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Discriminant accuracy of a semantics measure with Latino English-speaking, Spanish-speaking, and English–Spanish bilingual children

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ABSTRACT

We explored classification accuracy of English and Spanish versions of an experimental semantic language measure with functional monolingual–bilingual children with and without language impairment. A total of 441 children participated, including 78 balanced bilinguals (15 with language impairment, 63 with typical development); 179 monolingual Spanish (36 with language impairment, 143 with typical development); and 183 monolingual English (49 with language impairment, 134 with typical development) children between 4;0 and 6;11 years. Cut points derived for functionally monolingual children were applied to bilinguals to assess the predictive accuracy of English and Spanish semantics. Correct classification of English monolinguals and Spanish monolinguals was 81%. Discriminant analysis yielded 76% and 90% correct classification for balanced bilingual children in English and Spanish respectively. This semantics-based measure has fair to good classification accuracy for functional monolinguals and for Spanish–English bilingual children when one language is tested.

Learning outcomes: As a result of this study, the reader will describe advantages of lexical-semantic tasks for identification of language impairment. They will be able to describe procedures for conceptual scoring and identify its benefits. Readers will also gain an understanding of similarities and differences in bilingual and monolingual performance on a semantics task in Spanish and English.

1. Introduction

Bilingual children with language impairment (LI), like their monolingual counterparts, have difficulties in the lexical-semantic domain (Gray, 2004; Jordaan, Shaw-Ridley, Serfontein, Orelwitz, & Monaghan, 2001; McGregor, 2009; Sheng, Bedore, Peña, & Taliancich-Klinger, 2013; Sheng, Peña, Bedore, & Fiestas, 2012) but such measures have not been evaluated for their classification accuracy. Bilingual children may demonstrate low performance, indicated by lower than expected scores, in the lexical-semantic domain due to LI, level of exposure to each language, or both. This low performance may be due to divided input in each of their two languages or because of acquisition difficulties associated with language impairment. Therefore a significant difficulty that speech-language pathologists face in identifying LI in bilingual children is determining if lower than expected language performance should be attributed to typical bilingual development or LI.

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A number of recent studies have focused on diagnostic accuracy of bilingual children's language ability on measures of morphosyntax (Gutiérrez-Clellen, Restrepo, & Simon-Cereijido, 2006; Gutiérrez-Clellen & Simon-Cereijido, 2007), nonword repetition (Gutiérrez-Clellen & Simon-Cereijido, 2010; Kohnert, Windsor, & Yim, 2006; Windsor, Kohnert, Lobitz, & Pham, 2010), and counting span (Danahy, Windsor, & Kohnert, 2007), as well as language sampling approaches (Bedore, Peña, Gillam, & Ho, 2010; Gutiérrez-Clellen & Simon-Cereijido, 2009; Simon-Cereijido & Gutiérrez-Clellen, 2007) but little work has focused on the lexical-semantic domain. A recent meta-analysis (Dollaghan & Horner, 2011) shows that there are a number of promising measures of language ability, particularly in the morphosyntactic domain, for Spanish–English bilinguals. Nevertheless, the authors noted that many of these measures had negative likelihood ratios with unacceptably large confidence intervals which limit the certitude of a negative diagnostic result.

Lexical-semantic measures of language are potentially useful for bilingual children in the process of learning two languages. First, bilingual children with LI are documented to have difficulty in the area of semantics (Sheng et al., 2012) as do monolingual children with LI (Gray, 2004; McGregor, 2009). Tasks that challenge the lexical-semantic system seem to be more robust indicators of impairment than single-word vocabulary knowledge. Such semantics tasks may have an advantage over assessment of basic vocabulary knowledge because they focus on use and organization of the lexicon rather than knowledge of a predetermined item set. Second, semantic knowledge is distributed across both of the bilingual's languages and can be expressed in either of two languages. Testing in one language at a time can allow for responding in either language, which one cannot account for when testing morphosyntax. These approaches to assessment of the lexical-semantic domain may help to level the playing field for children with varying experiences (Calderón et al., 2005; Hoff & Naigles, 2002; Hoff & Tian, 2005).

1.1. Vocabulary and semantic performance in language impairment

There are a number of commonly used measures of vocabulary development (Betz, Eickhoff, & Sullivan, 2013) including the *Peabody Picture Vocabulary Test* (Dunn & Dunn, 1981; Dunn & Dunn, 1997) and the *Expressive One Word Picture Vocabulary Test-2000* Edition (Brownell, 2000). These include Spanish-language versions: the *Test de Vocabulario en Imagenes Peabody* (TVIP, Dunn, Padilla, Lugo, & Dunn, 1986); and the *Expressive One Word Picture Vocabulary Test-Spanish Bilingual Edition* (Brownell, 2001). These measures focus on the production or comprehension of single words. Research demonstrates that children with LI have significantly lower single-word vocabulary skills than do their typically developing peers. However, many of these single-word-based tests have poor classification accuracy for English monolinguals (Gray, Plante, Vance, & Henrichsen, 1999; Restrepo et al., 2006; Spaulding, Plante, & Farinella, 2006) and for children from minority language backgrounds including African American and Latino American children (Peña & Quinn, 1997).

In addition to smaller vocabulary, children with LI often have significant semantic processing difficulties compared to their typically developing peers. These difficulties often occur even if children have relatively good vocabulary comprehension (e.g., McGregor & Windsor, 1996). The documented processing limitations of children with LI can lead to delays in word learning and in making connections among lexical-semantic entries. These difficulties can affect performance on a number of lexical-semantic tasks. For example, Nippold, Erskine, and Freed (1988) documented that children, ages 6–8 with language impairment, had particular difficulty on tasks requiring analogical reasoning in comparison to their typical peers. Children with language impairment have also been shown to perform more poorly on tasks of description which required them to describe a picture making comparisons to other pictures (Bishop & Adams, 1991). Children with language impairments also have documented difficulties with verbal fluency. Weckerly, Wulfeck, and Reilly (2001) compared children of ages 8–12 with and without language impairment on a set of verbal fluency tasks. There was a semantic condition in which children generated as many exemplars in a category in 90 s and a phonetic condition where they generated as many items beginning with a given sound in 60 s. Overall, children with language impairment generated fewer items in both conditions and made more errors compared to children with typical development. Children with LI also have difficulties naming action. Sheng and McGregor (2010b) examined object and action naming in children with LI as well as their age and verbal matched peers. While children with LI were less accurate and slower in naming as compared to their age-matched peers, they had particular difficulty with action naming. In a recent study Sheng and McGregor (2010a) showed that children with LI demonstrated more tenuous, shallow connections between words on a repeated associations task (where children provide a semantically related word three times in a row in response to an item such as "dinner"), in comparison to children with typical development. In this study, children of ages 5–8 provided three associations when provided with a stimulus word. Children with language impairment made more out of class (e.g., "rainbow" in response to what goes with the word "dinner") and phonological errors (e.g., "linner" in response to what does with the word "dinner") compared to children with typical development. Consistent with other reports comparing vocabulary and semantic tasks, children with language impairment demonstrated different patterns of responses compared to their vocabulary matched peers. Their pattern of response indicates difficulty making semantic links among related concepts not predicted by level of vocabulary knowledge. In contrast to single-word vocabulary testing, these semantic tasks require deeper knowledge and organization of the semantic system making them particularly challenging for children with LI. Brackenbury and Pye (2005) reviewed and summarized the semantic difficulties documented for children with LI. They concluded that assessment practices should include not only documentation of vocabulary size but also of children's ability to make connections among lexical entries through tasks such as picture description, and tasks that assess knowledge of category, part-whole, and thematic relationships.