Predictors of processing-based task performance in bilingual and monolingual children

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A B S T R A C T

In the present study we examined performance of bilingual Spanish-English-speaking and monolingual English-speaking school-age children on a range of processing-based measures within the framework of Baddeley's working memory model. The processing-based measures included measures of short-term memory, measures of working memory, and a novel word-learning task. Results revealed that monolinguals outperformed bilinguals on the short-term memory tasks but not the working memory and novel word-learning tasks. Further, children's vocabulary skills and socioeconomic status (SES) were more predictive of processing-based task performance in the bilingual group than the monolingual group. Together, these findings indicate that processing-based tasks that engage verbal working memory rather than short-term memory may be better-suited for diagnostic purposes with bilingual children. However, even verbal working memory measures are sensitive to bilingual children's language-specific knowledge and demographic characteristics, and therefore may have limited clinical utility.

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1. Introduction

Assessing the language skills of children who are exposed to more than one language and who come from low socioeconomic (SES) backgrounds poses many challenges for speech language pathologists and educators in the United States. In order to reduce bias and avoid a misdiagnosis of bilingual children, the use of assessment tools that are less dependent on a child's current knowledge and that instead rely more on the ability to process information has been recommended (Campbell, Dollaghan, Needleman, & Janosky, 1997; Kohnert, Windsor, & Yim, 2006; Laing & Kamhi, 2003; Rodekohr & Haynes, 2001). However, while some studies have yielded promising results in demonstrating comparable levels of performance by bilinguals and monolinguals on processing-based tasks (e.g., Danahy, Windsor, & Kohnert, 2007; Lee & Gorman, 2012; Sharp & Gathercole, 2013), other studies have shown that processing-based tasks do not eliminate group differences (Kohnert et al., 2006; Windsor, Kohnert, Lobitz, & Pham, 2010). The reasons behind these inconsistent findings in the literature remain unclear, and therefore the clinical utility of processing-based tasks for diagnostic purposes with bilingual children also remains in question. In the present study, we tested bilingual and monolingual children on a battery of processing-based tasks with the view to pinpoint the predictors of processing-based task performance in these two groups. Understanding what predicts bilingual and monolingual processing-based task performance may shed light on the reasons

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behind prior studies' inconsistent findings regarding bilinguals' performance on processing-based tasks, and may propel forward the search for valid processing-based measures that would effectively capture the bilingual language capacity.

1.1. Processing-based measures in monolingual and bilingual children

It has long been recognized that knowledge-based assessments rely on previous experiences and therefore have the potential for over-diagnosing language impairment in typically-developing children from disadvantaged backgrounds. As a result, tasks that reduce the need to depend on previous experiences and rely more on information processing have been introduced. In one of the first attempts to contrast knowledge-based and processing-based measures, Campbell et al. (1997) administered one standardized, knowledge-based assessment and three processing-based tasks to boys from minority racial groups and low socioeconomic (SES) backgrounds and boys from a majority racial group and higher SES backgrounds. The processing-based measures included a non-word repetition task in which participants repeated novel words; the Competing Language Processing Task, in which children were required to engage in grammatical processing while simultaneously maintaining a set of words in memory; and the Revised Token Test, in which children completed motor actions in response to an auditory command. Results revealed that, while the minority and the majority groups significantly differed on the standardized language-based assessment, they did not differ on any of the three processing-based tasks.

Campbell et al. (1997) concluded that processing-based measures minimize reliance on previous knowledge and reduce disparities between minority and majority children. A number of other studies revealed similar findings and also demonstrated that processing-based tasks can reliably distinguish children with language impairments from children with typically-developing language skills in both majority and minority populations (e.g., Bishop, North, & Donlan, 1996; Dollaghan & Campbell, 1998; Ellis Weismer et al., 2000; Rodekohr & Haynes, 2001). It was therefore very tempting to apply the same logic – i.e., to use processing-based tasks – to the problem associated with diagnosing language impairment in bilingual children.

Many studies have examined the utility of processing-based measures for reducing the bias inherent in administering knowledge-based measures normed on monolingual populations to children who speak two languages, yielding mixed results. Some studies reported positive findings, showing that typically-developing bilingual and monolingual children who differ on knowledge-based assessments of language ability can nevertheless attain similar levels of performance on processing-based measures (Danahy et al., 2007; Lee & Gorman, 2012; Sharp & Gathercole, 2013). For example, Lee and Gorman (2012) reported similar overall performance on a non-word repetition task between bilingual and monolingual children. Similarly, Danahy et al. (2007) reported no group differences between monolingual and bilingual children on a counting span task. However, other studies reported negative findings, showing that typically-developing bilingual and monolingual children who differ on knowledge-based assessments of language ability also tend to perform differently on processing-based measures (e.g., Hwa-Froelich & Matsuo, 2005; Kohnert et al., 2006; Gutiérrez-Clellen, Calderón, & Ellis Weismer, 2004; Sharp & Gathercole, 2013; Thorn & Gathercole, 1999; Windsor et al., 2010).

For instance, Kohnert et al. (2006) found that monolingual children with higher levels of English knowledge outperformed bilingual children with lower levels of English knowledge on a non-word repetition task that purportedly did not rely on English language knowledge. Similar findings have been obtained when listening-span-type tasks have been used to examine language abilities in bilingual children, in that children with higher levels of English knowledge outperformed children with lower levels of English knowledge (Gutiérrez-Clellen et al., 2004; Kohnert et al., 2006). In general, the conclusion reached by the field is that processing-based measures administered in a single language are not reliable diagnostic tools (e.g., Kohnert et al., 2006; Thorn & Gathercole, 1999). However, in the absence of viable alternatives, it appeared to us that further examination of processing-based tasks for their potential usefulness in the assessment of bilingual children was warranted.

We began by considering that part of the difficulty associated with the development of assessment measures that would be appropriate for both bilingual and monolingual children (including the processing-based measures) is that bilingual and monolingual children may occupy distinct demographic and sociocultural niches. Hispanic children who speak English and Spanish represent the largest segment of the bilingual population in the United States (Hopstock & Stephenson, 2003; Kohler & Lazarín, 2007). It is an unfortunate demographic reality that the majority of these children come from low SES backgrounds (Camarota, 2012). That is, bilingual Hispanic children face a multifaceted language acquisition challenge where their input is distributed across two languages, and where their sociolinguistic environment may yield non-optimal language outcomes. Thus, in addition to the different levels of language-specific skills that characterize monolingual and bilingual children, Spanish-speaking bilingual children in the United States also often differ from monolingual children in SES (Hernandez, Denton, & Macartney, 2007; Hoff, 2013). A viable processing-based measure that would be of most use to the field, therefore, would be one that would be unbiased against typically-developing bilingual children who not only have lower language-specific skills than their monolingual peers, but who also come from lower SES backgrounds. Therefore, in the present study, we examined a range of processing-based tasks for suitability in a sample of Hispanic bilingual children who differed from their monolingual English-speaking peers not only in their levels of English knowledge, but also in SES.

Our next step was the realization that the vast majority of processing-based tasks developed and employed by prior work are in fact verbal short-term and/or working memory tasks. For instance, research with bilingual children has used measures of short-term memory (such as non-word repetition) and measures of working memory (such as the Competing Language Processing Task) to index processing capacity, and several studies examined novel word learning – a task that relies on verbal