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# Conceptual Scoring of Expressive Vocabulary Measures in Bilingual Children With and Without Specific Language Impairment

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# Conceptual Scoring of Expressive Vocabulary Measures in Bilingual Children With and Without Specific Language Impairment

**by**

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# Abstract


## Conceptual Scoring of Expressive Vocabulary Measures in Bilingual Children With and Without Specific Language Impairment

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Purpose: This study examined the effects of conceptual scoring on vocabulary performance of bilingual children with and without language impairment and the classification accuracy of an expressive vocabulary test across four scoring methods, single language and conceptual scoring, for bilingual (English-Spanish) children with and without language impairment.

Method: Participants included English speaking monolingual children (n=14) and Spanish-English bilingual children (n=116) ages 5-11. Children completed the English and bilingual versions of the Expressive One-Word Picture Vocabulary Test. Four different scores were derived representing monolingual scores in English and Spanish, and three conceptual scores. Within-test conceptual scores credited children's other language responses during the test; and across-test conceptual scores compiled a conceptual score across Spanish and English administrations of the test.

Results: Across-test conceptual scoring resulted in better overall classification, sensitivity, and specificity than within-test conceptual scoring, which resulted in better overall classification, sensitivity, and specificity than monolingual scoring; however, neither method achieved minimum standards of 80% accuracy in sensitivity and specificity.

Conclusions: Results suggest that bilingual children are not always able to readily access their second language in confrontation naming tasks. Priming or inhibition may play a role in test performance. Cross-test conceptual scoring yielded the highest classification accuracy and is the recommended method for clinical practice.

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# Introduction

A fundamental task in the clinical practice of speech language pathologists is to accurately distinguish between those who have a speech or language disorder and those who do not. The task is further complicated when the child in question speaks more than one language as there is a lack of suitable language assessment instruments, poor understanding of clinical markers in languages other than English, and a lack of bilingual and bicultural clinicians. Typical characteristics of bilingual language development in the U.S. can look similar to a disorder to those unfamiliar with second language acquisition. For example, Teoh, Brebner, and McCormack (2012) found that Singaporean English-Mandarin bilingual preschool children performed poorly on the expressive vocabulary subtest (given in English only) of the *Clinical Evaluation of Language Fundamentals Pre-School 2 United Kingdom* compared to their UK monolingual counterparts. Baetens-Beardsmore (1986) suggests that the lower vocabulary of bilinguals at certain stages of development may have nothing to do with handicaps or dominance but rather with a smaller variety of linguistic input in each language taken separately. As a result, a bilingual's word knowledge may appear limited relative to monolingual peers (Bedore et al., 2005; Peña et al., 2011).

English language learners are often under or over represented in speech-language pathologists' caseloads because children are either overlooked as they develop their second language or they receive services that are not needed (Samway & McKeon, 2007, Bedore & Peña, 2008). Thus, the goal of SLPs, consistent with the IDEA statute, is to

reduce the inappropriate over-identification of children, especially minority and limited English-proficient children, as having a disability (Title 1.D.664.b.2.D.vii).

Lexical acquisition deficits have been a commonly noted characteristic of specific language impairment (SLI) in research and clinical practice (Weismer & Hesketh, 1998; Gray, 2004, 2005, 2006; Horohov & Oetting, 2004; Kiernan & Gray, 1998; Nash & Donaldson, 2005; Rice, Oetting, Marquis, Bode, & Pae, 1994). Compared to TD peers, children with SLI exhibit slower vocabulary growth (Rescorla, Roberts, & Dahlsgaard, 1997). Limited expressive vocabulary plays a key role when identifying children with suspected language impairment (McGregor et al., 2002; Spaulding, 2010, Rice & Bode, 1993). Naming errors, word approximations, and word retrieval difficulties are also associated with language impairment (Sheng and McGregor, 2010; Spaulding, 2010, Dollaghan, 1998). Experimental studies comparing children with SLI and typically developing language skills (TD) document significant difficulties in word learning. For example, Weismer and Hasketh (1998) found that children with language impairment require more exposures to a word to comprehend or produce it than their TD peers. In both fast mapping and quick incidental learning tasks, children with SLI learn fewer novel words (Alt, 2011; Alt, Plante, Creusere, 2004; Gray, 2004; 2006; Oetting, Rice, & Swank, 1995; Rice, Cleave, & Oetting, 2000; Rice, Oetting, Marquis et al., 1994).

Due to the documented difficulties children have with word learning, vocabulary tests are widely used by clinicians to determine whether a child's language skills require further evaluation (screening) (Campbell, Bell, Keith, 2001); as a method of identifying

SLI in children for research studies (Rice, Buhr, & Nemeth, 1990; Rice, Buhr, & Oetting, 1992; Rice et al., 1994); or to document vocabulary growth (Rowe, Raudenbush, Goldin-Meadow, 2012). While numerous comprehensive language batteries are commercially available to clinicians, vocabulary tests are frequently used as a component of diagnostic evaluations of children with SLI.

Through a clinical survey administered to SLPs within the U.S., Betz, Sullivan, & Eickhoff (2013) found that four single-word vocabulary tests were among the top 10 most frequently selected. These included the *Peabody Picture Vocabulary Test, Fourth Edition* (*PPVT-4*; Dunn & Dunn, 2007); *Expressive One-Word Picture Vocabulary Test, Third Edition* (*EOWPVT-3*; Brownell, 2000a), *Receptive One-Word Picture Vocabulary Test* (*ROWPVT-2*; Brownell, 2000b); and the *Expressive Vocabulary Test, Second Edition* (*EVT-2*; Williams, 2007). To use vocabulary test scores for screening or identification purposes, clinicians must first be confident that the test has evidence of validity, reliability, sensitivity, and specificity (McCauley and Swisher, 1984). Plante and Vance (1994) suggested that language tests that discriminate between children with and without language impairment with accuracy above 90% are considered "good" discriminators and those that discriminate with an accuracy between 80 and 90% are considered "fair" discriminators.

Gray, Plante, Vance, and Henrichsen (1999) evaluated the clinical utility of four vocabulary tests including the *EOWPVT-English edition*. Their results indicated that sensitivity ranged from 71% to 77% and specificity ranged from 68% to 77% across these

tests. When the authors combined scores across tests, sensitivity and specificity failed to improve. Thus, vocabulary assessments, in particular, have only modest utility for diagnosing language impairment in monolingual children (Gray et al., 1999).

## BILINGUAL ASSESSMENT

Assessment of bilingual children's vocabulary is a challenge for speech language pathologists because bilinguals possess distributed and uneven knowledge across two languages (Gollan, 2009, Ordoñes et al., 2002; Patterson and Pearson, 2004; Peña et al., 2012). There are some concepts for which they know the corresponding word in one language but don't know the word in their other language. This pattern of distributed vocabulary has been observed in infants and toddlers, preschool children, and school-age children. In comparing parent reports on the *MacArthur Communicative Development Inventories* (*CDI*, Fenson et al., 1993) and its Spanish adaptation; the *MacArthur Inventario de Desarollo de Habilidades Comunicativas* (*IDHC*; Jackson-Maldonado et al., 2003), Pearson, Fernandez, and Oller (1995) found that 70% of young (between the ages 0;8 and 2;6) children's vocabulary was language specific and did not overlap with their other language. Similarly, Peña, Bedore, and Zlatic-Giunta (2002) found that a large proportion (over 65%) of the category items generated by bilingual (Spanish-English) children between the ages of 5;1 and 6;5 years was unique to either language. This distribution is due, in part, to the context in which they learn the concepts. For example, a child whose dominant home language is Spanish but attends an English instruction classroom may know math terms only in English but may know more food items in

Spanish. Children may also choose to use different words depending on the setting, interlocutor, and context (Iglesias, 2001) as well as their cultural experiences (Peña, 2001).

In order to fill lexical gaps in their vocabulary's knowledge, bilinguals will sometimes code switch to achieve their communication goals. In schools, educators may interpret code switching to denote language confusion or inadequate word knowledge suggestive of language impairment (Miccio et al., 2009; Peña et al., 2003); however, code switching often occurs within an intact system (Greene, Peña, & Bedore, 2013). Therefore, measures of bilingual vocabulary knowledge need to take into account the child's vocabulary knowledge across both languages (Bedore & Peña, 2008; Kohnert, 2010).

Bilingual children have consistently been found to score below their monolingual peers (Bialystok, Luk, Peets, & Yang, 2010; Hemsley, Holm, & Dodd, 2010) or below their monolingual norms (Umbel, Pearson, Fernandez, & Oller, 1992) on vocabulary measures in one or both of their languages. Conceptual scoring, which considers the number of concepts for which a child has a word in any language, has been suggested as a valid tool for accurately assessing bilinguals' vocabulary performance (Pearson, 1993). Conceptual scores can be gathered directly from school-age children using vocabulary measures that take into account both languages or indirectly by means of parent questionnaires such as the *MacArthur Communicative Development Inventory* and its Spanish adaptation. Bedore and colleagues (2005) found that conceptual scoring during

the English version of the semantics subtest of the *Bilingual English Spanish Assessment (BESA)* yielded improved specificity in correctly classifying typically developing bilingual children within the normal range. Similarly, Sheng and colleagues (2012) found that conceptual scoring resulted in better specificity and sensitivity than monolingual scoring in distinguishing between bilingual children with and without language impairment on a test of semantic skills.

Although conceptual scoring can give us a more complete picture of a bilingual child's lexical knowledge than monolingual scoring, a standard way of obtaining a conceptual score during confrontation naming has not been established. One method of obtaining a conceptual score is to ask the child to code switch immediately after an incorrect response is given. For example, if the target word is *dog* and the bilingual child does not respond or produces an incorrect response, i.e. *cat,* the administrator would then ask the child to name the picture in Spanish. This method is employed most often as it can be obtained in a single test administration and a test score can be derived immediately following administration. Finkbeiner et al, (2006) found that participants took no longer to name pictures in their dominant language on language switch trials than they did on nonswitch trials, indicating that nontarget lexical representations are not suppressed, thereby supporting the use of this method. The *EOWPVT-SBE* (Brownell, 2000), *Preschool Language Scales-5th edition- Spanish* (*PLS-5*; Zimmerman, Steiner, Pond, 2012*)* are examples of standardized tests that incorporate this approach. While efficient, a possible disadvantage is that children may not be able to code switch between

languages on demand. Code switching highlights how bilinguals activate, separate, and select lexical items between two languages; however, speakers are not able to switch equally between both languages. When a bilingual is speaking their first language (L1), less effort is required to suppress the less-dominant language (L2) (Costa & Santesteban, 2004). Studies imply that switching into L2 presents more challenges than switching into L1, because dominant language inhibition requires more cognitive resources (Bialystok et al., 2008; Kroll et al., 2008, Misra et al., 2012). Furthermore, work by Yan and Nicoladis (2009) suggest that low expressive vocabulary scores in bilinguals may not reflect small expressive vocabularies, but rather difficulty accessing and retrieving the appropriate word in the moment of the assessment.

A second, method of obtaining a conceptual score is to test each of the child's languages independently of each other (i.e., English administration on one day, Spanish administration on a different day) and then adding the total unique concepts that the child knows in either language. While this method has not been recommended in standard tests, perhaps because it is more time consuming, it has been implemented in research studies. Pearson (2001) and Marchman (2002) measured bilingual children's "Total Conceptual Vocabulary" on a parent-report measure by counting cross-language synonyms, such as *dog* and *perro* only once. Although these methods have been utilized across different standardized tests and research studies, potential diagnostic classification differences between these have not been evaluated.

The purposes of this study were to determine whether the school-age children with SLI included in this study demonstrated vocabulary deficits as measured by the *Expressive One Word Picture Vocabulary Test, English (2000)* and *Bilingual Spanish Edition (2001)* and to determine which method of conceptual scoring yielded the best diagnostic accuracy. Specific questions were: Does conceptual scoring on the *EOWPVT-English* (2000) and *Bilingual Spanish Editions* (2001) yield better diagnostic accuracy for specific language impairment in bilingual children than single-language scoring? Which method of scoring, single-language or conceptual scoring, on the *EOWPVT- English (2000) and Bilingual Spanish Editions (2001)* results in higher diagnostic accuracy of specific language impairment in bilingual children?

# Method

## PARTICIPANTS

The participants in this study included 130 children enrolled in kindergarten, second, and fourth grade. Twenty-six were identified with language impairment and 104 were typically developing. Fourteen were monolingual English speakers and 116 were bilingual Spanish-English speakers.

**Sampling procedures.** Children were selected from a larger ongoing study. Phase 1 of the project is a screening phase in which 4 to 6 year old children were recruited from two Central Texas school districts. All participants were screened in English and Spanish using the *Bilingual English Spanish Oral Screener (BESOS),* a semantics and morphosyntax screener with 90% classification accuracy, developed from the *Bilingual English Spanish Assessment (BESA)*; (Peña, Gutiérrez-Clellen, Iglesias, Goldstein, & Bedore, 2014). Parents also responded to a questionnaire and were asked to report on their child's hour-by-hour exposure and use of Spanish and English (Gutiérrez-Clellen & Kreiter, 2003). Children who had at least a combined 20% of input and output in both English and Spanish were considered bilingual. Children who had at least a combined 80% of input and output in English were considered functionally monolingual. Bilingual and monolingual children who scored below the 30th percentile in either morphosyntax or semantics subtest in their best language, and were exposed to English by at least age 5, were invited to participate in follow-up testing (Phase 2). In addition, age, sex, and language-use matches who scored above the 30th percentile were invited to participate in Phase 2. Children with a history of brain injury, severe social-emotional problems, or an autism spectrum disorder were excluded from the study. Children who spoke a language

other than English or Spanish were also excluded from Phase 2. To rule out poor performance due to cognitive skills, children who fell below a standard score of 75 on the *Universal Nonverbal Intelligence Test* (*UNIT*, Bracken & McCallum, 1998) were excluded from the study. The present study uses data from Phase 2 follow-up testing.

Trained research associates administered all tests. Testing was completed during four 1-hour sessions at each child's elementary school. To control for order effect when administering tests, we counterbalanced presentation of testing language.

## MEASURES

Confirmatory testing was conducted during phase 2 of the study, one year after the screening phase. Children completed the following tests 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, the *Test of Narrative Language* (*TNL*; Gillam & Pearson, 2004) and *the EOWPVT-English* and *Spanish Bilingual Editions* (Brownell, 2000, 2001). All children also completed the *UNIT* (Bracken & McCallum, 1998) and passed an initial hearing screening or a follow-up hearing test conducted by the schools' nurses. Their parents and teachers also completed a language-use questionnaire.

***BESA*** or ***BESAME.*** Subtests on 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 and are not direct translations. The semantic subtests use conceptual scoring which is more

effective for bilingual children (Bedore, Peña, García, & Cortez, 2005). Morphosyntax subtests focus on structures that are difficult for bilingual children with SLI (Bedore & Leonard, 2001; Gutierrez-Clellen, Restrepo, Simón-Cereijido, 2006; Muñoz, Gillam, Peña, & Gulley-Faehnle, 2003). Children ages 4 to 6;11 were administered the *BESA* while those age 7 to 9;11 were administered the *BESAME*.

***TNL.*** The *Test of Narrative Language* (Gillam & Pearson, 2004) is a test designed to examine the narrative comprehension and production skills of children, between the ages of 5;0 and 11; 11. The test includes three narrative elicitation tasks, i.e. stories retell with no picture, and two story formulations elicited by a picture-sequence task and a single-picture task. The Spanish version is adapted from the English *TNL*. It is structured similarly but uses different stories so that it is not a direct translation. Preliminary analysis demonstrates that it reliably differentiates between bilingual children with and without language impairment.

***UNIT.*** *The Universal Nonverbal Intelligence Test* (Bracken & McCallum, 1998) is administered completely nonverbally, and provides an assessment of intelligence for children ranging in age from 5 through 17 years. Reliability coefficients for the *Abbreviated Battery*, as reported in the manual is .96.

***EOWPVT.*** The *Expressive One-Word Picture Vocabulary Test* (2000) and the *Expressive One-Word Picture Vocabulary Test- Spanish Bilingual Edition* (2001) are individually administered, norm-referenced tests of single-word expressive vocabulary. The test consists of 190 items presented in developmental sequence. The same items are

included in both test editions, which allows for direct comparison of items in each language. The *English Edition* of the *EOWPVT* contains 20 items that are not administered in the standardized administration of the *Bilingual Spanish Edition*. Basal and ceiling rules set forth in the manuals were followed when computing scores.

***Parent Teacher Language-Use Questionnaire.*** To document children's use and exposure to Spanish and English, children's primary caregivers and teachers independently responded to a questionnaire where they were asked to report on the participants' hour-by-hour exposure and use of Spanish and English at home and in the classroom. They were also asked to rate the participants' ability in the areas of; frequency of language use with peers and adults, vocabulary, speech, sentence production, grammatical, and comprehension proficiency (Gutiérrez-Clellen & Kreiter, 2003).

## CLASSIFICATION

Group classification was primarily determined from the follow-up testing completed in Phase 2. Eligibility for the LI and TD groups was derived on the basis of five indicators; participants' *BESOS* screener scores from phase 1, *TNL* in English or Spanish, Morphosyntax and Semantics subtests of *BESA* or *BESAME*, parent and teacher ratings of participants' language proficiency.

Participants were identified with language impairment if they met at least four of the five indicators: scored below 1 standard deviation (SD) on age norms on one or both of the *BESA* or *BESAME* subtests (Semantics and Morphosyntax) in their better language, scored below 1 SD on the *BESOS* screener from phase 1, scored below 1 SD on the *TNL*

in English or Spanish, and participants whose teachers or parents rated their proficiency below 4.25 were considered for the LI group while ratings above 4.75 were considered for the TD group. Children were identified with typically developing language skills if they scored above -1SD below the mean on two or more of these measures.

## EXPERIMENTAL MANIPULATIONS

***Administration***. The English and bilingual versions of the *EOWPVT* were administered as English only and Spanish only versions, respectively. All responses in any language were recorded verbatim during the administration of the *EOWPVT- BSE* and English editions. When responses were not given in the target language, one was elicited. Specifically, if the child gave a response in English during the SBE administration, the response was written in English then one was elicited in Spanish and both responses were recorded verbatim. The *Bilingual Spanish Edition* of the *EOWPVT* contains 20 “do not administer” items; however testers administered those items to allow for direct item comparisons. Basal and ceiling rules set forth by the manual were followed. Test administration in each language was discontinued if the child did not obtain a basal. After the ceiling recommended in the manual was reached, 14 additional items were administered to ensure a ceiling was reached across all scoring methods. Five different scores were recorded using four methods.

**Scoring Procedures**

***Monolingual English***. Scoring of responses adhered to the instructions in the test manual. Instructions and test questions were administered in English and only responses in English were accepted as correct. Standard scores were derived using English norms.

***Monolingual Spanish***. Scoring of the *BSE* Edition was similar to the monolingual version given that only Spanish responses were accepted as correct. The 20 do-not-administer items were not included in this score. Standard scores were derived using norms published in the *BSE* manual.

***Within Test Conceptual Scores BSE Edition.*** Scoring adhered to the instructions in the *BSE* manual. Responses in both languages were accepted as correct. The 20 do-not-administer items were not included in this score. Standard scores were derived using norms published in the *BSE* manual.

***Across Test Conceptual Scores*** **(English norm comparison and *BSE* norm comparison).** Scoring involved analyzing each item across both administrations. Correct responses in either language were accepted as correct. The 20 do-not administer items were included in this score. Two different standard scores were derived using the norms published in the *BSE* manual and another using the English edition manual.

***Reliability***

To estimate inter-examiner reliability for these tests, a trained research associate double-scored 15% of the vocabulary tests through the use of audio-recorded responses. Point-to-point percent agreement for each test was as follows: 95.4% for the *EOWPVT*,

93.8% for the *EOWPVT-BSE*, 97% for the *BESA* 95.8% for the *BESAME*, and 100% for the *UNIT*.

## Results

To address our question whether conceptual scoring on the *Expressive One Word Picture Vocabulary Test, English (2000)* and *Bilingual Spanish Edition (2001)* yield better diagnostic accuracy for specific language impairment in bilingual children than single-language scoring, a repeated measures ANOVA with test score (single language Spanish, single language English, within-test conceptual, across test conceptual compared to bilingual norms, across test conceptual compared to monolingual norms) as the within-subjects factor and grade (Kinder, $2^{nd}$, $4^{th}$) and ability (LI and TD) as the between-subjects factor was run. Results demonstrate a significant main effect for test score, $F(4,102) = 320.816$, $p < .001$ partial eta squared = .929 and for ability, $F(1,105) = 14.470$, $p < .001$, partial eta .121. There was no main effect for grade ($p>.05$) and interactions were not significant. Pairwise comparisons by test score demonstrated that all test scores were significantly different except single-language scoring and within-test conceptual scoring. Rank order from highest to lowest was: 1) across-test conceptual scoring compared to bilingual norms, followed by a tie between 2) within-test conceptual scoring and 2) single-language scoring in Spanish, followed by 3) across-test conceptual scoring when compared to English norms, then 4) single-language scoring in English.

To address our second question about which method of scoring, single-language or conceptual scoring, on the *EOWPVT- English (2000) and Bilingual Spanish Edition (2001)* results in higher diagnostic accuracy of specific language impairment in bilingual children, five exploratory discriminant analyses were conducted. For each scoring

method we used discriminant function analysis to compare children with and without language impairment and their classification accuracy for each. The results are shown in Table 1. Results indicated that conceptual scoring, whether within or across tests, resulted in more accurate overall classification accuracy than monolingual scoring in either language. The highest sensitivity resulted from across test conceptual scoring when compared to English norms (84.6%); however, specificity was 66.3%. The highest specificity resulted from across test conceptual scoring when compared to bilingual norms (77.9%) and sensitivity was 76.9%. The best overall classification resulted from across-test conceptual scoring when compared to bilingual norms (77.7%).

| Discriminant Function | Cutoff Score | Overall Classification | Sensitivity | Specificity | Wilk's $\lambda$ | $\chi^2$ | $N$ | Canonical Correlations |
|---|---|---|---|---|---|---|---|---|
| Single Language-Spanish | 87.87 | 66.4 | 58.3 | 68.5 | .921 | 9.352 | 116 | .281 |
| Single Language-English | 68.08 | 55.2 | 83.5 | 48.5 | .952 | 6.019 | 125 | .219 |
| Within-test Conceptual (bilingual norms) | 90.04 | 70.7 | 62.5 | 72.8 | .866 | 16.293 | 130 | .366 |
| Across-test Conceptual (Eng Norms) | 80.51 | 70 | 84.6 | 66.3 | .855 | 19.969 | 130 | .381 |
| Across-test Conceptual (bilingual Norms) | 100.42 | 77.7 | 76.9 | 77.9 | .820 | 25.377 | 130 | .425 |

Table 1: Discriminant Analyses

| Discriminant Function | NL | | LI | |
|---|---|---|---|---|
| Single Language-Spanish | 93.78 | (16.53) | 81.96 | (16.31) |
| Single Language-English | 73.48 | (19.78) | 62.67 | (15.98) |
| Within-test Conceptual (bilingual norms) | 96.62 | (13.46) | 83.46 | (14.55) |
| Across-test Conceptual (English Norms) | 87.28 | (13.68) | 73.73 | (11.38) |
| Across-test Conceptual (bilingual Norms) | 108.57 | (13.84) | 92.27 | (14.63) |

Table 2: Mean and SD by Ability

| | Kinder | | Second | | Fourth | |
|---|---|---|---|---|---|---|
| Discriminant Function | LI | TD | LI | TD | LI | TD |
| Single Language-Spanish | 82.09 | 94.67 | 75.33 | 92.03 | 95.50 | 97.50 |
| Single Language-English | 55.91 | 65.46 | 64.56 | 72.53 | 67.00 | 83.08 |
| Within-test Conceptual (bilingual norms) | 83.00 | 95.41 | 78.22 | 97.84 | 95.50 | 98.08 |
| Across-test Conceptual (English Norms) | 71.55 | 84.46 | 71.33 | 87.39 | 82.00 | 94.17 |
| Across-test Conceptual (bilingual Norms) | 89.45 | 106.08 | 89.89 | 108.89 | 102.50 | 113.83 |

Table 3: Means by Grade and Ability

# Discussion

With the ever-increasing diversity in schools and communities, SLPs have a critical responsibility to provide accurate and appropriate identification of children who do and do not qualify for services. Currently there is limited guidance regarding diagnostic assessment of bilingual children particularly in how to use assessment information that considers both languages, as do conceptual scores. Although conceptual scoring may be a valuable clinical tool for reducing the bias associated with single-language vocabulary measures, a clear method for obtaining a conceptual score has not been defined. This study used different scoring procedures to compare the discriminant validity of an expressive vocabulary measure in differentiating between bilingual children with and without SLI.

## Classification Accuracy

The scoring procedures included single language testing in English and Spanish, within test conceptual scoring, and across-test conceptual scoring compared to monolingual English and bilingual norms. Highest classification accuracy was obtained by using across-language conceptual scoring method while single-language testing obtained the lowest classification accuracy suggesting that clinicians should take into account both languages when testing a bilingual child. Within the clinical setting consequences for misclassified children are serious (Plante & Vance, 1994). A child with SLI that is not identified misses the available opportunities for academic and communication support that can promote success in school. On the other hand, a child

who is mislabeled SLI will likewise miss the opportunities and resources for academic success. Both can result in children whose emotional and developmental well-being are compromised.

## PERFORMANCE DIFFERENCES

Consistent with research demonstrating children with SLI exhibit slower vocabulary growth, results from the present study demonstrate typically developing children consistently scored higher than language-impaired children across all grades represented and across all scoring methods, refer to Table 2 and Table 3 (Paul, 1995; Rescorla, Roberts, & Dahlsgaard, 1997). Across-language conceptual scoring resulted in higher scores than within-language conceptual scoring suggesting that bilingual children are not always able to readily switch between languages. These results support the language suppression hypothesis, which stipulates that language switch costs arise as a result of switching to a language that was inhibited on the previous trial (Green, 1998).

Speech production models address how message conceptualization, language formulation, and articulatory output occur incrementally (De Bot, 2004; Levelt, 1989, 1996). To complete a word-naming task, first a semantic concept is retrieved. Second, the phonological and lexical word components are formulated, and finally the word is articulated to match the language context. Since a bilingual's two languages share conceptual characteristics, both languages are potentially activated during the semantic system's incremental lexical selection process (Isurin et al., 2009; Kormos, 2006; Patterson and Pearson, 2012). In a test situation, the test-taker may face challenges in

suppressing the response from the language in which the lexical item is more strongly activated since a concept has activated two lexical items. Meuter and Allport (1999) found that language-switching costs were consistently larger (responses were slower) when switching to the dominant language from the weaker language than vice versa. They suggested that naming in the weaker language requires active inhibition or suppression of the stronger competitor language and that this inhibition persists into the following switch trials in the form of "negative priming" of the dominant lexicon as a whole. It is possible that children's lower scores in the within-language conceptual scoring condition are reflective of these switching costs.

The differences between bilingual children with and without language impairment were more apparent in the across-test test conceptual scores. For children with typical development testing in one language at a time and then deriving a conceptual score allowed them to achieve higher scores because they did not experience the switch costs associated with within-test switching. However, this was not the case for children with language impairment. Children with language impairment very often have smaller vocabularies and while for them the one language at a time approach may have been optimal, they nonetheless demonstrated more restricted vocabulary knowledge compared to their typical peers under all conditions.

Results suggest clinicians should assess bilingual vocabulary independently then derive conceptual scores to achieve higher diagnostic accuracy. However, it is important to note that by Plante and Vance's (1994) standards, none of the methods investigated

achieved “fair” (at least 80% accuracy) much less “good” levels (at least 90% accuracy). These findings are consistent with that of monolingual studies evaluating the diagnostic utility of single word receptive and expressive tests (Gray, Plante, Vance & Henrichsen, 1999). Thus, here clinicians are cautioned against using expressive single word tests alone for language impairment diagnoses.

Although it is recommended that bilingual expressive vocabulary be assessed through independent administration in each language given our results, it is understood that clinicians’ evaluation time is limited. A third, less time consuming manner of obtaining a conceptual score could potentially provide scores comparable to our across-language conceptual score. Specifically, test the child in their strongest language and then ask the child to code switch at the end of the test for the series of questions that were incorrect. This procedure doesn’t entail switching back and forth between languages and children are required to respond to fewer items within one administration, reducing fatigue and administration time. The *Bilingual Verbal Ability Tests* (Muñoz-Sandoval et al., 1998) employs this method for obtaining conceptual scores where students are allowed to return to items they miss and respond in their other language. Diagnostic accuracy of this method was not directly assessed through the present study and merits further research.

**LIMITATIONS**

This study had a limited sample size, with only 26 LI participants in total. As such, there is some degree of uncertainty associated with the values found in this study. A

larger sample would likely serve to increase confidence in our findings. Furthermore, we analyzed spontaneous language switching responses when an incorrect response was given in the target language; however, this is unlikely to be a problem given that a small subset of kids were not able to switch successfully when explicitly asked, but we have not explored the limits of this.

### FUTURE RESEARCH

Future research should test whether dominance has an effect on language suppression given that language suppression hypothesis implies that the stronger a language is the more strongly it will be suppressed when it is the non-target language, therefore, switching to the stronger language should always incur a cost. Although a subset of children were asked to actively switch to the other language if they responded incorrectly this did not result in higher scores. Most often they could not respond or translated an incorrect answer in the target language. However, systematically exploring switch costs across children with and without language impairment might help us to better understand the circumstances under which bilinguals can and cannot successfully utilize both languages in an on-line task.

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