Research Note

Language Proficiency and Dominance Considerations When Working With Spanish–English Bilingual Adults

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Purpose: As the Hispanic population continues to increase within the United States, there is a pressing need to incorporate rigorous and efficient clinical assessments of language dominance and proficiency when working with Spanish–English bilingual patients. The purpose of this study was to begin addressing this need by evaluating the association between language dominance and language proficiency.

Method: The association between scores for the English Versant Test (Pearson Education, 2010), an automated

assessment of spoken language proficiency, and dominance and proficiency scores obtained using the Bilingual Language Profile, a self-report questionnaire was evaluated.

Results: The results indicated that half of the variance in the English Versant Test was explained by the response to a single question included in the Bilingual Language Profile.

Conclusion: These data support the inclusion of asking patients to not only indicate how many languages they speak but, for those patients that speak more than 1 language, to also ask how well they understand each of the languages.

There are currently over 40 million Spanish-speaking individuals in the United States (Ryan, 2013), reflecting a 133% increase since the 1990s. This demographic statistic highlights the need for accurate assessments of communication outcomes in individuals who speak Spanish or who speak both Spanish and English. Despite this need, few audiologists in the United States speak Spanish fluently. In fact, only 2% of American Speech-Language-Hearing Association (ASHA) certified audiologists report being a bilingual Spanish/English language service provider (ASHA, 2019a, 2019b). Added to the shortage of bilingual clinicians, heterogeneity within the bilingual population can create large variation in test performance for this group (Rimikis, Smiljanic, & Calandruccio, 2013), complicating the interpretation of test results and

highlighting the importance of understanding the person's language profile for their two languages.

Two important components of an individual's language profile are proficiency and dominance. Language proficiency is the extent to which the individual's current language abilities meet age-based standards set by native or monolingual speakers (Bedore et al., 2012). Language proficiency has been associated with vocabulary and grammatical skills (reviewed by Bialystok, Craik, Green, & Gollan, 2009), but factors such as the age of English language acquisition, daily language, and sociolinguistic use influence English language proficiency for Spanish–English bilingual adults (e.g., Grosjean, 1998; von Hapsburg & Peña, 2002). Therefore, it is not sufficient to simply administer a vocabulary test in English to determine a bilingual patient's ability to complete an English speech perception task.

Language dominance refers to the relative proficiency of the bilingual person's two languages (e.g., Gathercole & Thomas, 2009). Dominance in bilinguals tends to be categorized into three groups: (a) first language (L1) dominant, (b) second language (L2) dominant, or (c) balanced bilingual, meaning the individual has equal levels of proficiency in both languages. Language dominance and proficiency are not interchangeable; higher levels of proficiency in one language do not necessarily indicate language dominance. For example, immigrants with many years of immersion in

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their L2 have shown dominance in their L2, whereas remaining more proficient in their L1 (Harris, Gleason, & Aycicegi, 2006).

Due to the heterogeneity of bilinguals' language experience, obtaining information about an individual patient's language proficiency and dominance is essential in order to ensure that audiological assessments and services are provided and interpreted appropriately. This concern is particularly important when assessing speech recognition in noise, which may reveal bilingual/monolingual differences in speech recognition performance that are not always evident when speech recognition testing is completed in quiet (e.g., Gat & Keith, 1978; Rogers, Lister, Febo, Besing, & Abrahms, 2006; Shi, 2015). Speech-in-noise testing is an important part of the audiological test battery, contributing to the diagnosis of hearing loss, informing decisions regarding device candidacy, and facilitating recommendations for additional services or interventions. However, administering speech-in-noise tests to our bilingual patients is complicated. Clinicians who are monolingual speakers of English cannot administer and score open-set speech-in-noise tests in a language other than English. Furthermore, it can be difficult for these same clinicians to appropriately score open-set speech-in-noise tests in English when working with patients who have highly accented speech (Rimikis et al., 2013). Interpreting test results poses additional challenges, as audiologists must differentiate whether poor performance for these patients is due to an auditory impairment or linguistic inexperience (e.g., Rimikis et al., 2013; von Hapsburg & Peña, 2002). As a result of this conundrum, many audiologists omit speech recognition testing altogether when working with patients who have a diverse linguistic background (ASHA, 2004).

Self-report questionnaires are often used to characterize the language profile of bilingual participants in the laboratory (e.g., Dunn & Fox Tree, 2009; Lim, Liow, Lincoln, Chan, & Onslow, 2008; Marian, Blumenfeld, & Kaushanskaya, 2007). For example, the Language Experience and Proficiency Questionnaire (Marian et al., 2007) collects valuable information about language proficiency, experience, and attitudes in both languages. Although used extensively in laboratories, the use of self-report questionnaires has not been widely adopted in clinical settings. Existing questionnaires tend to be difficult to score, often include complex questions, and/or are deemed to be too time consuming to incorporate into the clinical test battery.

The goal of this study was to begin to address the need for efficient and rigorous clinical assessments of language proficiency and dominance in Spanish-English bilingual patients in order to better understand individual linguistic profiles, determine the most appropriate tests for speech-in-noise testing, and interpret results obtained in either language. The approach was to examine the feasibility of administering two language profile assessments, the English Versant Test (Pearson) and the Bilingual Language Profile (BLP; Birdsong, Gertken, & Amengual, 2012), with a specific focus on evaluating the association between estimates of language proficiency and dominance

obtained using these two measures. The English Versant Test was selected because it offers an automated assessment of language proficiency, and prior research has shown that scores on the English Versant Test predict English speech-in-noise recognition performance for non-native speakers of English (e.g., Rimikis et al., 2013). The BLP was selected for its potential to be used in a clinical setting; the BLP is freely available, quick to administer, and yields a quantitative score.

The BLP is composed of 19 questions organized into four modules. The modules were designed to evaluate the following: (a) language history, (b) language use, (c) language proficiency, and (d) language attitudes. The test is self-administered either in paper format or electronically via computer. The BLP includes questions regarding non-linguistic variables, such as cultural identification and language attitudes, while also providing a general profile of language capabilities. The assessment yields scores for each module as well as a global dominance score that is derived from an equal weighing of scores for each module. The global dominance score ranges from -218 to +218; a positive score indicates English dominance, whereas a negative score indicates Spanish dominance. A score close to 0 indicates similar proficiency between the two languages, suggesting that neither language is dominant and that the person identifies more as a balanced bilingual.

The English Versant Test is an automated speech recognition measure of language proficiency conducted over the telephone. The test takes 15–20 min to complete in each language. Scoring does not rely on subjective responses from the participant, but is instead done using speech processing technology that evaluates the different rhythms and varied pronunciations used by native and nonnative speakers. The test provides an overall proficiency score, ranging from 20 to 80, which encompasses sentence mastery, vocabulary, fluency, and pronunciation, and a detailed description of the person's language capabilities. Scores for the individual modules, using the same scoring range, are also provided. Test takers are categorized into three groups based on the overall score: (a) Proficient, (b) Independent, and (c) Basic User. A score equivalency scale, comparable with other tests that measure language proficiency, is also provided.

Rimikis et al. (2013) reported a significant linear correlation between the English Versant Test scores and English sentence recognition in speech-shaped noise for a group of 102 nonnative speakers of English. Versant scores accounted for 63% of the variance in speech-in-noise performance. In contrast, self-reported factors such as age of immigration, number of years in the United States, and proportion of daily English use accounted for only 33% of the variance in speech-in-noise performance across their sample of participants. This observation suggests that the Versant provides information pertinent to speech-in-noise recognition testing that may be difficult to obtain using subjective responses to a simple query of demographic factors.

The English Versant Test is automated and yields detailed, yet easy to understand, information about an

individual's language knowledge and spoken language capabilities. However, the cost of the test and time associated with the Versant test may not be practical for use in a clinical environment. Testing in a single language costs approximately \$30 and takes 15–20 min to complete. Unlike the Versant, the BLP can be administered in both languages in about 10 min at no cost to the researcher or clinician.

The type of information provided by the BLP and Versant tests can help determine candidacy for a research study, may provide valuable information regarding what language to test during a clinical visit, and would be useful to guide appropriate audiological interventions. In this study, bilingual Spanish–English speakers completed the BLP and the English Versant Test. The objective was to identify a test that would reliably and concisely measure language proficiency and dominance, while being feasible for use in an audiology clinic.

Method

Participants

Fifty-three adults, ages ranging from 19 to 53 years (17 male, 36 female, $M_{\text{age}} = 30$ years), participated in this study. Each participant passed a hearing screening on the day of their visit in accordance with American National Standards Institute, 2010 (thresholds less than or equal to 20 dB HL for octave frequencies between 250 and 8000 Hz). All participants reported having knowledge of both English and Spanish, either through exposure at school or at home. Self-reported initial exposure to L2 ranged from birth to after 20 years of age. Fifty participants indicated that their L1 was Spanish (17 male, 33 female). On average, these participants reported that they were exposed to English at 8 years of age and felt comfortable using English at 11 years of age. Three participants (three female) reported being exposed to both English and Spanish since birth. Most participants indicated that they spoke Spanish at home, on average using Spanish 72% of the time with their families. In order to be enrolled in the study, participants had to receive a score of 35 or higher on the English Versant Test. A score of 35 corresponds to a Basic User, indicating the ability to understand, recall, and produce phrases and complete sentences.

English Versant Test

All participants completed the English Versant Test. As previously mentioned, the Versant test is an automated speech recognition assessment of spoken language proficiency conducted over the phone. The test was developed to assess sentence mastery, vocabulary, fluency, and pronunciation in a selected language (Spanish, English, Mandarin, etc.). To complete the Versant, participants were seated alone inside a quiet room or sound booth. A landline telephone was used. Prior to beginning the test, participants were given an instruction sheet by lab personnel. This sheet included information about how to initiate the test, how to hold the phone, and how to answer questions. The test began as soon as the participant successfully dialed the test phone number. The automated test examiner guided the participant through

six different tasks (reading, sentence repetitions, answering questions, sentence builds, story retelling, and open-ended questions). The participant had 40 s to answer each question.

The Versant scores both the content and the manner of speech by using speech processing technology that was developed to handle the different rhythms and varied pronunciations used by native and nonnative English speakers. In addition to recognizing spoken words, the system is designed to identify the part of the speech signal containing relevant segments, syllables, and words in the response. Based on this processing, scores are assigned based on the content of what was spoken as well as the pace, fluency, and pronunciation of those words in phrases and sentences (Pearson Education, 2010). A proficiency score is generated for each language. Based on this score, participants are categorized as a Basic User, an Independent User, or a Proficient User of the test language. Basic Users are described as being able to understand sentences and communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. At the other end of the spectrum, Proficient Users are described as being able to speak and understand effortlessly at native-speaker speeds, contribute readily to a native-paced discussion at length, and maintain the colloquial flow.

BLP

All participants completed the BLP, which is a self-assessment questionnaire (Birdsong et al., 2012). As summarized in the introduction section, the BLP contains 19 questions that assess several domains related to language. These domains include the participant's English and Spanish language proficiency, language learning experience, age of first exposure to the language, length of residency, and language use on a day-to-day basis. Participants were instructed to complete the questionnaire independently by responding to each question. Larger scores within individual modules indicate greater language exposure in the listener's personal language history, greater language use, higher language proficiency, or a more positive attitude about language competence. A Dominance score is also computed for each language. To ensure that each module score receives equal weighing, the BLP provide factors by which each module score has to be multiplied before summing the weighted module scores for each language. Finally, a Total Dominance score is calculated by subtracting the Spanish Dominance score from the English Dominance score. Additional information collected as part of the BLP included age, current place of residency, and highest level of education.

Results

Predicting the Versant Score From the BLP Total Dominance Score

Figure 1 shows the relationship between the BLP Total Dominance and the English Versant Test scores ($r = .55$, $p < .001$). The BLP Total Dominance scores ranged from

Figure 1. Individual English Versant Test scores plotted as a function of Bilingual Language Profile (BLP) Overall Dominance scores. The solid black line indicates a significant linear fit to the data (Pearson $r = .55$; $p < .001$).

–136 to 90, with approximately two thirds of participant scores indicating Spanish dominance (i.e., negative scores). Data falling at or near the dotted vertical line indicate balanced bilinguals based on the BLP Total Dominance score. English Versant Test scores ranged from 39 (Basic User) to 80 (Proficient) across participants. The direction of the relationship between the two variables is positive, indicating that participants with a more positive BLP Dominance score (i.e., more English dominant) tended to have a higher English Versant Test score. The BLP Total Dominance score explained 31% of the variance in the Versant score, $\beta = .13$, $t = 4.73$, $df = 51$, $p < .001$.

Predicting the Versant Score From the BLP English Proficiency Score

Figure 2 shows the relationship between the BLP English Proficiency and English Versant Test scores ($r = .74$, $p < .001$). The BLP English Proficiency score represents the weighted sum of four questions. Scores can range from

Figure 2. Individual English Versant Test scores plotted as a function of Bilingual Language Profile (BLP) English Proficiency scores. The solid black line indicates a significant linear fit to the data (Pearson $r = .74$; $p < .001$).

0 to 54.48, with higher scores indicating higher proficiency in the English language. The BLP English Proficiency score explained 54% of the variance in the Versant score, $\beta = .123$, $t = 7.79$, $df = 51$, $p < .001$.

The BLP English Proficiency score is the weighted sum of the responses to four questions (Q12: How well do you speak English? Q13: How well do you understand English? Q14: How well do you write English? Q15: How well do you read English?). Cronbach's alpha was used to evaluate the extent to which scores for these four questions are related to each other. The Cronbach's alpha score using standardized variables is .92, indicating a very high level of consistency between the variables. Q13 (How well do you understand English?) was the most highly correlated with the English Versant Test score, explaining 50% of the variance in the data.

Discussion

The purpose of this study was to evaluate the association between language proficiency scores obtained through the English Versant Test, and both Dominance and Proficiency scores obtained using the BLP. The rationale for the study was to begin to address the important need for efficient and rigorous clinical assessment of language proficiency to better serve the growing number of Spanish–English bilingual patients who visit audiology clinics in the United States. By addressing this need, clinicians and researchers will better understand individual linguistic profiles, determine the most appropriate language for speech recognition testing, and consider language proficiency and dominance when interpreting test results in either language.

The Versant test was selected because of its automation and simple scoring and because prior research has demonstrated a strong association between Versant scores and performance on speech-in-noise tests (e.g., Rimikis et al., 2013). Of high importance, the predictive association with speech recognition scores suggests the Versant test offers considerable promise for audiologists who often struggle to determine whether English speech recognition testing is an appropriate assessment metric for their Spanish–English bilingual patients. Although the Versant test provides a quantifiable value that can be easily understood and potentially applied in both the research and clinical environment (e.g., Rimikis et al., 2013), several features inherent in the administration of the test reduce the likelihood that it will achieve widespread use in clinical appointments. These features include time, cost, and the need for a dedicated and quiet space. Thus, a specific goal of this study was to evaluate the extent to which two scores obtained from the BLP were associated with the English Versant score. The rationale for evaluating the BLP was that it provides a less expensive and more efficient alternative to the English Versant Test, and because of the comprehensive language profile that is generated including a numeric quantification of language dominance and proficiency.

The strongest predictor of the overall English Versant Test score was the score generated by the English Proficiency

subscale of the BLP. This relationship suggests that the two measurements are indeed capturing similar aspects of the language profile. Whereas a significant association between the BLP Total Dominance score and the English Versant Test score was observed, this association accounted for 31% of the variance in performance. In contrast, BLP English proficiency scores accounted for 54% of the variance in Versant scores. These observations highlight the importance of treating language proficiency and language dominance as separate, but related, constructs. Recall that language proficiency has been linked to multiple aspects of the language profile of an individual, including vocabulary and sociolinguistic use. On the other hand, language dominance is a relative comparison between the two languages. Clinically, this distinction can be quite important. Proficiency in one language (in the United States, this language would be English) may be required for administering specific clinical tests to determine, for example, cochlear implant candidacy. However, objective measurements that quantify dominance between the person's two languages may be needed to understand performance on an English language recognition test or to justifying the decision to include or exclude such a test. Until we have better assessment tools that can be administered by monolingual-speaking clinicians in multiple languages, a combination of proficiency and dominance measures may be required to make appropriate clinical decisions.

Administering the four questions that comprise the English Proficiency score of the BLP, or even simply asking Q13 (How well do you understand English?), may be appealing to many audiology clinics due to the relatively minimal time; administering these questions would place on the already packed clinic schedule. Nonetheless, more research is clearly needed in order to determine the interplay between language proficiency, language dominance, and speech perception testing in a clinical environment. Although the English Proficiency subscale of the BLP predicted over half of the variance in the overall English Versant Test scores, it is important to highlight that a substantial proportion of variance was unaccounted for. Future experiments are required to examine the additional contributions of participant factors such as age of English language acquisition, length of residency, and quantity and quality of English exposure in an effort to develop an efficient questionnaire that captures a person's language profile. These efforts should include evaluation of bilinguals with a wide range of language proficiency in both languages. In addition, it is important to evaluate the association between BLP proficiency scores and masked speech recognition performance. These data will provide insight into how proficiency and dominance are expected to affect performance for patients who are bilingual, building upon previous results that suggest language background and demographic information are important considerations when measuring language proficiency and dominance through self-report measures (e.g., Marian et al., 2007; von Hapsburg & Peña, 2002). Finally, understanding the multifaceted aspects of bilingualism will require a large study to gather information

on age of immigration, language of education, hours of daily exposure in the language, the number of people they communicate with in each language, and so forth. Modern statistical methods such as hierarchical modeling, or linear mixed models, can then be used to begin teasing apart variability attributed to those multifaceted elements.

The demographics of our patient population are shifting rapidly, requiring audiologists to be aware of the most appropriate ways to test bilingual patients. An important first step toward implementing more rigorous clinical assessments and decisions regarding intervention is to determine what language (or languages) should be used for a given bilingual individual. This approach implies that audiologists will avoid making assumptions about native-language status, language proficiency, and language dominance, understanding that bilingualism is multifaceted. All audiology case history forms should include the questions "What is your native language?" and "Do you speak more than one language?" The present data also suggest that an additional question of "How well do you understand each of these languages?" may provide important insight to clinicians asked to appropriately administer and interpret speech recognition test results.

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