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Comparing a Non-Word Repetition Task Performance to a Standardized Morphosyntax Measure in Bilingual Spanish-English Children

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NORTHERN ILLINOIS UNIVERSITY

Comparing a Non-Word Repetition Task
Performance to a Standardized Morphosyntax
Measure in Bilingual Spanish-English
Children

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By

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Comparing a Non-Word Repetition Task Performance to a Standardized Morphosyntax

Measure in Bilingual Spanish-English Children

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Abstract

To diagnose a child with a language impairment, speech-language pathologists (SLPs) most often rely on standardized norm-referenced assessment tools. However, current norm-referenced assessment tools used to make speech-language diagnostic decisions are often not representative of the linguistic variability observed in many children in the United States. This issue creates a need for bias free assessment tools. One approach to help reduce bias in assessment is the use of processing-based tasks. These tasks attempt to reduce bias by focusing on overall skills such as memory and eliminate the reliance on prior linguistic knowledge. One processing-based measure that has shown diagnostic potential is a non-word repetition task. In this task, clients are asked to repeat non-sensical words that are based on a language's phonotactic structure while systematically increasing in length and complexity. In the present study, we administered two non-word repetition tasks to Spanish-English bilingual pre-school age children ($n = 11$; $Mean\ age = 5.19$, $SD = 0.79$). Children completed one non-word repetition task in which the non-words were based on English phonology and one where the non-words were based on Spanish phonology. Correlation analyses were used to compare the performance on the non-word repetition tasks to a standardized measure of morphosyntax and a parent rating of children's language skills. The results revealed that the non-word repetition task has diagnostic potential, but appears to be more suitable for the weaker language. Specifically, a significant correlation between the non-word repetition task and the standardized assessment was only found in Spanish but not in English, and all participants had lower Spanish language skills. Thus, present findings warrant further investigation into how non-word repetition tasks can be used with bilingual children especially when their language skills are not equally balanced.

Keywords: non-word repetition, processing-based tasks, bilingual children, assessment

Introduction

The number of bilingual children is continuously growing in the United States and other countries. To put into perspective, in 2019, there were over 67 million Americans ages five years and over that spoke a language other than English in the home (Dietrich & Hernandez, 2022). This means that children will have various language profiles, depending both on the quantity and quality of language input. With these drastic changes and variability in language profiles, children learning more than one language poses a unique challenge for speech-language pathologists. The problem surrounding these different language profiles is that there is a lack of appropriate diagnostic tools available to gather the entirety of each child's communicative abilities, as many tests rely on prior language knowledge or do not include bilingual children in the normative sample. This barrier has created more over- and under-diagnosis of bilingual children with language impairment. Misidentifications can then lead to unnecessary costs for services and psychological effects on the child. Therefore, researchers have proposed several tools/methods to reduce the bias seen across assessment measures, one of which includes processing-based tasks.

Processing-Based Tasks

Processing based tasks are expected to remove the reliance on prior experiences and instead, aim to examine information-processing skills used by the child. Examples of these types of tasks include measures of novel word-learning and short-term memory. Many studies have looked at the clinical utility of using processing-based measures by comparing the scores of monolingual and bilingual children, but findings have had mixed results. Some studies have found that performance can be relatively similar across monolingual and bilingual children,

regardless of differing performance levels across knowledge-based tasks. (Sharp & Gathercole, 2013; Danahy et al., 2007; Lee & Gorman, 2012; Lee, Kim, & Yim, 2013) For instance, Danahy et al. (2007) looked at performance across a counting span task by examining the performance of Spanish-speaking children to monolingual English-speaking children and found similar accuracy levels across both groups. This differs from other studies that have found that bilingual and monolingual children who already have pre-existing differences across knowledge-based tasks also have differences across processing-based measures (Gutiérrez-Clellen, Calderón, & Ellis Weismer, 2004; Windsor et al., 2010; Kohnert et al., 2006).

Another study completed by Buac, Gross, & Kaushanskaya (2016) sought after examining these discrepancies by further examining the performance of bilingual English-Spanish-speaking children and monolingual English-speaking children across multiple processing-based tasks. The result revealed that monolingual children performed better across short-term memory tasks, but not within working memory and novel word-learning measures. They additionally found that vocabulary skills and socioeconomic status affected the performances obtained by the bilingual group more than the monolingual group. These findings led researchers to believe that working memory tasks may be better than short-term memory tasks when testing bilingual children. Regardless, the authors note that they still found reoccurring biases that are like others that have been seen within bilingual populations, which include prior language knowledge and socioeconomic status.

The tasks that have received the most attention and have been identified to have promising diagnostic accuracy are non-word repetition tasks (NWR). NWR consists of using a set of nonsensical words that do not hold any semantic value, eliminating the bias of previous language knowledge. In it, participants are asked to repeat non-words after an auditory stimulus

presents each word. For bilingual populations, where language experiences typically factor into performance, non-words may be ideal since participants have not been exposed to the words prior to the task.

Quasi-Universal vs. Language Specific

Non-word repetition tasks can be based on either a language-specific or quasi-universal task. A language-specific task uses non-words based on the phonology of the specific language looking to be observed through the measure. For instance, a language-specific non-word repetition task that is composed in English would have non-words that follow English phonology, and the formation of the word may not make sense in another language that differs heavily based on form. This differs from quasi-universal tasks, where non-words are created with the phonology of many different languages in mind. While this type of task is aimed to be administered across multiple languages, it still must be used with caution since language-specific elements are inevitably retained regardless of attempts to take out all bias. Based on current research, language-specific non-word repetition tasks have shown more promise of clinical utility for bilingual English-Spanish-speakers. The discussion for this is driven by the fact that the phonological structures between English and Spanish do not allow for a completely unbiased quasi-universal task to be administered to the population. A research study conducted by Irizarry-Pérez, Peña, & Bedore (2021) found that bilingual Spanish-English-speakers performed better on a Spanish non-word repetition task compared to an English non-word repetition task when using comparable syllable lengths across tasks. Once identified, they added additional 5-syllable non-words to the Spanish task and additional monosyllabic words to the English task and found that children performed similarly across both non-word repetition tasks. The researchers determined that Spanish words are composed of longer syllables than in English, so

using comparable syllable length was biased towards the Spanish task due to phonological structure differences. Quasi-universal measures would not be able to equally challenge a child in both languages and would conclude biased results. In addition to task specific factors affecting performance on non-word repetition tasks, studies have shown that child specific factors also impact performance on non-word repetition tasks.

Factors Affecting Non-Word Performance

Non-word repetition has also been compared to different measures that affect language development, which include items such as vocabulary, language exposure, and parent concerns. Many of these factors have mixed results across studies when correlated to a non-word repetition task. Farabolini, Rinaldi, Caselli, & Cristia (2021) compared a non-word repetition task to several different measures that included receptive vocabulary scores, cumulative exposure, age of first exposure, current exposure, maternal education, and parent concerns. The study found correlations between non-word repetition tasks and receptive vocabulary scores, along with correlations between non-word repetition and parental concerns. This differed from maternal education and language exposure, which were not found to be correlated to non-word repetition performance. Other studies have found that performance on non-word repetition tasks is correlated to language exposure (Gutiérrez-Clellen & Simon-Cerejido, 2010; Kohnert et al., 2006), vocabulary (Lee, Kim, & Yim, 2013; Hoff, Core, & Bridges, 2008), and language experiences (Windsor et al., 2010; Summers et al., 2010).

The Current Study

The current study aims to provide new data into the clinical utility of using non-word repetition tasks to make a diagnosis of language impairment. Our study incorporates both English and Spanish non-words to assess bilingual preschool and early school-age children. This

population was chosen because these ages are most likely to be misidentified for disorders that include language impairment. Through a sample of bilingual English-Spanish speaking children, we collected performance across non-word repetition tasks, standardized measures, and parent reports. These measures were analyzed to examine if a non-word repetition task shows comparable diagnostic utility to standardized measures when assessing the language skills of bilingual children. Additionally, the measures were examined to see if there is a correlation between a non-word repetition task and a language impairment risk index calculated through a parent questionnaire. Based on current research, it is expected that a non-word repetition task will have diagnostic utility when compared to a standardized measure of morphosyntax in both English and Spanish (Summers et al., 2010; Girbau & Schwartz, 2007). In line with results from Farabolini et al. (2021) it can additionally be hypothesized that our non-word repetition tasks will be correlated to a language impairment risk index observed through parent reports.

Method

Participants

The study was approved by the Northern Illinois University Institutional Review Board. Bilingual English-Spanish speaking children were recruited through flyer distribution in the DeKalb-Sycamore area. All children were required to pass a bilateral hearing screening at 25 dB. Participants included 11 English-Spanish bilingual children (4 males, 7 females) that ranged from 4 to 6 years old with a mean age of 5.19 (SD=0.79). Socioeconomic status (SES) was calculated by averaging the primary caregivers' total number of years of education. The average SES across participants was 12.96 (SD=1.82), indicating at least a high school education. All participants began hearing English from about birth (Mean = 0.60 months; SD = 1.90) and Spanish around 5 months (Mean = 5.20; SD = 11.48). Children also began producing two-word

phrases in English around two years of age (Mean = 26.10 months; SD = 4.01) and in Spanish slightly before three years of age (Mean = 32.67; SD 8.54). As part of a questionnaire, caregivers were asked to provide their child's exposure to each language during a typical week. On average, participants were exposed to English 70.73% (SD = 14.08) of the time and to Spanish 29.27 (SD = 13.77) of the time.

Tasks

Questionnaire

Children's linguistic exposure and history were obtained through a caregiver questionnaire. The questionnaire was designed to ask each caregiver questions about when the child started hearing English and Spanish, the age they were when reaching language milestones (ex; began producing 2-word phrases, began producing complete sentences), and the exposure they have to each language in a typical week. Caregivers were also asked to rate the child's receptive and expressive abilities in each language and to provide socioeconomic status information.

Non-Word Repetition Task

Two non-word repetition tasks were administered, one based on English phonology and one based on Spanish phonology. The English non-word repetition (NWR) task designed by Dollaghan and Campbell (1998) was used. The items included in the measure consist of sixteen non-words that range between one and four syllables (four non-words per syllable length). Each non-word was designed to exclude the use of late-developing sounds, individual syllables that correspond to real English words, consonant clusters, and the use of a consonant or vowel more than once per non-word. The Spanish non-word task used was the task developed by Calderòn (2003). This task included sixteen non-words that range between two and five syllables (four

non-words per syllable length). The non-words in this measure were based on the rarity of the syllable structures in real Spanish words. Summers et al. (2010) describes that the syllables used for each non-word occurred less than 200 times in the Alameda and Cuetos (1995) corpus of 2 million words. Both measures were chosen because of their disassociation from real English and Spanish words, and they have been successfully implemented in previous studies.

Standardized Assessments

Subtests from the Bilingual English-Spanish Assessment (BESA; Peña, Gutiérrez-Clellen, Iglesias, Goldstein, Bedore, 2018), Phonology and Morphosyntax, were administered in English and Spanish. The phonology task measured the phonological skills of each child. The morphosyntax subtest included cloze and sentence repetition tasks to measure grammatical morphemes and working memory skills. The Memory for Digits subtests from the Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, Rashotte, & Pearson, 2013) was also used to measure phonological awareness and memory. Please refer to Table 1 below for children’s demographic data.

Table 1. Demographic data

	Mean (SD)
N	11
Age (years)	5.19 (0.79)
Socioeconomic Status (years of parent education)	12.96 (1.82)
Began hearing English (months)	0.60 (1.90)
Began hearing Spanish (months)	5.20 (11.48)
Current English exposure (%)	70.73 (14.08)
Current Spanish exposure (%)	29.00 (13.77)
Morphosyntax (BESA: Standard score best language score)	88.91 (13.82)
Memory for Digits (Scale score)	5 (1.95)

Analysis

The non-word repetition tasks were scored by two students, one undergraduate student

and one graduate student. The undergraduate student scored the English non-word repetition task while the graduate student, who is a Spanish-English bilingual speaker, scored the Spanish non-word repetition task. The non-word repetition tasks were scored using the phonological scoring system, where children were given credit for each phoneme that was correctly repeated. This scoring method resulted in the most variability in performance. Reliability was calculated by having another Spanish-English bilingual speaker score all the non-words, resulting in 97% agreement for the English non-word repetition task and 96% agreement for the Spanish non-word repetition task. Given the small sample size, Spearman's rho nonparametric correlation analyses were used to assess the relationship between children's performance on the non-word repetition tasks and their performance on the standardized measure of morphosyntax, in each language, and parent ratings of language skills.

Results

English Non-Word Repetition Task

Overall, children obtained a proportion correct of 0.70 (SD = 0.07) on the English non-word repetition task. Correlation analysis did not reveal a significant relationship between the English non-word repetition task and the English Morphology subtest of the BESA ($r_s = 0.06$, $p = .86$). Similarly, there was no significant relationship between children's performance on the non-word repetition task and parent's ratings of English receptive language skills ($r_s = -0.17$, $p = 0.61$) or expressive language skills ($r_s = -0.16$, $p = 0.62$).

Spanish Non-Word Repetition Task

Overall, children obtained a proportion correct of 0.56 (SD = 0.12) on the Spanish non-word repetition task. Correlation analysis revealed a significant relationship between the Spanish non-word repetition task and the Spanish Morphology subtest of the BESA ($r_s = 0.70$, $p = 0.02$).

However, there was no significant relationship between children's performance on the non-word repetition task and parent's ratings of Spanish receptive language skills ($r_s = -0.20, p = 0.55$) or expressive language skills ($r_s = 0.40, p = 0.23$).

Discussion

The goal of the present study was to assess diagnostic utility of non-word repetition tasks in pre-school and early school-age Spanish-English bilingual children. Two non-word repetition tasks were administered to a group of 11 participants, one non-word repetition task used words based on English phonology while the other task used words based on Spanish phonology. Significant correlation was only observed between the Spanish non-word repetition task and the Spanish language measure. There were no significant correlations between the Spanish non-word repetition task and parent ratings of children's Spanish receptive and expressive skills. The English non-word repetition task did not significantly correlate with either the standardized measure of English morphosyntax or the parent ratings of English receptive and expressive language skills. It was hypothesized that a non-word repetition task would show diagnostic utility in both English and Spanish when compared to standardized measures examining morphosyntax in both languages. It was also hypothesized that a non-word repetition task would be correlated to a parent rating of concern calculated through a parent questionnaire. However, we observed that significant correlation was only observed with the Spanish non-word task and the Spanish standardized language measure. It is likely that our results are due to a low sample size and also a sample that consisted of participants that were dominant in English compared to Spanish, resulting in a lack of variability in scores.

English Non-Word Repetition

Overall, children performed better on both the English standardized language measure

and the experimental non-word repetition task, and were rated by parents to have higher English speaking and understanding abilities. This aligns with this sample's exposure to each language, with children being exposed to English on average 70% of the time in a typical week while being exposed to Spanish an average about 30% of the time. Thus, these children have relatively stronger English language skills. The lack of a correlation between the two measures is likely due to lack of variation in the English measures' scores. Thus, for bilinguals who have one language that is relatively stronger, it may not be necessary to administer a processing-based measure for the stronger language. In fact, in previous work, it has been shown that children who are exposed to a language for 60% of the time or more function like monolingual children (Cattani et al., 2014) in that language.

Spanish Non-Word Repetition

A strong positive correlation was observed between the Spanish non-word repetition task and the Spanish language measure. However, there was not a significant correlation between the Spanish non-word repetition task and a parent rating of children's Spanish language skills. The discrepancy between the two language measures, the standardized assessment and the parent rating, is likely because parents may not be accurately rating their children's language skills. In fact, a correlation analysis between the Spanish language measure and parents' rating of their children's Spanish speaking and understanding abilities revealed a lack of a significant correlation. This is not surprising given the findings of a recent study which showed that parents have poor ability to identify developmental language disorder in their children when asked to rate their children's language skills (Nayeb et al., 2020).

Limitations

Limitations for this study include the relatively low sample size for participants. This low

sample size was reflected in the lack of variability in scores within the English non-word repetition task and the parent questionnaires in both English and Spanish. Alongside a small sample size, each participant was also dominant in English, and this affected the scores obtained for each task.

Conclusion

The present findings reveal that a non-word repetition task may have diagnostic utility when assessing Spanish-English dual language learners. Participants in the present study were found to be dominant in English across the standardized morphosyntax task and non-word repetition task, which reveals that both tasks are more sensitive for the weaker language. We also observed that the Spanish morphosyntax scores on the standardized assessment were well below the mean, but performance on the non-word repetition task were similar for both the English and Spanish tasks. These findings underline the importance of obtaining measures other than standard assessment scores when assessing dual language learners, especially for the weaker language. This also reveals that the weaker language is more vulnerable during assessment and thus measures such as non-word repetition tasks may be better able to demonstrate potential in that language. Future work should focus on obtaining a sample of bilingual children with more variable language exposure and language skills to delineate how these factors impact performance on a processing-based measure such as non-word repetition tasks. Future work should also focus on assessment approaches for children who may have a relatively weaker one language compared to the other.

References

- Buac, M., Gross, M., & Kaushanskaya, M. (2016). Predictors of processing-based task performance in bilingual and monolingual children. *Journal of Communication Disorders, 62*, 12-29.
- Calderón, J., (2003). Working memory in Spanish–English bilinguals with language impairment. Unpublished doctoral dissertation, University of California, San Diego and San Diego State University.
- Cattani, A., Abbot-Smith, K., Farag, R., Krott, A., Arreckx, F., Dennis, I., & Floccia, C. (2014). How much exposure to English is necessary for a bilingual toddler to perform like a monolingual peer in language tests?. *International Journal of Language & Communication Disorders, 49*(6), 649-671.
- Danahy, K., Windsor, J., & Kohnert, K. (2007). Counting span and the identification of primary language impairment. *International Journal of Language & Communication Disorders, 42*(3), 349–365.
- Dietrich, S., & Hernandez, E. (2022). Language use in the United States: 2019. *American Community Survey Reports*.
- Dollaghan, C., & Campbell, T. F. (1998). Nonword repetition and child language impairment. *Journal of Speech, Language, and Hearing Research, 41*(5), 1136-1146.
- Farabolini, G., Rinaldi, P., Caselli, M. C., & Cristia, A. (2021). Non-word repetition in bilingual children: The role of language exposure, vocabulary scores, and environmental factors. *Speech, Language and Hearing, 1-16*.
- Girbau, D., & Schwartz, R. G. (2007). Non-word repetition in Spanish-speaking children with Specific Language Impairment (SLI). *International Journal of Language & Communication Disorders, 42*(1), 59-75.
- Gutiérrez-Clellen, V. F., Calderón, J., & Ellis Weismer, S. (2004). Verbal working memory in bilingual children. *Journal of Speech, Language, and Hearing Research, 47*(4), 863–876
- Gutiérrez-Clellen, V. F., & Simon-Cerejido, G. (2010). Using nonword repetition tasks for the identification of language impairment in Spanish-English-speaking children: Does the language of assessment matter?. *Learning Disabilities Research & Practice, 25*(1), 48-58.
- Hoff, E., Core, C., & Bridges, K. (2008). Non-word repetition assesses phonological memory and is related to vocabulary development in 20-to 24-month-olds. *Journal of Child Language, 35*(4), 903-916.
- Irizarry-Pérez, C. D., Peña, E. D., & Bedore, L. M. (2021). Phonological predictors of nonword repetition performance in bilingual children. *Journal of Communication Disorders, 94*,

106156.

- Kohnert, K., Windsor, J., & Yim, D. (2006). Do language-based processing tasks separate children with language impairment from typical bilinguals? *Learning Disabilities Research & Practice, 21*(1), 19–29.
- Lee, H. J., Kim, Y. T., & Yim, D. (2013). Non-word repetition performance in Korean-English bilingual children. *International Journal of Speech-Language Pathology, 15*(4), 375-382.
- Lee, S. A. S., & Gorman, B. K. (2012). Nonword repetition performance and related factors in children representing four linguistic groups. *International Journal of Bilingualism, 17*(4), 479–495.
- Nayeb, L., Lagerberg, D., Sarkadi, A., Salameh, E. K., & Eriksson, M. (2021). Identifying language disorder in bilingual children aged 2.5 years requires screening in both languages. *Acta Paediatrica, 110*(1), 265-272.
- Peña, E. D., Gutiérrez-Clellen, V. F., Iglesias, A., Goldstein, B. A., & Bedore, L. M. (2018). Bilingual English Spanish Assessment (BESA). *Baltimore, MD: Brookes*.
- Sharp, K. M., & Gathercole, V. C. M. (2013). Can a novel word repetition task be a language-neutral assessment tool? Evidence from Welsh–English bilingual children. *Child Language Teaching and Therapy, 29*(1), 77–89.
- Summers, C., Bohman, T. M., Gillam, R. B., Peña, E. D., & Bedore, L. M. (2010). Bilingual performance on nonword repetition in Spanish and English. *International Journal of Language & Communication Disorders, 45*(4), 480-493.
- Wagner, R.K., Torgesen, J.K., Rashotte, C.A., & Pearson, N.A. (2013). CTOPP-2: Comprehensive test of phonological processing. Austin: Pro-ed.
- Windsor, J., Kohnert, K., Lobitz, K. F., & Pham, G. T. (2010). Cross-language nonword repetition by bilingual and monolingual children.