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Dynamic Assessment for Evaluating Bilingual Children's Potential for Language Development

Over Time: A Pilot Study

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An undergraduate honors thesis submitted in partial fulfillment of the

requirements for the degree of

Bachelor of Science

in

University Honors

and

Speech and Hearing Sciences

Thesis Adviser

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March 2020

The evaluation of bilingual children from culturally and linguistically diverse backgrounds has been difficult due to various factors (Kohnert, 2010). Specifically, these children might be at a disadvantage with standardized or static tests. A child's lack of experience (i.e., cultural, educational) may create bias during assessment, yielding low scores indicative of language impairment even though the child actually has typical language abilities (Barragan, Castilla-Earls, Martinez-Nieto, Restrepo, Gray, 2018; Peña, Iglesias, & Lidz, 2001). These results contribute to the over- or underrepresentation of English Language Learners or bilingual children in special education programs, the majority of whom are Spanish speakers (Bedore & Peña, 2008; Samson & Lesaux, 2009).

Currently, no single measure exists as a gold standard to identify language impairments for bilingual children. Best practice is to conduct a comprehensive assessment of bilingual children's language abilities using various methods, such as parent observations, teacher interviews, and static assessments (Kohnert, 2010). One such measure, dynamic assessment, has been identified as a promising tool towards improving the validity of assessment methods (Goldstein & Kohnert, 2005). Dynamic assessment (DA) measures a child's learning abilities, rather than their knowledge of specific language concepts or structures at a given point in time (Gutierrez-Clellen & Peña, 2001; Kapantzoglou, Restrepo, & Thompson, 2012; Lantolf & Poehner, 2007; Peña et al., 2001).

Many studies found dynamic assessment a valid tool in identifying language disorders with different language domains. For example, DA for bilingual children has been developed as a measure for narrative structure (Limmerstedt & Lyhre, 2011; Peña, Gillam, & Bedore, 2014; Petersen, Chanthongthip, Ukrainetz, Spencer, & Steeve, 2017), word learning skills

(Kapantzoglou et al., 2012; Peña et al., 2001), syntactic abilities (Hasson, Dodd, & Botting, 2012; King, 2014), and reading skills (Petersen & Gillam, 2015). The latter language skill was examined as a predictive measure of reading ability through a longitudinal study. Outside of this, there remains a lack of literature tracking the efficacy of DA over time for bilingual children in other domains of language. The goal of this study is to examine pilot data regarding the predictive validity of dynamic assessment of word-learning and rule-learning skills based on long term changes in bilingual children's language abilities.

Language assessment in bilingual Spanish-English speaking children

Current standard practice for assessing and diagnosing bilingual children is by gathering converging evidence from various measures, such as standardized, normed referenced tests, language sample analyses, and parent interviews. When examined together, similar conclusions across multiple methods provide a more accurate representation of the child's underlying language abilities and indication of the presence or absence of a language disorder. Of these methods, parent reports have been found as a very effective as an indicator of language impairment (Restrepo, 1998). although language sample analysis would be the strongest measure for diagnosis (Dollaghan & Horner, 2011; Restrepo, 1998). Examining multiple linguistic features (ie. grammar, lexical diversity, syntax) within an elicited language sample yields a more naturalistic analysis of the child's language skills in comparison to responses on vocabulary or grammatical elicitation tasks in standardized, normed-referenced tests. Nevertheless, language sample analysis may require extensive experience with the analysis process and a strong understanding of developmental patterns in order to correctly identify a developmental language disorder.

Standardized norm-referenced tests, such as the Clinical Evaluation of Language Fundamentals-Fourth Edition, Spanish (CELF-4 Spanish; Semel Wiig, & Secord, 2006) and the Preschool Language Scales-Fifth Edition (PLS-5; Zimmerman, Steiner, & Pond, 2011), are often used in the assessment process for diagnosing language disorders. Specific cut scores for different ages facilitate the interpretation of test outcomes; however, these score interpretations may lack validity due to numerous factors. For example, besides age, the characteristics of the norming group may not match the characteristics of the child being tested (Barragan et al., 2018). Specifically, the child's cultural and linguistic background must match those of the norming group for valid score interpretations since unfamiliarity with certain test stimuli may lead to bias within the test (Peña et al., 2001). In these cases, low performance may be due to a lack of experience in test material, not language disorder. This may contribute to a lack of specificity in assessment or overidentification of low income, Spanish-English speaking children (CELF-4; Spanish; Barragan et al., 2018; Coret & McCrimmon, 2015; Leaders Project, 2014).

Validity evidence of dynamic assessment as a language measure

Dynamic assessment examines information regarding children's academic performance which may not be captured with static tests. Vygotsky's model for the "zone of proximal development" is one of the main theoretical foundations for dynamic assessment (Grigorenko, 2009; Gutierrez-Clellen & Peña, 2001; Lantolf & Poehner, 2007). The "zone of proximal development" is the developmental level and cognitive tasks which are beyond the ability of a child to accomplish alone but which they may achieve with adult assistance. Dynamic assessment works to assess the child's *learning ability* through the zone of proximal development rather than the knowledge they have acquired with experience or instruction. This

is achieved using observations of the child's response and success in acquiring (learning) the desired language skill during examiner supported learning exercises. In this way, test bias is reduced by assessing the child's performance in an environment which promotes the ability to accomplish the desired task (Peña et al., 2001). Additionally, DA can be developed to assess children's language skills as domain general or domain specific (Grigorenko, 2009). That is, dynamic assessment may measure a child's learning potential across all cognitive functioning or be tailored to assess specific areas or skills (ie. reading, syntax, math).

One approach to dynamic assessment is the mediated learning experience (Feuerstein, 1979) approach which includes three parts: a pretest, teaching, and posttest session. First, the initial testing section examines the child's performance in the desired language domain without assistance. Then, the teaching session includes a mediated learning experience that explicitly teaches the target skill or concept in order to assess the child's learning abilities within the zone of proximal development (Feuerstein, 1979; Grigorenko, 2009). The posttest is similar to the pretest in format and content in order to examine the child's performance following meaningful instruction. Observations of the child's behavior and strategies during these stages may provide additional clinical information regarding how the child learns and their responsiveness to intervention (Peña et al., 2001). Further, posttest scores may be used to determine their language ability. Improved performance following instruction indicates typical language development (TLD) since the child demonstrates acquiring the desired skill while difficulty applying knowledge from the mediated learning experience may indicate a developmental language disorder (DLD).

Several studies have found high diagnostic accuracy in dynamic assessment's classification of children having typical language development or a developmental language disorder. Peña et al., (2014) found that a dynamic assessment of narrative ability using a pretest, mediated learning experience, and posttest format had 80.6% to 97.2% accuracy in classifying 54 Spanish-English bilingual children. In another study, Peña et al. (2001) investigated methods to reduce cultural bias in vocabulary tests for 79 Latino and African American children through dynamic assessment of word learning to promote single-word label use. DA was found to effectively differentiate between language difference and disorder. Another study examined the efficacy in classifying language abilities through a word learning task for dynamic assessment with twenty eight, primarily Spanish-speaking children (Kapantzoglou et al., 2012). Children's ability to identify new words after a brief, 10-minute session, was found to be a promising measure to differentiate bilingual children as TLD or with DLD.

Although the efficacy of various dynamic assessment tasks in classifying bilingual children's language abilities has been supported, there is limited evidence from longitudinal studies that have evaluated predictive validity evidence for dynamic assessment over time. One such study examined whether children's ability to learn novel words during a dynamic assessment task in kindergarten predicted children's reading abilities in first grade as measured by a static test (Petersen & Gillam, 2015). A group of 63 Spanish speaking English Language Learners at risk for developmental language disorder participated in the study. Results indicated that dynamic assessment had good predictive validity, with sensitivity and specificity rates at or above 80%. Beyond this study examining reading difficulties, there is still a need to examine the predictive validity of dynamic assessment in other domains of language. Thus, the purpose of the

present study is to investigate the predictive validity of dynamic assessment measures for word learning and rule learning and the stability of its outcomes. Specifically the present study examined the following questions

1. Is DA of word- and grammatical rule learning associated with changes in children's grammaticality and mean length of utterance in words (MLUw) in language samples after approximately seven to eight months?

2. Are there differences in children's performance on DA over time?

Method

Participants

Seven Spanish-English speaking, Latino children (5 females; 2 males) were included in this study. All children were native Spanish-speakers and spoke Spanish at home with at least one of their parents. All participants' second language was identified as English. All children were recruited from Kindergarten and first grade Spanish immersion programs, in public schools, in a metropolitan area in the northwestern United States. Children were from low socioeconomic backgrounds determined on the basis of eligibility for free or reduced-price lunch.

Students were participants in a larger study that was conducted in two consecutive academic years. Children were tested at Time 1 (T1), ages 5-6, and tested after seven to eight months for Time 2 (T2), ages 6-7. Participants in the present study were English language dominant at the time of testing.

Selection Criteria

None of the participants had a history of hearing loss, sensorimotor or neurological problems, severe psychological disorders or health problems, according to a parent questionnaire. All

children passed a pure tone hearing screening at the time of each evaluation. Six children were identified with developmental language disorder and one was classified as typically developing. Children were classified as having a developmental language disorder when they met two of the following four criteria: a) parent report indicated concern of language impairment; b) the number of grammatical errors per C-unit in the language sample was 20% or above (Restrepo, 1998); c) the mean length of utterance in words was low for their age; and d) 5- and 6-year-old children scored below the cut score on the Morphology subtest of the Bilingual English-Spanish Assessment (BESA; Peña, Gutierrez-Clellen, & Iglesias, 2006) and 7-year-old children scored 1 *SD* below the mean on two grammatical subtests of the CELF-4, Spanish (Word Structure and Sentence Repetition subtests)(Semel et al., 2006).

Measures

Identification measures

The combination of parent concern, performance on a standardized norm-referenced tests and percentage of grammatical errors and mean length of utterance in the story retell can provide enough information for detecting a DLD.

Parent Questionnaires. Parent report was used to profile the participant's language use and proficiency, the child's education history, their general health concerning motor, neurological, and psychological evolution, audition issues, maternal and paternal education, and any other speech and language concerns the parents might have about their child.

Bilingual English Spanish Assessment (BESA). The BESA (Peña et al., 2006) is a standardized, norm-referenced test designed as a diagnostic tool for children with potential DLD who speak Spanish. The morphosyntax substest was used because it is considered to be accurate

between the ages of 4 years and 6 years 11 months in bilingual children. According to the technical manual, for Spanish-English speaking children between 4 years and 5 years 11 months, the sensitivity of the morphosyntactic subtest is 89.7-90.9% and the specificity is 83.2-84.7%.

Clinical Evaluation of Language Fundamentals- Fourth Edition, Spanish (CELF-4, Spanish). Children age 7 were evaluated for DLD using CELF-4 Spanish (Semel et al., 2006). The test manual reports sensitivity of 100% and specificity of 91% for the core language score at 1 *SD* below the mean for Spanish-English speakers.

Language samples analyses. A language sample in the form of a story retell was collected from each child in both English and Spanish to assess language abilities based on the number of grammatical errors in the language sample (Restrepo, 1998). The clinician read the script of two different wordless picture books, "A Boy a Dog a Frog and a Friend" (Mayer & Mayer, 1967) and "Frog on His Own" (Mayer, 1973) and then asked the child to retell the story to the tester. Narratives were transcribed and coded by two trained, undergraduate students in communication sciences and disorders who used the Systematic Analysis of Language Transcripts (SALT; Miller & Iglesias, 2010) computer program to find grammatical errors in each language sample. Semantic, phonological or cohesive errors were not counted as grammatical errors. Instead, omissions, substitutions, additions and word order mixes were considered errors. Interrater reliability for grammatical errors on 10% of the samples was 86%. Any discrepancies were resolved by consensus with a third research assistant.

Spanish-English Language Proficiency Scale (SELPS). English and Spanish language samples were used to assess each child's language proficiency in each language based on SELPS (Smyk, Restrepo, Gorin, & Gray, 2013). SELPS measures sentence length and complexity, grammaticality, vocabulary, and fluency. The weighted *k* estimate for the scale is .81 indicating high interrater reliability.

Dynamic Assessment. Both DA tasks consisted of a scripted, structured play activity based on Lidz's (1991) mediation principles. A Mediated Learning Experience approach provided consistency of procedures across participants, allowing feedback adjusted to the children's responses (Anderson, 2001). Interactions and pace of the procedures will be adjusted to each child's needs (task regulation). The DA tasks were administered in English, the children's stronger language. Examiners were trained to a criterion for conducting the tasks.

DA of Word-Learning Skills. Kapantzoglou et al.'s (2012) 10-minute DA was used in adjusted form for the English version. In both languages, the tasks followed a pretest–teach–posttest design and the main mediation principles of a Mediated Learning Experience DA approach (Feuerstein, 1979). In English, the target novel words followed the phonological rules of English. Teaching Phase: The test giver read a script about a birthday party. Description of the presents included three familiar and three unfamiliar objects. Each word was presented nine times. The examiner provided support for learning each word and allowed the child to manipulate the object to become familiar with its characteristics. The assessor then asked the child to imitate each word on three occasions. The first imitation request was an immediate imitation, the second was after a gesture, and the third was a delayed imitation. Posttest: the examiner assessed the child's ability to name and identify the objects.

DA of Grammatical Rule-Learning Skills. The English DA of grammatical rule-learning skills were similar to Anderson's (2001) Spanish rule-learning task, adapted to follow a teach-posttest design and the main mediation principles of a Mediated Learning Experience DA approach (Feuerstein, 1979). The task took 20-minutes to administer. The target grammatical rule included an inflectional morpheme (a verbal suffix) that identified the gender of the sentence's grammatical subject – subject-verb gender agreement does not exist in Spanish nor in English. Post-test, the examiner assessed the child's ability to use and comprehend the grammatical rule.

General Procedure

All research activities were completed in three sessions during the school day in a quiet school area. Session 1: hearing screenings and Spanish diagnostic measures (40-50 min); Session 2: English diagnostic measures (50-60 min); Session 3: DA of word- and rule-learning (30 min). Fluent bilingual examiners, blind to each child's diagnosis, conducted the dynamic assessments. Training was provided following Lidz's Mediation Principles (1991) with a pass/no pass criterion. The primary investigator of the larger research project attended 20% of the DA sessions to ensure procedural fidelity.

Analyses and Results

The Spearman's rho non-parametric correlations were conducted to assess whether children's first performance on the DA of word-learning skills and the DA of grammatical rule-learning skills were associated with changes from T1 to T2 in the number of grammatical errors and the mean length of utterance in language samples elicited through story-retelling tasks. Results indicated that higher grammatical rule identification scores in English rule learning DA

were associated with larger increase of MLUw in English, r_s = .84, p=.02. The remaining correlations between DA and changes in measures based on language samples were not statistically significant.

The Spearman's rho non-parametric correlations were conducted to assess whether children's performance on the DA of word-learning skills and the DA of grammatical rule-learning skills were associated with the number of grammatical errors and the mean length of utterance in language samples elicited through story-retelling tasks in T2. Results indicated that higher expressive scores on DA of word learning skills in English were associated with lower number of grammatical errors in the Spanish language samples in T2, r_s=-.72, p=.06. Although results were not statistically significant due to the small sample size of this pilot study, the correlation was strong.

The Wilcox Signed Ranks Test was conducted to compare children's performance on the DA word- and grammatical rule-learning measures in T1 and T2. Results indicated that children's performance on the DA of word-learning skills improved significantly over time; for word production, z=-2.39, p=.02 and for word identification, z=-1,78, p=0.1. There were no statistically significant changes in children's performance on the DA of grammatical rule-learning skills; for rule production, z=-1.78, p=.08 and for rule identification, z=-1.07, p=.29

Discussion

The present study used pilot data to examine whether dynamic assessment scores of word and rule learning tasks were associated with changes in children's grammaticality and mean length of utterance in both Spanish and English language samples over the course of eight months, and if there were overall score differences in their DA performance over time. The

results indicated a positive association between grammatical rule identification scores in English DA from T1and increase of MLUw in English from T1 to T2. MLU has been identified as an effective measure of language development to identify DLD in early school age bilinguals (Bedore et al., 2010; Simon-Cereijido & Gutiérrez-Clellen, 2007). As such, the correlation of increased MLUw and rule identification may support the latter as a marker of bilingual children's language development through responsiveness to language rule learning. This is consistent with previous studies which concluded that children's performance on a dynamic assessment can predict growth in abilities over time (Hasson et al., 2012; Petersen et al., 2016; Petersen & Gillam, 2015). Apart from this, it has been asserted that DA can be adapted to assess skills which are domain general or domain specific (Grigorenko, 2009). Clear associations between performance in the same language domain across assessments would support DA as a viable domain specific measurement. Because there were no correlations between DA rule learning and the grammatical accuracy of the children's language samples, this may indicate that the grammatical tasks used in the present study may have measured more general language skills rather than the specific ability of grammatical rule learning. Nevertheless, a larger study would be needed to validate these preliminary findings.

Similarly, the finding of an association between expressive scores on the DA of word learning skills in English and the children's grammaticality in the Spanish samples from T2 indicated that the word learning task may have reflected, to some degree at least, general learning ability and language skills (Grigorenko, 2009). With respect to performance in the first language, Spanish, being associated with language skills in the second language, English, these findings were consistent with previous studies which suggest cross linguistic effects in bilingual

language development (Bedore & Peña, 2008; Kohnert, 2010). For instance, there is evidence that academic support in children's primary language helps bridge the gap for learning skills in their second language (Collier & Thomas, 2004). Thus, correlations in children's performance across both languages indicated general development over time. However, it is also interesting to note that previous studies have primarily identified the significance of associations between lexical and grammatical skill development within a given language, rather than cross-linguistically (Marchman, Martínez-Sussmann, & Dale, 2004; Simon-Cereijido & Gutiérrez-Clellen, 2009). Though an association between measures in both languages may indicate general language development, further investigation should be conducted on the relationship of cross-linguistic improvement in related domains.

Findings of overall score improvement in DA of word-learning skills and a lack of score changes in rule learning from T1 to T2 were consistent with studies indicating that bilingual children may have uneven performance across various language tasks, that is, they may perform better in one domain rather than another (Kohnert, 2010). Children in the present study were identified as participants with DLD primarily through grammatical measures. Thus, they may not have had semantic limitations, at least to the same degree as grammatical deficits, and therefore improved their performance on the word learning task at T2, but not on the rule learning task. As a skill, grammar requires the child to understand and apply the correct rules of a language in order to produce an accurate response. Within this study, the rule learning task further required the child to manipulate a novel rule accurately following a brief exposure. Finally, at the current study's point of time during children's academic experience, the students were still developing grammatical skills in the eight months from T1 to T2, likely causing no significant changes in

responsiveness to rule learning. Overall, dynamic assessment for word learning has tracked general language development in responsiveness to direct instruction while rule learning has not captured these changes as clearly due to task difficulty.

Limitations and Future Directions

The findings of this study were collected from pilot data which used seven participants. Due to the small sample size of this study, findings should be interpreted with caution. Moreover, the present study's group of participants was primarily composed of children with a developmental language disorder. Future studies with larger sample sizes should compare the results across two distinct groups of children with typical language development and developmental language disorder to further investigate the generalizability of these outcomes. Performance across groups would help examine DA's sensitivity to children's responsiveness and growth in language skills over time for diagnostic purposes. Finally, the present study did not control for external factors affecting student's progress. Future research could examine how quality of instruction in the classroom and language intervention may affect children's performance on the DA tasks.

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