objects") when provided with a picture and asked, "What is this?" or "¿Qué es ésto?" If children responded in the incorrect language during testing, the response was recorded in that language, and the examiner attempted to elicit a response in the target language by asking the child to name the item in the language of administration. Credit for a correct response was only given if the child produced the item in the target language. All 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 establish a basal. Subsequent to reaching the recommended ceiling, 14 additional items were administered (in each language) to allow for an adequate range of item-level comparison. Trained bilingual examiners (undergraduate and graduate students in the Department of Communication Sciences and Disorders) administered the testing one-on-one and scored the responses as correct or incorrect online.

Table 3. Mean (and standard deviation) frequencies per million words for EOWPVT items.

Language	Cognates	Noncognates
English frequency	33 (92)	32 (54)
Spanish frequency	24 (35)	16 (59)

Note. EOWPVT = Expressive One-Word Picture Vocabulary Test.

Scoring

Items (stimuli from the EOWPVTs) were included for analysis if 25% of the participant sample responded to that item across languages, yielding 67 items (22 cognates and 45 noncognates) with sufficient data for analysis. This method of inclusion was used because children were not given a uniform set of items; therefore, we focused on a subset of commonly administered items. Cognate and noncognate items were scored only if children had the opportunity to respond to the picture in both English and Spanish. Thus, all responses that were eligible for scoring were in response to the same objects (where the names were cognate or noncognate translation equivalents). Trained graduate students entered item-level data for each test. For the purposes of our statistical analyses, children's responses were coded as being correct in only English, correct in only Spanish, correct across both languages, or incorrect in both languages.

Reliability

A trained research associate conducted interrater reliability 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.

Results

Cognate Status by Language of Response and Ability

This analysis examined the distribution of correct responses to pictures by cognate status, ability, and language of response. More specifically, we were interested in learning if children differed in the likelihood that they could correctly name an object in one or both (correct in English only, Spanish only, both languages, or neither language) of their languages by cognate status and ability. We used the R statistical software environment to conduct all analyses (R Core Team, 2016).

The focal independent variables were ability status (language impaired and typically developing) and cognate status (cognate and noncognate). The dependent variable (language of response) was a (K = 4 levels) categorical variable (correct in neither language, correct in English only, correct in Spanish only, and correct in both languages). Given that multiple items were tested on each subject, we conducted a series of mixed-effects binary logistic regressions with a random intercept term for subject. Accordingly, we estimated a series of three (K-1) mixed-effect binary logistic regressions on each of English-only versus neither, Spanish-only versus neither, and both versus neither, where each analysis utilized a random intercept term for subject and a difficulty rank (item number on the EOWPVTs) covariate to control for test difficulty (Hosmer, Lemeshow, & Sturdivant, 2013) due to the fact that each child may have been tested on a slightly different set of items in each language. Note, however, that difficulty ranks between the two EOWPVT versions (EOWPVT-3 and EOWPVT-4 SBE) were highly correlated: rs = .88, $p < .01$. The −2 log likelihoods for these three regressions were aggregated, and the aggregated results were used in likelihood ratio tests of focal IVs. This general procedure of approximating a muiltinomial regression via a series of K-1 binary logistic regressions is described in Agresti (2002) as well as in Hosmer and Lemeshow (2000a, 2000b).

Likelihood ratio tests for the main effects of ability status and cognate status were constructed by comparing the −2 log likelihoods of a null model that included only the difficulty rank covariate and the subject random intercept term to otherwise identical models that included each individual main effect. These tests revealed main effects of ability status, $X^2(3) = 37.12$, $p < .0001$, and cognate status, $X^2(3) = 226.47$, $p < .0001$. A likelihood ratio test for the interaction of ability status and cognate status was constructed by comparing the model with both main effects, the difficulty rank covariate, and the subject random intercept term to an otherwise identical model that included the interaction of ability status and cognate status. The interaction was not significant, $X^2(3) = 1.85$, $p = .60$.

Outputs from the three binary logistic regressions with both main effect terms were used to generate predicted odds by language of response (correct in English only, correct in Spanish only, and correct in both languages vs. correct in neither). These odds were then transformed into probabilities to arrive at the full set of predicted probabilities shown in Table 4 (predictions are independent of random subject effects and are at the mean difficulty ranks for English and Spanish).

Results indicated that, across word types, children with SLI had a lower likelihood of correct responses relative to children with typically developing language. In addition, cognates demonstrated a higher likelihood of being correct in both languages, as opposed to responding correctly to a cognate in only one language, and relative to correct responses in both languages for noncognate items (see Table 4). Therefore, the lack of the interaction between cognate status and ability indicates that the two groups of children did not differ significantly in the overall distribution (language of response) of their responses to cognates and noncognates (for the items that they responded to). Both groups of children demonstrated a relative advantage for cognate items relative to noncognates, meaning that, although children with SLI named fewer items overall, the pattern of responses for cognate versus noncognate items was similar for both groups of children (SLI and TD), thereby supporting our hypothesis that bilingual children would demonstrate an overall advantage for cognate items.

The Association of Correct Reponses Across Languages

The next analysis examined whether the likelihood of generating a correct answer for Spanish was associated with a correct answer generated in English, and vice versa. The purpose of this analysis was to examine whether children with SLI differed from children with TD in their ability to bootstrap cognates as opposed to noncognates (from English to Spanish and from Spanish to English). We also examined difficulty rank, ability status (children with SLI vs. children with TD), cognate status (cognate vs. noncognate), and all possible interactions. These analyses were mixed-effects logistic regressions with the aforementioned variables as fixed effects and a random intercept term for subject.

These analyses revealed significant main effects and two-way interactions. Likelihood ratio tests for the main

Table 4. Predicted probabilities by language of response derived from binary logistic regressions.

Ability	Cognate status	Neither	English only	Spanish only	Both
SLI	Cognate	.36	.07	.25	.31
SLI	Noncognate	.47	.07	.40	.07
TD	Cognate	.11	.05	.16	.69
TD	Noncognate	.24	.08	.44	.25

Note. SLI = children with specific language impairment; TD = typically developing children.

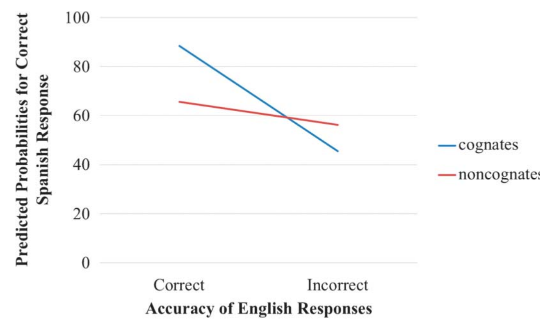
effects were constructed by conducting a chi-square test on the difference between the −2 log likelihood of a null model that included only the subject random intercept term and an otherwise identical model that included each individual main effect. Likelihood ratio tests for two-way interaction terms were constructed by conducting a chi-square test on the difference between a model with all main effect terms plus the subject random intercept term and an otherwise identical model that included the interaction term being tested.

Spanish Responses Associated With Correct English Responses

In the analysis to determine whether the likelihood of generating a correct answer for Spanish was associated with whether a correct answer for English was generated, main effects of Spanish difficulty rank, $X^2(1) = 599.01$, $p < .0001$, cognate status, $X^2(1) = 2.31$, $p = .13$ (marginally significant but retained in model due to presence in interaction term), and whether a correct answer for English was generated, $X^2(1) = 426.61$, $p < .0001$, were found. Therefore, we found that having lower difficulty rank, being a cognate rather than a noncognate, and being named correctly in English were associated with a correct response in Spanish. This analysis revealed no interactions by ability status. Rather, we found that all children were more likely to respond to a cognate singleton correctly in Spanish if they had done so in English. This is consistent with our hypothesis that both groups of children would demonstrate an increased likelihood of responding accurately to cognates if they responded correctly to cognates in English. Furthermore, this finding suggests equivalent bootstrapping of phonological information from English to Spanish for cognate items in children with and without SLI.

In addition, two-way interactions between cognate status and difficulty rank, $X^2(1) = 61.58$, $p < .0001$, and between cognate status and whether a correct answer for English was generated, $X^2(1) = 88.66$, $p < .0001$, were found. Fixed effect coefficients from the full model are shown in Table 5. These coefficients were used in the logistic function to generate predicted probabilities for generating a correct answer for Spanish at the levels of the fixed effect independent variables (ability and cognate status). For difficulty rank, levels used were the mean rank of difficulty for Spanish items ($M = 50.06$), −1 *SD* ($M = 25.55$) and +1 *SD* ($M = 74.59$). Predicted probabilities (regarding whether the likelihood of generating a correct answer for Spanish was associated with whether a correct answer for English was generated by cognate status) are shown in Figure 1. This interaction revealed that cognates that

Figure 1. Interaction of cognate status and accuracy of English responses.



were responded to correctly in English had a higher likelihood of being responded to correctly in Spanish and that cognates that were responded to incorrectly in English were less likely to be correct in Spanish. For noncognate items, accuracy in English did not have a substantial impact upon accuracy in Spanish. Therefore, our hypothesis that accuracy in one language (here, English) would be associated with performance in the other for cognate items relative to noncognates was confirmed.

Performance on cognates and noncognates by difficulty rank is shown in Figure 2. This interaction revealed that cognates (relative to noncognates) with a higher difficulty level (+1 *SD*) had a higher probability of being correct in Spanish. On the other hand, noncognate items with lower difficulty levels (−1 *SD*) had a higher probability of being correct in Spanish relative to cognate items. This interaction indicates that cognates show a decreased impact of difficulty rank in Spanish, whereas noncognates demonstrate greater sensitivity to difficulty rank.

English Responses Associated With Correct Spanish Responses

In the analysis to determine whether the likelihood of generating a correct answer for English was affected by whether a correct answer for Spanish was generated, main effects of English difficulty rank, $X^2(1) = 476.28$, $p < .0001$, cognate status, $X^2(1) = 136.57$, $p < .0001$, whether a correct answer for Spanish was generated, $X^2(1) = 433.16$, $p < .0001$, and ability status, $X^2(1) = 8.25$, $p = .0041$, were found. Main effects from this analysis indicated that lower difficulty rank, being a cognate, and being named correctly in Spanish predicted a correct English response. Fixed effect coefficients from the model are shown in Table 6.

Table 5. Fixed effect coefficients from the model showing Spanish responses affected by accuracy of English responses.

Intercept	Item difficulty	Correct in English	Cognate status	Item difficulty by cognate status	Correct in English by cognate status
1.09	−0.03	2.32	2.21	−0.03	−1.79

Figure 2. Interaction of cognate status and difficulty rank.

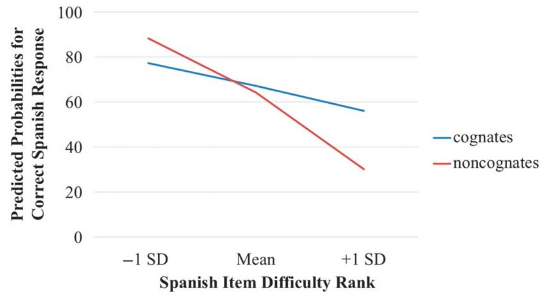
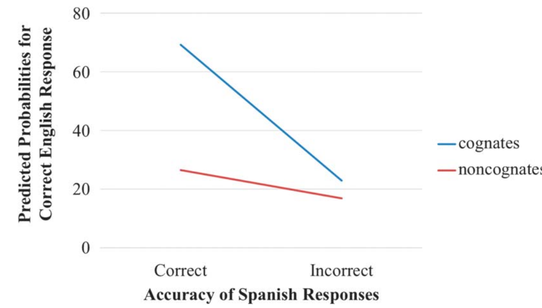


Figure 3. Interaction of cognate status and accuracy of Spanish responses.



These coefficients were used in the logistic function to generate predicted probabilities for generating a correct answer for English at the levels of the fixed effect independent variables. For difficulty rank, the level used was the mean (M = 42.59) difficulty level for English items (multiple levels were not needed as there was no interaction with difficulty rank). Children with SLI displayed lower predicted probabilities of cognates and noncognates relative to children with TD. However, the association of correct responses across languages was not evident for noncognates, as reflected in a significant two-way interaction between cognate status and whether a correct answer for Spanish was generated, $X^2(1) = 71.47$, $p < .0001$ (see Figure 3).

This interaction showed that cognates that were responded to correctly in Spanish had a higher likelihood of being responded to correctly in English and that cognates that were responded to incorrectly in English were less likely to be correct in Spanish. For noncognate items, accuracy in Spanish did not have a substantial impact upon accuracy in English. Therefore, as was found in our previous analysis, our hypothesis that accuracy in one language would be associated with performance in the other for cognate items was again confirmed.

Discussion

To our knowledge, this is the first study to examine the potential presence of a cognate advantage in a group of bilingual children with SLI. Results from our first analysis indicated that, despite significant group differences in overall accuracy (TD > SLI), the interaction examining the distribution of correct cognate and noncognate responses by ability (SLI and TD) revealed that the pattern of responses by language (English, Spanish, both, or neither) and word type were similar across groups. The likelihood that children could correctly name an object in one or both of their languages was impacted by ability and by cognate status, such that children with SLI were less accurate in their responses overall and that cognates were more often correct in both languages as opposed to one language for both groups of children. An interaction of cognate status and ability was not present. These findings replicate and extend previous work that has demonstrated cognate advantages in typically developing bilingual children's expressive vocabulary (Malabonga et al., 2008; Schelletter, 2002; Sheng et al., 2016) by comparing performance in typically developing children to a group of bilingual children with SLI (see Kelley & Kohnert, 2012, for a study examining monolingual children with SLI).

In our second analysis, we examined the association of correct responses across languages (e.g., is a correct response in English associated with a correct response in Spanish for a pair of cognates or noncognates?). In accordance with our hypothesis, we found that accuracy in one language was more associated with performance in the other language for cognate items relative to noncognate items. This suggests that the shared phonological information that exists for cognates may facilitate cross-language transfer for both groups of children. Thus, even when children have SLI, they show a cross-linguistic advantage in their production of cognate items.

In addition, in our examination of Spanish responses associated with correct English responses, we found that difficulty rank interacted with cognate status. At the mean difficulty rank and at higher levels of difficulty rank, cognates displayed a higher predicted probability for a correct Spanish response than noncognates did. This provides additional evidence that cognates may benefit from cross-language facilitation, especially when difficulty rank increases. Both groups of children demonstrated an advantage for

Table 6. Fixed effect coefficients from the model showing English responses affected by accuracy of Spanish responses.

Intercept	Item difficulty	Correct in Spanish	Cognate status	Ability status	Correct in Spanish by cognate status
0.39	−0.05	2.17	−0.4	1.1	−1.56

Spanish responses (associated with correct English responses) to cognates relative to noncognates. It is possible that the interaction of difficulty rank and cognate status in Spanish responses emerged because the responses were closer to ceiling for the low difficulty items, whereas responses were farther from the ceiling in English.

Interestingly, a main effect of ability was only observed in our analysis of English responses associated with correct Spanish responses. This is consistent with our prediction that bootstrapping would be least prominent in this direction (Spanish to English); however, this was not dependent on cognate status. The different significant effects that were observed for English and Spanish responses may be attributed to the fact that Spanish was primarily the language of the home for our participants; therefore, the directionality of bootstrapping may have been more likely to occur from Spanish to English. This would also provide a possible explanation for the differences in ability that emerged for English responses, the language that most children had a slightly lower percentage of input for.

Specific to SLI, one study (Kohnert et al., 2004) has explored whether children who did not speak Spanish could use form similarity to deduce word meanings of Spanish words that have English cognates (with four levels of phonological overlap). That is, English-speaking children with SLI were asked to select a picture from a foil picture when presented with a Spanish word (e.g., *planta*, the cognate pair of *plant* in English). Results suggested that children with SLI could be distinguished from their typically developing English-only peers and typically developing bilingual peers in both accuracy and reaction times (via pairwise comparisons following main effects for group and the four levels of phonological overlap). Typically developing children demonstrated greater accuracy and faster response times relative to monolingual children with SLI. Although group by condition (levels of phonological overlap) interactions emerged, this was driven by the bilingual group performing more accurately and quickly relative to both groups of monolingual children who showed sharper declines over the conditions. In the current study, our first analysis also resulted in main effects for ability and condition when comparing cognates and noncognates, with no evidence of an interaction. Furthermore, we used a design comparing cognates and noncognates, whereas Kohnert et al. (2004) compared different levels of phonological overlap. Nevertheless, our results converge with the finding that phonological overlap aided all children with word recognition, although children with SLI performed at a lower level overall. In addition, the results of the current study suggest that either cognate awareness is not necessary for showing a cognate advantage or, unlike monolingual children with SLI, bilingual children with SLI have cognate awareness and are able to use it to facilitate word production.

Although our study did not directly test specific models of word production, our findings are generally consistent with the cascaded activation models of word production (e.g., Caramazza, 1997; Dell, 1986; Dell & O'Seaghdha, 1992; Harley, 1993; Humphreys et al., 1988; Peterson & Savoy, 1998), which purport that bilinguals (Costa & Caramazza, 1999; Costa et al., 1999; Roelofs, 1998) have a shared conceptual store and a distinct lexicon for each language. We found that performance on cognates was more accurate than performance on noncognates in both groups of children and that accurate performance on cognate pairs was influenced by a correct response to the singleton of that cognate in either English or Spanish. Thus, cascading activation may have been strengthened by phonological redundancy that is unique to cognates for both groups of bilingual children. It is also possible that bootstrapping occurred, which would require awareness of the word forms. Regardless of the mechanism that underlies a cognate advantage in vocabulary acquisition, both groups of children capitalized on cognates to the same extent.

Clinical implications of these findings may inform goals in intervention for bilingual children with SLI. For example, it may be appropriate for clinicians to capitalize upon cognate pairs in order to target vocabulary goals in bilingual children with SLI, as has been demonstrated in one case study, to date (see Kambanaros et al., 2017). Cognates may provide a unique opportunity to improve language skills across languages, given that strategies utilizing cognates have been efficient and successful for typically developing English language learning students (Bravo et al., 2007; Carlo et al., 2004; Nagy et al., 1993; Proctor & Mo, 2009; Dressler et al., 2011). One potential method for selecting cognates as targets for intervention would be to select vocabulary that is directly tied to the curriculum, which will maximize upon children's exposure to words that are currently being taught in the classroom. Future studies should further address intervention approaches targeting the use of cognates as a vocabulary learning strategy for school-age bilingual children with SLI and should include a set of noncognate items that receive treatment in order to distinguish if cognates demonstrate a cross-linguistic facilitative effect relative to noncognates. Thus far, Kambanaros et al. (2017) have demonstrated that cognates generalize to other typologically similar languages, but studies have yet to examine this effect relative to noncognates.

One limitation of this study is that we selected a core set of items from the EOWPVTs based on children's performance, and so all children were not administered all items, nor is the test specifically designed to elicit cognates. Future studies should replicate our findings with a prospectively matched item set of cognate and noncognate items that is prospectively designed to test the proposed hypothesis. Although the stimuli in this study did not differ significantly in frequency, by selecting a matched set of items researchers can include items that are matched by frequency and other linguistic characteristics (such as familiarity and word length) across languages and may consider using databases that contain lexical frequency for children (Zeno, Ivens, Millard, & Duvvuri, 1995). In addition, developing a test for cognate production or administering a test aimed at testing cognate awareness (see August et al., 2001) may allow for comparisons to be made across studies and age ranges. Another limitation of this study is the age range studied (kindergarten and second grade) varies in their literacy skills. Therefore, we cannot conclude whether children in second grade, who have literacy skills, were using different strategies to produce the items used in this study.

Conclusion

Our study extends the current literature examining the nature of bilinguals with SLI by comparing accuracy of cognate production in bilingual children with and without SLI. These findings suggest that bilingual children with SLI do not demonstrate a significant difference in cognate advantage relative to their typically developing peers. Although children with SLI demonstrated overall lower accuracy for both cognate and noncognate items, they demonstrated an association between their English and Spanish responses, such that a correct response to a cognate in one of their languages increased the likelihood of generating a correct response for the cognate in their other language. Future studies should consider the role of cognates in intervention for bilingual children with SLI, as they may promote generalization (Kambanaros et al., 2017), and should include a treated set of noncognate items to discern if cognates demonstrate a cross-linguistic facilitative effect relative to noncognates.

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Appendix

Cognate Items Administered to Children

English	Spanish
Train	Tren
Computer	Computadora
Paint	Pinta
Tiger	Tigre
Animals	Animales
Penguin	Pingüino
Skeleton	Esqueleto
Dentist	Dentista
Cactus	Cacto
Telescope	Telescopio
Rectangle	Rectángulo
Thermometer	Termómetro
United States	Estados Unidos
Percent	Porcentaje
Stadium	Estadio
Bicycle	Bicicleta
Insects	Insectos
Fruit	Fruta
Trumpet	Trompeta
Statue	Estatua
Musical instrument	Instrumento musical
Leopard	Leopardo

Note. This subset of items was derived from the Expressive One-Word Picture Vocabulary Test–Third Edition and Expressive One-Word Picture Vocabulary Test–Third Edition: Spanish-Bilingual Edition (Brownell, 2000, 2001). Reprinted with permission. Copyright © Academic Therapy Publications.

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