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CHARACTERISTICS AND CAUSAL FACTORS FOR THE RECEPTIVE-EXPRESSIVE GAP IN TYPICALLY DEVELOPED SPANISH-ENGLISH ADULT BILINGUALS

Rachael Janelle Javaherian

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**CHARACTERISTICS AND CAUSAL FACTORS FOR THE
RECEPTIVE-EXPRESSIVE GAP IN TYPICALLY
DEVELOPED SPANISH-ENGLISH ADULT BILINGUALS**

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
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Master of Arts

in

The Department of Communication Sciences and Disorders

by

Rachael Janelle Javaherian

B.A., Southeastern Louisiana University, 2016

B.S., Southeastern Louisiana University, 2017

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ABSTRACT

A receptive-expressive language gap occurs when a standardized receptive score is statistically greater than an expressive score in either a primary or a second language. In bilingual children, gap studies already exist for determining language impairment. In adults, there are few studies; nevertheless, one needs to distinguish between typical language patterns of bilingualism due to non-pathological loss of L1 skills versus problems resulting from accidents, disease, or age. To this end, the present study attempted to expand findings of studies by Gibson et al. (2012 and 2014) that focused on analysis of the gap and possible factors influencing its existence and magnitude in both Spanish and English of bilingual children. The present research investigates 21 typically-developed adult participants from 9 Spanish-speaking countries, between the ages of 25-71. The principal purpose was to demonstrate the degree to which the gap existed or had disappeared. As a secondary goal, if a gap were detected, speculation would be made as to possible causal factors associated with the gap in this sample. Participants were assessed via Zoom software with standardized bilingual versions of the *One-Word Picture Vocabulary Test (EOWPVT-SBE and ROWPVT-SBE)*. They were also assessed with the *Language Experience and Proficiency Questionnaire (LEAP-Q)*. Standardized test results were analyzed by a paired sample t-test. Analyses demonstrated no gap for the study sample. However, individual results on the tests provided curious patterns that served as a basis for discussion as to why L1 results were better overall than those of L2, why no overall typical gap appeared in either language, and why an inverse pattern of expressive language exceeding receptive language emerged. No gap may have appeared, perhaps due to presentation of several gap patterns, a mismatch between participant types used in the norming process and present study, data-gathering differences, test design, and the weaker links hypothesis. Spanish results were better due to factors of early age of acquisition (AoA) of L1, current use, and self-rating proficiency.

CHAPTER 1. INTRODUCTION

1.1. Receptive vs. Expressive Vocabulary

In the early stages of language development, children generally have a larger receptive than expressive vocabulary, that is, they can comprehend more words than they can produce. They show that they comprehend words around nine months of age, but do not start producing them until around twelve months (Benedict, H. 1979, p. 183, 198; Gibson et al., 2014a, p. 90). Pointing to pictures is generally accepted to be easier than naming them. Differences on receptive and expressive vocabulary task results may be due to differences in receptive and expressive processing; when one analyzes phonetic input during comprehension (receptive language) activation of a concept takes place, whereas production (expressive language) launches with a concept that yields a phonetic result (Gaskell & Marslen-Wilson, 1997; Indefrey & Levelt, 2004; Gibson et al., 2014b, p. 656). Despite these differences, studies have shown that both modalities are correlated; therefore, a high score on one type of test should predict a high score on its counterpart (Gibson et al., 2014a, p. 90). For typically-developing bilingual children, however, this expectation is sometimes thwarted. Their expressive language use may not be as extensive as their receptive language use and may even demonstrate a considerable gap between the two. Such performance differences can manifest themselves in what has come to be known as a “receptive-expressive gap.” (Gibson et al.2012, p. 102).

1.2. The Receptive-Expressive Gap

For the purposes of this study, the receptive-expressive gap occurs when an individual’s standardized receptive language score is statistically greater than his/her standardized expressive language score (Gibson et al. 2014b, p. 656). A gap can be a useful tool to identify language impairment via scores on standardized picture identification and naming tests for vocabulary,

especially in a monolingual language context, because the most salient and easily graspable characteristic of language development is vocabulary (Kan & Kohnert, 2005; Sheng et al., 2011; cited in Keller et al., 2015, p. 8). When a statistically-significant discrepancy appears in the standardized testing results of the two modalities, a language disorder may be indicated. The gap has been shown to indicate language impairments in bilinguals as well. For instance, in the study of Gibson et al. (2014b), it was demonstrated that the receptive-expressive gap of bilingual children with primary language impairment (PLI) was greater than that of bilingual children of typical development (Gibson et al., 2014b, p. 662). Another case in point is a study that focused on adults (Muñoz & Marquardt, 2003) and revealed that bilingual individuals with aphasia produced a greater receptive-expressive gap, with better scores in receptive rather than expressive skills, even though both modalities had deficits (p. 1129).

1.3. The Importance of Studying the Gap in Bilingual Children and Adolescents

Investigations of patterns of bilingual language knowledge and the manner in which language is processed in bilinguals are important areas of research (Ellajosyula et al., 2020, p. 551). From a purely theoretical standpoint, study of language development patterns, such as a gap in receptive and expressive language competence, contributes to an understanding of the mechanisms involved in bilingual language development. The study of language patterns of Hispanic bilinguals is useful as a means to understand how regularities, or irregularities in linguistic form, emerge from the operation of subtle neural, physical, and social processes (MacWhinney, 2015, p. 296).

From a clinical perspective, it is useful to note that non-English speaking children require approximately 3.31 years to become proficient in English (MacSwan & Pray, 2005, p. 653). They often lag behind their monolingual peers in language comprehension and production. It is necessary, therefore, to identify linguistic patterns of bilinguals in order to be

able to accurately distinguish typical differences in L2 acquisition from a language disorder and thereby avoid costly misdiagnoses that may either waste time and money for unnecessary treatment, or else delay intervention for future language and literacy difficulties (Gibson et al., 2012, p. 114). Knowledge of a receptive-expressive language gap may be included among studies with potentially useful clinical value, and to this end, several investigations have been done concerning the existence of the receptive-expressive gap in the first language (L1) and second language (L2) of bilingual children and adolescents.

1.4. Rationale for Studying the Gap in Bilingual Adults: Purpose of the Study

While bilinguals have, according to some researchers, an advantage for positive effects in old age due to cognitive reserves that result from lifelong bilingualism, such as benefits for working memory, inductive reasoning, rule learning and semantic memory, among others, as bilinguals age (Jafari et al., 2014 p. 355), many are at risk for acquiring communication disorders resulting from accidents, disease, or strokes, such as aphasia and dementia. SLPs must be ready to address the needs of these individuals (Lorenzen & Murray, 2008, p. 299). Clark et al. noted in 2005 that Spanish-speaking bilingual adults over 50 years of age comprised 10% of the total United States population of 40 million Hispanic bilinguals (the Hispanic bilingual population now totals over 60 million; United States Census Bureau, 2020). They also observed the heightened incidence of Alzheimer's disease in Hispanic bilinguals, due in part to increased rates of diabetes, hypertension, and cognitive decline even without disease processes. Thus, there is an important need for clinicians to use valid, reliable measures to determine cognitive impairment in this population (Clark et al., 2005, p. 774).

Researchers have claimed that picture-naming and picture-identification vocabulary assessments often used in clinical settings to assist in diagnosing cognitive disorders are useful as such measures because they may be especially sensitive to differences in

performance between monolinguals and bilinguals (Casas et al., 2008, p. 958). Edmonds and Donovan (2012, p. 374) also reported the advantage of imageability of the stimuli used in naming tasks as having good construct validity because this variable is less language-specific than other factors like frequency and age of acquisition. Moreover, concrete items (such as a picture) prompt a collective semantic network in bilinguals (Kroll & de Groot, 2005, p. 251; Edmonds & Donovan, 2012, p. 374).

With these statistics and concepts in mind, it is notable that, aside from a few studies (Muñoz & Marquardt, 2003; Peña et al., 2003; Linck et al., 2009), hardly anything is known about the gap in adults. Some scholars have revealed discrepancies solely in testing scores for Spanish expressive vocabulary in bilingual adults, but not in the counterpart receptive modality (Edmunds & Donovan, 2012; Gollán et al., 2008). The present study, then, hopes to address this need and attempt to contribute to the knowledge of the receptive-expressive gap in the bilingual adult population, specifically, in this case, Hispanic bilingual adults. Using as a general model the 2012 study of bilingual Hispanic children, by Gibson et al., an investigation will be made as to the central characteristics and possible explanations for the appearance of the receptive-expressive gap phenomenon in bilingual adults. As a backdrop, however, a review of the existence of the gap and its possible causes, as represented and analyzed in various studies, will be undertaken in order to highlight what is known about the phenomenon.

1.5. Manifestation of the Receptive-Expressive Gap in L1

Scholars have found a significant discrepancy between receptive and expressive language assessment performance of bilinguals of different languages when it would not be predicted. In the case of bilinguals, the unanticipated phenomenon of a statistically larger gap in L1, rather than in L2, stood out in early investigations but was seldom the focus of

research. Such studies have included only two, to our knowledge, that have focused on bilingual adults, one with Spanish as L1 (Muñoz & Marquardt, 2003), another with English as L1 (Linck et al., 2009), and several of bilingual Hispanic children, including Windsor & Kohnert, 2004; Miccio et al., 2005; Oller et al., 2007; Swanson et al. 2008; Gibson et al., 2012, among others. This unexpected receptive-expressive discrepancy in L1 was also demonstrated in early studies of receptive and expressive vocabulary in other languages besides Spanish, for instance, Hmong (Kohnert & Kan, 2005) and French (Yan & Nicoladis, 2009), and it was present in studies that included children with language impairment as well (Windsor & Kohnert, 2004).

The sizes of some of the gaps in L1 were considerable. In the case of Muñoz & Marquardt (2003), their adult participants manifested a receptive-expressive gap in raw, non-standardized scores of 14.9, in L1 (Spanish), whereas the difference in the English scores was only 8.3 points. The other adult study (Linck et al., 2009) highlighted two groups of English-speaking university students in the intermediate stage of becoming bilingual, one group via Spanish immersion studies abroad and the other group by means of classes in the U.S. Researchers discovered through receptive and expressive language testing (a translation exercise and a naming task, respectively) that only the immersion students demonstrated a significantly lower expressive language than receptive language performance in L1 instead of L2 (Linck et al., 2009, p. 1512).

In the research on children, several of the discrepancies were also considerable, as noted in the listing here: 12 standard points for the Spanish and 5 points for the English scores in a study by Windsor and Kohnert (2004); 19 standard points versus 5 points in Miccio et al.'s study (2005), 11.9 non-standardized raw scores compared to 1.6 in Kohnert and Kan's investigation (2005); 23 standard points to 6 in Oller et al. (2007); 53 standard

points as opposed to 6 in Swanson et al. (2008); and 21.02 standard points versus 7.33 in Gibson and colleagues (2012). These studies reflected, to varying degrees, differences in participant sample size, age, gender, birth order, country of origin, maternal educational levels, duration of maternal U.S. residency, socioeconomic background, age at the time and duration of L2 exposure, attendance of preschool where English was spoken, groupings of participants according to language dominance, whether or not they had language impairment, use of different types of receptive-expressive vocabulary tests, or use of monolingual control groups, yet all of the studies demonstrated the unanticipated phenomenon of a statistically-significant gap in scores on both non-standardized and standardized receptive-expressive vocabulary tests in L1 and a smaller gap in their scores in L2.

Other studies emerged by Gibson and various colleagues that further explored the receptive-expressive gap by naming and defining it more thoroughly, examining factors that might influence it, speculating its causes and broadening the scope of testing to include assessments other than ones that merely test vocabulary. Causes of the gap had not been a main area of concern in the earlier studies, except for Oller et al. (2007). Muñoz & Marquardt (2003), for instance, noted only that bilingual adults may have found word-retrieval difficult and may have been at different proficiency levels (p. 1115); Linck et al. (2009), speculated that either a type of suppression (a “mental set” of L2) or the *weaker links hypothesis* might have potential bearing on the gap discovered in the results of their adult language immersion studies. The latter theory claims that reduced functional frequency in each of the languages causes less accessibility to vocabulary. (Linck et al., 2009, p. 1512-1513; Gollan et al., 2008, p. 788). Windsor & Kohnert (2004) speculated that age of English acquisition or stimulus complexity in vocabulary tasks of their 8–13-year-old participants must have created the odd discrepancy (p. 878); and Swanson et al. (2008) commented that English-language

dominance at the third-grade level and greater cognitive demand placed on phonological processing of longer syllable words in Spanish could have had a bearing on the gap (p. 420; 427).

A closer look at an important feature of bilingual learning and at a possible cause for the gap was initiated by Oller et al. in 2007. Before examining a suppression effect as a possible cause of the gap, the researchers discussed the importance of the *distributive characteristic* as background information necessary to understand a bilingual's vocabulary learning process. Distributive characteristic of bilingualism means that the vocabularies are not equivalent in the two languages. A child who lives in two language contexts may know, for example, the word "naranja" in Spanish but not its equivalent, "orange" in English. It can be said, therefore, that vocabulary may be accessible in one language but not the other, and vice versa because they would be exposed to it in one context, but not the other (Oller et al., 2007, p. 191). For this reason, it is inappropriate to assess bilinguals' lexicon knowledge directly in terms of monolingual norms—because the distributed characteristic makes some of the bilinguals' vocabulary inaccessible to any single-language assessment (Abudarham, 1997 p. 127). This is perhaps why overall scores in one language might be lower when compared to overall scores in another. But what about the occurrence of significantly lower expressive scores compared to receptive scores within a language? Oller et al. (2007) and Gibson et al. (2012) speculated that one reason for the gap and in this case in L1, might be a suppression effect or mechanism that seems to occur in L1 of children in the beginning stage of second-language acquisition (Oller et al. 2007, p. 475).

In addition to the Oller et al. study (2007, p. 475-476), a suppression mechanism was postulated as the cause for the L1 gap in the research on university immersion students made by Linck et al. (2009, p. 1512-1513), and in the longitudinal investigation of 5-7-year-old

bilingual Spanish and English and monolingual Spanish-speaking children (Gibson et al., 2012, p. 106). The latter study explained that the suppression effect was a modified form of the “inhibitory control model which originated with D.W. Green (1998). In such a model, a bilingual may want to say a word like “week” and both “week” and “semana” become activated. Then, after this activation, the word that an individual does not want to say becomes inhibited. This leaves behind for selection the word that the person actually wants to say.

María Borragán et al. (2018) described this type of suppression as an “inhibition of lexical competitors,” as opposed to a “non-target language inhibition,” the latter of which is a broader category (p. 1-2, 6). Respectively, the one focuses on inhibiting the lexical aspects of language, while the other inhibits the whole language system of the non-target language. Language proficiency determines how much inhibition is needed in order to suppress the target language (Green, 1998; Gibson et al., 2012; Borragán et al., 2018). As an example of how suppression might operate, one can visualize a scenario wherein a native English speaker has been speaking for an extended time in L2 (Spanish, in this case), and suddenly encounters a monolingual English-speaking friend. Having to shift back to conversation in L1, he or she experiences a mental block on the native-language words needed in the conversation. They could even be high-frequency words like “pen” or “paper,” for instance, with the result that the speaker may have to resort to circumlocution, such as “that thing you write with” or “that thing you write on.” These retrieval failures are also described as a “tip-of-the-tongue” phenomenon (Gollán & Acenas, 2014, p. 246) because the blocked words would usually be accessible in the middle of speaking to someone in their dominant language. This mental blocking produces low expressive vocabulary in L1 only, in naming confrontation tasks, for instance. This happens because the mind may limit access to L1 while using L2 (Oller et al.,

p. 476). In other words, even though the speaker may know words in a receptive language picture identification task, the mental block he or she has been having to produce to engage in communication in L2 may be substantial enough to block out L1 production during a test of expressive language. The result is a gap (Gibson et al. 2012, p. 112).

Another possible cause of the gap postulated by Gibson et al. is a “relative activation” mechanism (2012, p. 113). Under the influence of this force, a specific suppression effect is not required to produce a gap in L1. Instead, an individual may enter a state of relative activation of each language, but as the activation level of English goes up, the Spanish activation level may passively decrease. Such differential activation may affect the expressive language task more than it does the receptive task within L1, thus causing the expressive language task to have considerably lower scores in L1, and hence resulting in a receptive-expressive gap (Gibson et al., 2012, p. 113; Gibson et al., 2018, p. 10). Some examples may help to envision this process here. For instance, words that are in frequent use in a language might be less susceptible to deactivation than low-frequency words, but if there is a mismatch between low-frequency and high-frequency words on test measures, such as the high-frequency “plaza” in Spanish and low-frequency “square” in English, the access to the English word may be deactivated to such a low level that word retrieval failure occurs. Or during a naming confrontation measure, upon being presented with a picture of a star, the two languages may activate both “star” and “estrella;” however, as word retrieval for L1 is attempted, a low relative activation state for L1 and a high state for L2 may create a delay or block, this time with a phonological difficulty playing a role, since the initial sounds of the two words are mutually exclusive to their respective languages. There are no words that begin with “st” in Spanish. Or, similarities in cognates and word length may create difficulty

in word retrieval from an imbalanced competing activation of both languages in words such as, for example, “boat” vs. “bote” or “crocodile” vs. “cocodrilo.”

Gibson et al. elaborate that the effects of relative activation (or of the suppression effect) are more salient at the onset of second language study; they report that studies have shown that as proficiency levels in both languages increase, there is a reduction in the strength of the receptive-expressive L1 gap over time. They refer to the results of the Miami project in support of this idea. In that project there was a reduction from a gap of 28 standardized points at kindergarten level to 19 points at grade 5 (Oller & Eilers, 2002; Gibson et al., 2012, p. 113).

Yet another possible cause is that of “*peer effects*.” The same authors postulated that the children’s desires to “fit in” with the dominant culture might have encouraged a lower performance on picture-naming tasks in their study because of a reluctance to speak in L1 (Gibson et al., 2012, p. 115). Since speaking Spanish would not be part of the English-speaking peer culture, a bilingual child might go to great lengths to avoid the negative exclusionary consequences of revealing him or herself to be part of a minority. This hesitation to reveal that they are Spanish speaking could help produce a gap in L1 due to low expressive vocabulary scores on a naming test. Pointing to a picture of a “caballo” (horse) is less threatening and less ostentatious than making oneself vulnerable to exclusion or ridicule in one’s peer group by announcing “I am Hispanic” via a confident oral response of “caballo” to a picture cue.

1.6. Receptive-Expressive Gap in L2

The gap has also been identified in bilingual children’s L2, especially when different tasks were added to the assessments. Gibson et al. headed up two of these investigations (2014a, 2014b), both of which focused on bilingual Hispanic children, including primary

learning impaired (PLI) individuals in the latter of the two studies (2014b). An additional investigation appeared in 2015, which examined the gap in vocabulary testing results of children whose L2 was German, but who compositely spoke 46 different L1s. This study again lent support to the idea that the receptive-expressive gap occurs in all languages, but this time saliently appearing in L2 (Keller et. al., 2015).

In the first Gibson et al. investigation of 2014, the research underscored results of vocabulary testing for a large sample of 778 bilingual Hispanic children divided into five groups including 2 language-dominant groups, 2 mainly monolingual groups and 1 balanced bilingual group. They used the mainly monolingual groups to test for the receptive-expressive gap via the *Bilingual English-Spanish Oral Screener (BESOS)*. The single-name vocabulary measures were not used, but rather semantics subtests that measured vocabulary knowledge through assessment items that included analogies, categorization, descriptions, linguistic concepts, functions, and differences and similarities. Items consisted of questions requiring a verbal reply with a variety of answers, such as “What is different about these cats?” (expressive language), or “Point to the dog that is different.” (receptive language). Items were not equated as direct translations but rather on the basis of difficulty, especially those that might be problematic for a pre-school child who might be at risk for a language disorder (Peña et al., 2011; Gibson et al., 2014a). For the standardized tests, the Mean was 100 and the Standard Deviation (SD) was 10. Caregiver and teacher questionnaires on language use and proficiency were also part of this test (Summers et al., 2010; Gibson et al., 2014a). The findings showed a gap discrepancy of 9.07 in English to 1.97 in Spanish, with only one group (the Bilingual Dominant in English) failing to exhibit a gap (2014a, p. 106).

The subsequent investigation of Gibson et al. (2014b) examined results from a sampling of older children, ages 7-10, some of whom were language impaired; again, they

were tested with semantics subtests of standardized vocabulary tests, the same as those used in the previous study, but with phonological assessment added. The standardized assessment tool was the *Bilingual English Spanish Assessment –Middle Extension* (BESA-ME). The phonology that was added was a single-word test of 28 words in Spanish and 31 in English that the children produced in order to enable the diagnosis of typical from atypical phonological skills (Peña et al., 2018, p. 10). As was the case in the 2014a study by Gibson et al., no gap appeared in the Spanish scores, yet there was a statistically strong gap of 14.99 in the English scores (p. 662).

Another gap in L2 was demonstrated in the study of Keller et al. (2015). These researchers also deviated from single-word receptive-expressive measures in the addition of a morpho-syntactic task of sentence production to the single-word semantics measure. Their standardized testing of 406 three-year-olds yielded a gap of 25.38 in L2, which, as noted previously, was German. Their *German Development Test* (Grimm, 2000) had two subtests for receptive language: a picture identification test similar to the *Peabody Picture Vocabulary Test (PPVT)*, with cues such as “show me the bunny”; and a sentence comprehension measure with pictures of situations, such as a horse standing on a table, which had to be identified. There were also two expressive language tests for word and sentence production (p. 5).

The common denominator of these studies was a statistically greater gap in L2 rather than in L1 (Gibson et al., 2014a; 2014b; Keller, 2015). As Gibson et al. noted, the effects of L1 suppression, which had characterized earlier studies, might be unique to tasks like picture naming. Single-word picture naming was not used in later studies (2014a, p.106), thus changes in task-type for assessment could have influenced a shift to L2 as the predominant gap site in the later studies.

The authors provided the *weaker links hypothesis* as the principal explanation for their results (Gibson et al., 2014a, 2014b; Keller et al., 2015). The weaker links hypothesis proposed by Gollán and colleagues (Gollán & Acenas, 2004; Gollán et al., 2006) claims that since bilinguals speak each language less often than do monolinguals, words in the system have less practice frequency of use overall. Bilingualism may exhibit weaker links between semantics and phonology in each lexical system because production of vocabulary in each language is more infrequent when sharing time of possible use with another language. Moreover, production of vocabulary (the expressive modality) requires much more effort than mere picture identification (the receptive modality).

An individual might manage to comprehend language even under the operation of the impediments of suppression, low activation, or weak links in a picture-identification task (the receptive domain), but accurate production of a name for concepts (the expressive domain) requires more effort to overcome these impediments. Increased use of both languages leads to stronger links between vocabulary comprehension and production (Gollán et al., 2008, p. 788). The weaker links hypothesis proposes that a weak nexus impedes vocabulary access but does not produce much interference, if any, for language comprehension. This disconnect can produce a receptive-expressive gap (Keller et al., 2015, p. 8). In Gibson et al. (2014a), speculation was made that the L2 gap found in the results of their research may have been associated with a logical expansion of the weaker links hypothesis that not only incorporates the claim that the connections between phonological and semantic representations strengthen with practice, but also that the representations themselves increase in strength (2014a, p. 104).

This idea is connected to the *lexical restructuring hypothesis* proposed by Metsala & Walley (1998) that described phonological representations as first being stored as large

chunks of information at the levels of phrases and words, which with language experience, would then decompose into segmental representations, such as, for instance, an example at the word level of “un cartero” (un car-te-ro) [(a mailman (a mail-man))]. These segments are easier to access and produce, and since these sounds appear frequently in both languages, they are the first to be decomposed and stored in segments (Gibson et al., 2014a, p. 104).

Gibson and colleagues elaborated that this restructuring process may have already occurred in Spanish for the young children of their first 2014 study, but not yet in English. So, even though shaky phonological representations may have made word production in English difficult, the children’s vocabulary comprehension was strong enough to allow them to score better on the English receptive semantic tasks than on the expressive ones (Gibson et al., 2014a, p. 106).

In Gibson et al. (2014b), which featured older children (ages 7-10), again the extension of the weaker links theory was applicable. As the researchers suggested, one might be able to correctly indicate a picture of a “chair” even with weak, or “fuzzy” phonological knowledge as to how it would be said, but success with the word would come only with the phonological knowledge that arrives with having heard and used it before, perhaps repeatedly. As concerns the current study, note can be made of the inherent phonological differences in the two languages. In English, there is greater consonant cluster reduction and final consonant deletion, 13 vowels and 24 consonants, as opposed to only 5 vowels and 20 consonants in Spanish. Moreover, there are more closed, end-stopped forms in English as contrasted with the Spanish language’s open-ended words ending in vowels (Gibson et al., 2014b, p. 656). Thus, there may be inherent difficulty in production of vocabulary in English, despite a bilingual having a larger repertoire of receptive English vocabulary. In the Keller et al. study (2015), the researchers acknowledged that their results corroborated the claims of

the Gibson study (2014a). They echoed Gibson et al. in proposing that association of the weaker links hypothesis with weak semantic and phonological representations could have caused the L2 gap in their own participants' receptive and expressive language scores. (Keller et al., 2015, p. 8).

The literature review demonstrates that almost all information available about the receptive-expressive gap is with children. As we have said previously, Spanish-English speaking bilingual adults merit more study as well, especially since they constitute a large part of the U.S. population who, as they age, will need treatment for language disorders caused by stroke, dementia, brain trauma, or other diseases affecting language and cognition. SLPs have to be prepared to meet this challenge with knowledge about the special language patterns of bilinguals in order to effectively assess deficits and design treatments. Based on the review of the literature and the realization that more information on adults might be beneficial, the following research questions guided the study:

1.7. Questions Guiding the Study

1. In the sample, do Spanish-English bilingual adults present with a receptive-expressive gap?
2. If present, what variables best predict the presence of a receptive-expressive gap?

1.8. Predictions

1. A gap may be present in L2 with the adult bilingual participants due to cumulative language use and operation of the weaker links hypothesis.
2. Cumulative language use based on AoA and as self-reported in the *LEAP-Q*, will be the most significant variable affecting the gap.
3. The cause of the gap can be explained by the weaker links hypothesis.

CHAPTER 2. METHODS

2.1. Participants

The participants selected were non-speech- and language-impaired between the ages of 25-71 years, including 21 Spanish-English bilingual adults. There were 11 male and 10 female participants representing the different decades of life, from the 20s through the 70s (Table 1).

Table 1. Participant Demographic Statistics

	Number	Mean	Standard Deviation
Age	21	38.80	15.94
Education	21	2.42	0.92
Age of Acquisition L1	19	0.36	0.68
Age of Acquisition L2	19	7.05	6.92
% of Current Exposure L1	20	0.48	0.22
% of Current Exposure L2	20	0.49	0.22

Note. Educational level was indicated with the numbers 1= *College*, 2 = *Some Graduate School*, 3 = *Master's Degree*, 4 = *Doctorate*.

Note. The number of participants (N) vary between 19-21 due to omitted items from the questionnaire for 3 participants with regard to current exposure and AoA for L1 and L2, as well as small percentages of languages other than English being included for 3 participants in the Current Exposure tally.

Variables of the most significance were age, education level, AoA for L1 and L2, and levels of current exposure for both languages. The participants were well-educated (Mean (M) = 2.4286). The average AoA was a little over 3½ months (M = 0.3684) for Spanish and slightly over 7 years (M = 7.0526) for English. They represented a diversity of native Spanish-speakers from 9 Spanish-speaking countries, including Spain, Mexico, Honduras, Cuba, Argentina, El Salvador, Colombia, Venezuela, and Guatemala. Most of them had lived in the U.S. for at least 4 years and all possessed a college degree or postgraduate degree.

They came from very diverse fields, including two dairy science students, two architects, two Spanish teachers, two artists, one ecologist, two business professors, one movie producer, one environmentalist, one math professor, one data processing specialist, two biology students, one broadcaster, one mechanical engineer, one linguist, and one computer programmer. Not all the adults were equally fluent in both languages, nor did they have equal exposure to each language. Via the *LEAP-Q* responses that pertained to use and self-proficiency ratings for each language, an attempt was made to group the participants for language dominance. Accordingly, 16 were predominantly Spanish-Speaking, 2 were predominantly English-Speaking (Participants 11 and 19), and 3 were Balanced Bilingual (Participants 3, 7, and 16). Dominance was determined on the basis of their self-ratings for Order of Dominance, AoA, Percentage of Current Use, and Self-Rating of Proficiency in Speaking, Understanding, and Reading in each language. Standardized test scores were also considered in the determination that 3 were balanced bilinguals and 2 were English-dominant.

2.2. Materials

Language Experience and Proficiency Questionnaire (LEAP-Q) (Marian, 2007)

The questionnaire that was used was the *Language Experience and Proficiency Questionnaire (LEAP-Q)*. This assessment was validated in two research studies by its authors, Marian et al. (2007). The first (p. 944-951) included 52 multilingual participants who spoke 34 different languages. Factor analysis revealed logical groups of questions connected to basic aspects of bilingualism, such as second and native-language competence, that helped to determine its internal validity. The second study (p. 951-962) included 50 Spanish-English bilingual speakers whose internal validity was determined similarly to the aforementioned study; however, criterion-based validity was established by authenticating a relationship between the self-reported *LEAP-Q* information together with performance on objective and

behavioral speech and language assessments in both languages from a battery of widely-used standardized language tests. These included the *Peabody Picture Vocabulary Test* (PPVT) and its Spanish version (*Test de Vocabulario en Imágenes Peabody* (TVIP)), grammaticality judgment assessments, and subtests of the *Woodcock-Johnson/Woodcock Muñoz Test of Achievement*. Correlation patterns demonstrated stronger relationships for L2 than L1. Self-ratings of reading competence were the strongest predictors of performance on speech and language assessments in L1. In L2, self-ratings of speaking competence were the staunchest predictors of performance (Marian et al., 2007, p. 945-946). The original version was administered in its entirety via Zoom. No adaptations were made.

***Expressive and Receptive One-Word Picture Vocabulary Test-Spanish Bilingual Edition* (Martin, 2012) (E/ROWPVT-SBE) (Martin, 2012)**

The vocabulary assessments that were administered were the *Expressive One-Word Picture Vocabulary Test Spanish Bilingual Edition* (EOWPVT-4:SBE) and the *Receptive One-Word Picture Vocabulary Test Spanish Bilingual Edition* (ROWPVT-4:SBE).

Appropriate examinees for these tests are individuals ages 2-70+ years, primarily Spanish-speaking with some English to primarily English-speaking with some Spanish. Assessments purportedly are reliable measures of a person's ability to comprehend (receptive language) as well as to produce words (expressive language) from memory retrieval.

For the *EOWPVT-4:SBE*, the examinee looks at a picture and then produces the word that best describes the action, object, or idea represented. For the *ROWPVT-4:SBE*, the examinee looks at a card with 4 pictures and chooses the one that matches the word or short phrase that the test administrator states. The assessments take approximately 20 minutes each to give and 5-10 minutes to score. The 90 total items for each test, for the age group of 16-70+, start off easy and gradually increase in difficulty.

Norming of the assessments took place in 14 states at 54 locations, including public, private, and parochial schools and private practices. The 1,260 final normative sample approximated the demographics of the U.S. Hispanic population. Participants ranged from 2-93 years of age. There were 56 qualified examiners, including SLPs, educational specialists, school psychologists, and supervised graduate students. Participants included normally-developing persons from regular education classrooms and community settings, as well as individuals with a wide range of disabilities. Scaled scores, standard scores, percentile ranks, and age-equivalencies were the types of scores derived from the raw scores (Martin, 2012, p. 53).

To measure reliability of the assessments, Cronbach's Coefficient Alpha was computed for scores obtained at each age level, as well as across age levels. This analysis indicated the homogeneity of the test items and amount of error associated with the test results. The median score was 0.95 across all ages (Martin, p. 59). Test-retest reliability showed a temporal stability score of 0.99 for raw scores and 0.97 for standard scores, so this test has been quite stable over time (Martin, p. 60). The tests were also analyzed for confidence intervals and content, construct, and criterion validity. Confidence intervals were found to be small in range, which indicates that measurements would probably obtain the same results if the tests were repeated (Martin, 2012, p. 62).

Content validity was shown in the formats that depicted mainly nouns, with some gerunds, verbs, and modifiers, as well as in the alignment of the vocabulary with academic and everyday tasks. Item analysis ensured that the set of items demonstrated degrees of difficulty commensurate with assessing a broad range of levels of vocabulary ability (Martin, p. 65). Construct validity was demonstrated in the comparison of the tests to their previous 2001 edition. When standard scores were compared between the *EOWPVT-4:SBE* and

ROWPVT-4:SBE, based on their normative samples, they obtained a positive correlation of 0.67 (Martin, p. 65). Criterion validity was revealed in the study made of development across the lifespan and of exceptional groups; *EOWPVT-4:SBE* and *ROWPVT-4:SBE* scores showed a moderate positive relationship to chronological age. Test scores of those with academic or cognitive disabilities all had significant differences when compared to examinees without impairments (Martin, p. 66).

2.3. Procedures

The investigators was approved by Louisiana State University's Institutional Review Board. Potential participants were contacted by email. Following execution of a consent script via email, which automatically served as an authorized consent form when the participant continued to the interview questions of the *LEAP-Q*, the participant answered and returned the *LEAP-Q* by email in either Spanish or English. Once the *LEAP-Q* was received by the test administrator, another consent script followed by four standardized assessments were delivered entirely and orally on Zoom. All standardized test procedures were video- and audio-recorded without personal identifying information. The *EOWPVT-4:SBE* was always administered first to avoid the potential of the receptive test to trigger recall for the expressive test. Instructions were read by the examiner as follows in the language featured in each test: "I am going to show you some pictures. I want you to tell me the one word that names the thing or group of things in each picture. Let's practice first." ["Te mostraré algunas imágenes. Quiero que me digas la palabra que nombra la cosa o el grupo de cosas en cada imagen. Vamos a practicar."]. Instructions for the *ROWPVT-4: SBE* were read similarly by the test administrator as follows in the language featured in each test: "I am going to show you some pictures. I want you to tell me the number of the picture that shows the word I say. Let 's practice first." ["Te mostraré algunas imágenes. Quiero que me digas el número de la

imagen que muestra la palabra que yo diga. Vamos a practicar.”]. Four practice examples were executed as many times as necessary before beginning each test. Each expressive language test took approximately 20 minutes, whereas the receptive tests took approximately 15 minutes each. Although a break was offered between each set of tests, only 2 participants requested a short break.

For all examinees, a basal score was established upon the examinee acquiring 8 consecutive correct answers for both tests. For the *EOWPVT-4:SBE*, the ceiling was reached when there were 6 consecutive errors. For the *ROWPVT-4:SBE*, the ceiling was reached when the examinee made 4 errors within 6 consecutive items. Items for ages 16-70+ begin with Item 90 and continue through 180, so there were 90 items in all for each test in the present study sample. Tests were not timed, but the items did not require a wait time of more than 30 seconds. Test plates were moved consecutively on the Zoom screen. Fortunately, no technological issues arose during the testing except for one examinee having to use the small screen of her iPhone for testing rather than a full-sized computer screen. Verbal prompts and cues for assessment in English or Spanish were used for the *EOWPVT-4:SBE*. This test required cueing only to draw attention to the feature being tested if it was not being focused on by the examinee. The manual provides a protocol for this, which was followed. For instance, for an action cue, if the person names an object in the illustration instead of naming the action required, one would be cued with “What is he/she doing?” [“¿Qué está haciendo él/ella?”] Several re-directions had to be made for most participants because of the poor-quality of some of the visuals.

2.4. Data Analysis

For the *EOWPVT-4:SBE* and *ROWPVT-4:SBE* assessments, a paired sample t-test, which indicates whether the Mean difference between 2 sets of observations equals 0, thus indicative of statistically-significant differences, was utilized to determine the differences between the Spanish and English test scores. Standardized scores were reported with 100 points representing the Mean and a Standard Deviation of 15. Since no gap was found for the participant sample, a descriptive analysis was performed based on answers acquired from the *LEAP-Q* in order to explain some of the individual results obtained on the standardized tests. Standardization is important because the idea of a receptive-expressive gap is not a discrepancy between, for example, a maximum raw score of 100 and the number of items missed, but rather a statistically-meaningful discrepancy that may still exist between receptive and expressive scores after the raw scores are standardized (Gibson et al., 2014a, p. 92).

CHAPTER 3. RESULTS

The main question and prediction that was addressed in this study was whether or not the sample group of 21 bilingual participants would demonstrate a receptive-expressive gap in L2 (English). Testing for the presence of the gap was performed using a 2-tailed paired sample t-test (Table 3). A simplified version of the correlations for the test scores is shown first in Table 2 below.

Table 2. Descriptive Standardized Test Statistics

	N	Mean	Standard Deviation
EOWPVT-SPSS	21	114.14	16.46
ROWPVT-SPSS	21	108.80	21.61
EOWPVT-ENGSS	21	105.47	17.21
ROWPVT-ENGSS	21	112.19	17.59
Valid N (listwise)	20		

Note. EOWPVT-SPSS refers to the Standard Scores of the Spanish *Expressive One-Word Picture Vocabulary Test*; ROWPVT-SPSS refers to the Standard Scores of the Spanish. Valid *N* refers to an unbiased estimate of the true population variance.

Table 2 reveals correlations among standardized test scores for the English and Spanish versions of the *EOWPVT-SP/ENG* and the *ROWPVT-SP/ENG* for the 21 participants. This data shows the small edge the Spanish scores had over the English scores overall as well as inverse patterns of receptive being higher for English and expressive being higher for Spanish.

Table 3. Paired Samples Test

Paired Differences									
		Mean	Std. Deviation	Std. Error Mean	95% confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	EOWPVT-SPSS ROWPVT-SPSS	5.33	15.27	3.33	-1.61	12.2	1.60	20	0.125
Pair 2	EOWPVT-ENGSS ROWPVT-ENGSS	-6.71	17.47	3.81	3.81	-14.6	-1.76	20	0.09
Pair 3	EOWPVT-SPSS EOWPVT-ENGSS	8.66	22.15	4.83	-1.41	18.7	1.79	20	0.08
Pair 4	ROWPVT-SPSS ROWPVT-ENGSS	-3.38	10.49	2.29	-8.15	1.39	-1.47	20	0.15

Note. *df* stands for degrees of freedom, which is the number of independent data that went into calculating the estimate.

The paired sample t-test compared, via SPSS software, standard receptive and expressive scores in Spanish ($t(20) = 1.6, p = 0.125$) and standard receptive and expressive scores in English ($t(20) = -1.76, p = 0.094$). Examination of the far-right column (Table 3) indicates that the p -value is not less than 0.05. The fact that the discrepancies between the Means of the paired trials were all higher than 0.5 demonstrates that there was no statistically-significant difference in the scores of the group sample.

Table 4. Correlations

		Age of Acquisition	% of current L2 exposure	EOWPV T-SPSS	ROWPV T-SPSS	EOWPVT-ENGSS	ROWPVT-ENGSS
Age of Acquisition on L2	Pearson Correlation	1	-0.02	-0.18	0.10	-0.13	0.00
	Sig. (2-tailed)		0.92	0.44	0.67	0.58	0.97
	N	19	19	19	19	19	19
% of current exposure L2	Pearson Correlation	-0.02	1	-0.09	0.02	0.10	-0.13
	Sig. (2-tailed)	0.92		0.69	0.92	0.64	0.57
	N	19	20	20	20	20	20
EOWPV T-SPSS	Pearson Correlation	-0.188	-0.09	1	0.71**	0.13	0.57**
	Sig. (2-tailed)	0.44	0.69		0.00	0.55	0.00
	N	19	20	21	21	21	21
ROWPV T-SPSS	Pearson Correlation	0.10	0.02	0.71**	1	0.26	0.87**
	Sig. (2-tailed)	0.67	0.92	0.00		0.24	0.00
	N	19	20	21	21	21	21
EOWPV T-ENGSS	Pearson Correlation	-0.13	0.10	0.13	0.26	1	0.49*
	Sig. (2-tailed)	0.58	0.64	0.55	0.24		0.22
	N	19	20	21	21	21	21
ROWPV T-ENGSS	Pearson Correlation	0.00	-0.133	0.57**	0.87**	0.496*	1
	Sig. (2-tailed)	0.97	0.57	0.00	0.00	0.02	
	N	19	20	21	21	21	21

*Correlation is significant at the 0.01 level (2-tailed); **Correlation is significant at the 0.05 level (2-tailed).

The Mean difference between the scores in Spanish and English was 5.33 and -6.71, respectively. The difference between the scores was 12.04, however, no gap was indicated

because the patterns for the *EOWPVT* and *ROWPVT* Spanish and English went in the opposite direction from a typical gap. The negative number automatically indicates this aberration of the expressive language being higher than the receptive.

Table 4 highlights the relationship among the variables listed in Table 1 in the Methods Section, but it focuses on the significance for L2 only, since the research question for this study speculated that the gap, if it occurred, would present in L2. There were no statistically-significant correlations between language test scores and measures of current and cumulative exposure at the group level. There were, however, positive correlations between and within language test scores, suggesting that participants had strong vocabulary skills in general, not just language-specific vocabulary skills.

Table 5. Individual Standard Scores					
Participant Information		Spanish		English	
		ROWPVT	EOWPVT	ROWPVT	EOWPVT
#	Age	SS	SS	SS	SS
1	29	102	115	101	103
2	34	110	100	101	101
3	31	92	99	107	111
4	25	108	119	116	83
5	35	101	128	101	110
6	29	136	122	136	119
7	30	122	122	120	129
8	41	102	115	99	95
9	71	126	116	140	130
10	68	96	110	93	99
11	50	89	78	101	114
12	65	134	130	136	118
13	40	92	116	91	90
14	67	139	117	136	102
15	27	56	93	83	81
16	42	93	102	92	92
17	25	129	139	116	87
18	26	131	134	131	96
19	26	80	96	108	136
20	27	116	101	114	85
21	27	131	145	134	134

In turning to analyze the variables that may have affected the individual scores (Table 5), one should remember that according to our standard, the presence of a receptive-expressive gap demonstrates a statistically-significant difference between the two types of

standardized language scores, based on a mean of 100 and a standard deviation of 15 (Gibson et al., 2012, p. 102; Gibson et al., 2014b, p. 655). Though most individual assessment scores showed differences in their scores, and 17 scores were in the typical gap pattern, no statistically-significant gap in either Spanish or English emerged for the typical-pattern gap overall. Since there was no statistically-meaningful gap in the group, *LEAP-Q* variables that might have influenced a gap have not been explored here in detail for correlation with standard score measures.

The better outcomes in Spanish overall seemed to correspond primarily to the fact that all of the speakers' L1s were Spanish. The Spanish scores, as a whole, however, were skewed because of the atypical-gap pattern of a lesser score for the receptive than for the expressive, with 108.80 for the Receptive and 114.14 for the Expressive. On the contrary, the English scores overall did manifest the typical pattern, with a Mean for the Receptive of 112.19 and 105.47 for the Expressive (Tables 2 and 3). Brief speculation can be made as to why Spanish scores were better overall, why no statistically-significant gap emerged in either language in this sample group, and why the atypical patterns for both languages prevailed. Table 6 illustrates that there were 8 patterns followed by the 21 participants. The 8 patterns include typical pattern gaps in both languages, closed gaps in both languages (receptive and expressive scores are the same), and atypical gaps in both languages expressive scores are higher than receptive). Only 9 had receptive-expressive scores with at least 15 or more points of difference in one or both of their languages. 7 were in English and 2 were in Spanish (Column 3).

Table 6

Patterns of Assessment Scores

	Pattern Type	Number of Assessment Scores in Each Pattern	Standard Score Receptive Points (≥ 15)
1	Typical-gap Spanish only	1	n/a
2	Typical-gap English only	6	33, 29, 35
3	Atypical-gap Spanish only	9	n/a
4	Atypical gap in English only	2	n/a
5	Typical gap in both Spanish and English	5	Spanish: 22, 15
		5	English: 34, 18, 17, 29
6	Atypical gap in both Spanish and English	5	n/a
		5	n/a
7	Closed gap in Spanish	1	n/a
8	Closed gap in English	3	n/a

As one can see, half of the 42 assessment scores (Column 2) were not valid (n/a) for finding a typical gap in either language; according to our definition herein. 17 scores were typical gap patterns and 21 were atypical gap patterns.

CHAPTER 4. DISCUSSION

4.1. Research Question 1: Do Spanish-English Bilingual Adults Present with a Receptive-Expressive Gap?

Now that the statistical data concerning the outcomes for both languages has been presented, possible explanations related to the research questions and predictions will be examined. Three areas will be the focus (1) gap patterns and variables that may have influenced them, (2) test norms and testing protocol, and (3) a potential influence of the weaker links hypothesis. The first research question was concerned with the finding of a gap. The results of the study did not yield a statistically-meaningful gap in the study sample in either L1 or L2.

Nonetheless, a brief exploration of the patterns of the gaps may be useful for figuring out other factors that influence the discrepancies, as well as to inform future studies. From an analysis of scores, one sees that only 17 of 42 possible assessment scores for the 21 participants (2 each) demonstrated a typical pattern of a gap (receptive scores higher than expressive) (Table 6). Also, there were several patterns of gaps, including many atypical or inverted ones (21 in all), in which the expressive scores were higher than the receptive scores. No gap could possibly have emerged from such a mixture.

Some of the participants had typical gap patterns in both languages. Others indicated no difference between their sets of scores in one of their languages, that is, their receptive and expressive scores were exactly the same on either their Spanish or English assessments. Their scores had no typical or atypical pattern. They closed a potential gap (Tables 5 & 6). Participant 7 demonstrated this closed-score pattern in Spanish while Participants 2, 16, and 21 exhibited this pattern in English (see Tables 5 and 6). AoA and current use, perhaps, had a bearing on these results. Participant 7 indicated that he had lived 15 of his 30 years in a

Spanish-speaking country, spent 30 years with a Spanish-speaking family and had a Spanish current use of 40%. The 3 participants who had a closed-gap pattern in English scores (2, 16, and 21) shared the common denominator of current use of L2 as higher than that of L1 at 60%, 60% and 42%, respectively. The lower percentage of exposure for Participant 21 was due to shared usage with 3 other languages. AoA was also a factor in closing the gap for two of these participants. Participants 16 and 21 began acquiring L2 at 5 and 2 years of age, respectively. AoA was not a potentially influencing variable for Participant 2, a 35-year-old whose AoA for L2 was 25 years of age.

In addition to contradictory patterns and participant scores that possibly closed gaps through the influences of AoA or current use, the norming samples and protocols of the language tests may have influenced the failure of a gap to appear in the study sample. Researchers have discussed the problem of atypical patterns in vocabulary assessments, such as the ones used in this study, and they suggest that results like these are usually associated with the tests' norming procedures or the norming samples used (Gibson et al. 2017, p. 3). They identified areas where two comparable tests may err in such a manner as to produce skewed outcomes, for instance, the difference in testing groups, uniformity in test settings, uncontrolled environmental factors, use of the same set of qualified test administrators, differences in lists of to-be-tested Spanish vocabulary items, differences in test administration, gathering of test data, and in verification procedures across tests (p. 8-9). There does not seem to be anything amiss in the norming process for the *EOWPVT-SBE* and the *ROWPVT-SBE*, based on the information given and as described (Marian et al. 2013, p.65). The test protocol that its authors described was one the present study tried to emulate as much as possible. There were, however, at least three areas where differences in the present study sample and protocol may have affected the outcome of the tests. These were the

norming sample, the control over environmental factors, and differences in data-gathering. The norming group of individuals used for both standardized tests were based on participants who were a very diverse U.S. population, including over 1,000 Hispanics whose ethnicities included primarily Mexico (785 participants), and also smaller groups from Central America, Cuba, Puerto Rico, the Dominican Republic, and South America (p. 56). Their educational levels were primarily less than high school (408), high school (329), 1-3 years of college (215), a bachelor's degree (188) and a postgraduate degree (115). Also, there were 131 individuals with disabilities included.

Compared to this normative group, the sample used in the present study was quite different in that 9 ethnicities were represented by 21 participants and the educational level was less diverse. Their average level at above a bachelor's degree far exceeded the normative sample's level of approximately 11%. Additionally, there were no persons with disabilities included in the present study. With regard to the factor of control over the environment, the present study was unable to use a common testing site, but rather had to rely on individual private homes and offices accessible by Zoom software. This created a technological difficulty of a screen not being very clear or of a size compatible with optimal viewing of the visuals for one of the participants (Participant 9), as well as a few disruptions, such as family members and coworkers briefly interrupting the session (Participants 2 and 19). The data-gathering was probably the primary area affected by protocol differences because the list of items to be tested had to be checked by Spanish language specialists for validity as acceptable dialectal variations. The manual specifically stated that these variations were to be accepted for the expressive tests if the test administrator was certain that they were valid (Marian, p. 29). In the present study, two native Spanish-speaking language instructors were consulted with a list of 52 items of synonyms for verification. For each participant, some 6-12

synonyms were accepted as dialectally appropriate for the Spanish expressive test while approximately half this number were accepted for the English representations. No such flexibility was approved or recommended as part of the protocol for the administration of the receptive assessments. These three areas of difference perhaps led to the atypical pattern of expressive language scores being higher than the receptive ones in the present study.

The tests themselves are less-than-desirable in their visual representations. During the formal testing for the present study, some of the test visuals were extremely poor in eliciting the expected answers. For example, in one instance, a participant exclaimed in response to “What is this?”: “I don’t know, a putrefied sandwich?”. Another object for naming did not appear to be an image of the tool listed as the correct response for the English translation at all. Some participants became exasperated and cursed at the presentation of several poor-quality drawings. This, in turn, may have led to frustration over their own slower response times with the expressive when confronting a bad visual. Then, as a corrective measure, some participants would rapidly go through the receptive items to make up for the foolish-looking time they had to spend on the expressive test; in other words, there may have been a problem of attunement, but with adults rather than the usual audience of children. Much reassurance and encouragement were needed for motivating the participants in the expressive part of the testing. Another factor that most likely affected the higher expressive scores, especially in English, was the order of testing and a memory factor. Using Spanish testing first perhaps triggered the correct responses in English or allowed corrections to be made. In some instances, one could see on their faces and in their faster response times that they were easily remembering and repeating or correcting what they had said 30 minutes prior.

Finally, the test that was used seemed designed to close the gap, perhaps too much so. The test protocol seems to be user-unfriendly for most Spanish-speaking SLPs. Without

consultation with Spanish language experts and without considering the changing nature of language and vocabulary use over a period of 14 years since the test was created (2000 the original test; 2007 the revised test), the test administrator may acquire invalid results based on failure to count as correct appropriate synonyms unfamiliar to the SLP. This has clinical implications because an SLP may erroneously diagnose a potential patient as having a language disorder based on discounting the use of unfamiliar synonyms. The tests are also problematic in that a test administrator who is knowledgeable about valid dialectal synonyms used for all Spanish-speaking countries must be consulted before the Spanish expressive test is given, especially since the test form lists only one or two for a few images, and then unexpectedly lists 4 for an item that does not even resemble what it names. On the other hand, if a native Spanish speaker gives the English Expressive test, he or she may also need to consult specialists who know valid dialectal substitutes for the English equivalents.

The final item that will be discussed here is the idea that outcomes of the current investigation were consistent with the weaker links hypothesis. In Chapter 1, the weaker links hypothesis was discussed as a possible explanation as to why a person would find it easier to point to a picture but not be able to name it. Under the operation of the weak links hypothesis, bilinguals speak each language less often than do monolinguals, so their practice frequency is less than that of monolinguals. As an extension of the weaker links hypothesis, weaker links between semantics and phonology in each language can also occur (Gibson et al., 2014a, p. 94.; Gollan et al., 2008, p. 789). Over time, links between semantic and phonological representations improve with use, and therefore, reduce word recall problems. This idea is related to the lexical restructuring hypothesis, proposed by Metsala and Walley (Gibson et al., 2014a, p. 106). But until this restructuring occurs, there can be much phonological and semantic imprecision. Examples of weak links occurred in the current study several times.

For example, one participant said “skycraper” for “skyscraper.” Another said “rule” for “ruler,” while still others would simply say the Spanish word for an English cognate without changing pronunciation, as in “eclipse” and “fósil.” Sometimes they would make a semantics error by changing an almost-cognate word (“galaxia”) to an entirely different word (“universe”). Production of a word is much harder than simply recognizing it. One might have an idea in his or her head as to what a word might be, so if one sees a line-up of pictures, as the participants did for the receptive tests, he or she may be able to easily identify the item that is named. That is, if one is thinking “empire,” but hears “empress” for a queen, he or she still may be able to correctly identify the word. If, however, one is confronted with a picture of an empress and asked to name it, out comes “empire,” which of course, is an incorrect answer and hence a lower score. Such slip-ups were common while the participants who demonstrated gaps were taking the L2 tests. Though more of the participants demonstrated problems with L2, there were similar slip-ups made in L1 as well, such as a couple of participants saying “sextogramo” for “hexágono” and another saying “montadura” for “montura.” These disconnections cost the participants points in the expressive assessments of both languages but still the Spanish scores had a slight advantage over the English scores overall. Only 2 gaps occurred in Spanish in L1, whereas 7 occurred in L2 (Table 6).

4.2 Research Question 2: If Present, what Variables Best Predict the Presence of a Receptive-Expressive Gap?

Because no meaningful gap, as per our criteria, presented in our participant sample as a group, we included herein a correlation table (Table 1) that shows that none of the *LEAP-Q* variables correlated with the gap in either language. Although language experience correlated with test outcomes, these variables did not correspond with the gap itself in either language.

Here, we might look, however, in a general way, at the variables that contributed the most to the few individuals whose scores did demonstrate typical patterns of a gap within the group. Such commentary may inform future studies. These variables were AoA, current use of the language, and self-rated reading proficiency. The latter was not included in the data table, nonetheless it may have contributed to the better outcome in Spanish.

AoA was one of the main indicators for cumulative use in the *LEAP-Q*. It possibly influenced the slightly better Spanish scores because the participants on average began acquisition at 3-and-a-half months of age. Their L2 average AoA, on the contrary, was much later, at approximately 7 years of age. However, there was much variance. For example, several participants acquired L2 at 5 years (when they started school) or earlier, and one 27-year-old participant beginning as late as 25 years.

Recent research on the effect of AoA on L2 acquisition focuses on brain maturation and restructuring. These ideas also support the idea of stronger results for the higher L1 performance in the present study. The findings of one study of early childhood acquisition of L2 suggested that children need stimulation from L2 lexical material during a pre-grammatical period of 5-20 months of age. Denied this stimulation, they might have difficulty analyzing and detecting recurrent structural patterns at 20-37 months in L2. The researchers used this for their argument that difficulties of late bilinguals for processing L2 syntax may stem from lack of lexical stimuli before the age of 3 years (Isel et al., 2010, p. 176). A second study also shored up the idea of better L1 scores being directly related to the developing brain. Dual language-learners who obtained both languages by age 6 reveal bilateral hemispheric engagement for both languages, while those who attained their language after 6 years of age demonstrate dominance in the left hemisphere for both languages. Among bilinguals who acquired their second language later, left hemispheric involvement was more

pronounced for those who had less proficiency in L2 (Hull & Vaid, 2007, p. 356). Based on the brain lateralization theory in bilingualism, in the present study, most of the participants would likely demonstrate less proficiency in L2. Thus, one reason for better Spanish scores was AoA.

Other variables that perhaps influenced better performance were current use and the self-rated reading proficiency factors. Aside from 2 English-dominant participants, the majority of individuals rated themselves between 40-50% on average for their current use of L1. For L1 reading proficiency, they rated themselves either a 9 (*excellent*) or a 10 (*perfect*). In regard to this latter factor, the authors of the *LEAP-Q* commented that self-rated reading proficiency correlated with better outcomes in Spanish (Marian et al., 2007 p. 946). They did not elaborate on this idea, but it is a well-known fact that people who read a lot have larger vocabularies. A recent example of a study that focused on this idea is one that investigated how differences in reading could influence vocabulary growth, a phenomenon called the *Matthew Effect*. Their longitudinal study of kindergarten and 4th-grade reading skills and oral vocabulary knowledge demonstrated that individuals with above-average reading experienced a higher rate of vocabulary growth than average readers (Duff et al., 2015, p. 853). AoA, current use, and reading proficiency, then, may all have been factors contributing to the less-than-meaningful gaps and better overall scores in L1.

4.6. Limitations

The sample size was small with only 21 participants; 30 would have been a better sample. Also, more diversity in educational level would have been desirable and better represented the normative sample. Additionally, there was no control group for this study

because the standardized vocabulary tests that were used required basic functionality with both Spanish and English of at least 20% in L2.

4.7. Conclusion

Despite the failure to discover a statistically-significant gap in L2, as predicted for this study sample, further research is warranted, particularly with aging bilinguals, and especially in view of the mixed gap-pattern results acquired from the investigation. Two participants did demonstrate sizable receptive-expressive standard-score differences in L1 and 7 in L2. The study's results demonstrated that some of the typical gap patterns were leaning in the direction of the predicted gap in L2, but without reaching statistical significance. The weaker links hypothesis also may have had a bearing on the better performance of L1 in the group sample. Finally, the study tends to corroborate the ideas that test norming samples and protocol are important to testing for the gap (Gibson et al., 2017, p. 3).

But changes in assessment tasks and procedures should occur, as investigators in the field have already pointed out. The current view is to offer more in-depth testing. Restriction of testing to one modality can lead to an under- or over-estimation of general ability in a second language. The use of a language development test with different subtests should be a priority for future studies. In addition to the testing of receptive and expressive vocabulary, there should be comprehension and production of entire sentences and use of words in a narrative structure that relates to routine communication (Gibson et al., 2014b, p. 660; Keller et al., 2015, p. 8).

According to researchers on the aging bilingual brain, different languages connect to a shared semantic system in the brain (Ellajosyula et al., p. 559). Later-learned and less-proficient languages are more susceptible to neurodegeneration, which implies that there will

be a larger gap in English than in Spanish because the later-learned languages disappear first. Naming and comprehension scores will be better in L1 (551). Knowing a bilingual's language gap status for both languages would be useful information for aging and dementia studies because it may be expected that L1 and L2 semantic tasks would deteriorate similarly (p. 559).

Since half the world's population is bilingual, most SLPs will face the challenge of the bilingual speech, language, and cognition assessment process at some point in their careers. They should educate themselves in each of these areas. One specialist in bilingualism and aging comments on the need for such education: "It's a moral and ethical responsibility to rise to that challenge to the best of our abilities" (Ardila, p. 191). Information acquired through gap studies is useful, especially with regard to effects of neurodegeneration of the brain during the aging process. Another specialist in bilingualism acknowledges that there is a need to know about language loss over the lifespan and which language might be most beneficial for treatment, L1, L2, or an ESL type of treatment because of language loss over time. We need to know whether we have a language retrieval disorder, or the typical receptive-expressive gap (Kayser 1995, p.294).

Appendix A. Thesis IRB Form

Abstract:

Receptive language refers to comprehension, whereas expressive language refers to production of language. The links between these two modalities of language are strong. The more words a person knows, the more he/she can produce. It is general knowledge, however, that individuals can comprehend more words than they can produce. Receptive vocabulary develops earlier, is larger, and the brain processes it differently than expressive vocabulary. The receptive-expressive gap takes place when an individual's standardized receptive language score is statistically greater than his/her standardized expressive language score. This can occur in either a primary language (L1) or a second language (L2). In adults, there is a need to be able to distinguish between normal language patterns of bilingual speech as a result of non-pathological loss of L1 skills versus language problems resulting from accidents, disease, or age, such as aphasia, amnesia and dementia. To help address this need, the present study will attempt to expand the findings of the research of Gibson et al. (2012) that have focused on analysis of the receptive-expressive gap and analyzed possible factors influencing its existence and magnitude in bilingual Hispanic kindergarteners. In this study, the receptive-expressive gap was significantly higher in L1 than in L2. The research will be based on the Gibson et al. study (2012), with a smaller number of participants from a different population, non-language or hearing-impaired Spanish-English Hispanic adults, for the purpose of demonstrating the degree to which this receptive-expressive gap exists, persists, or fades, as well as engaging in speculation as to possible causal factors associated with the receptive-expressive gap in the adult bilingual population.

Methods:

Participants: Bilingual Spanish-English Hispanic adults from Southeastern Louisiana University (SLU), Louisiana State University (LSU), the Baton Rouge and Hammond Louisiana communities, as well as other communities, both national and international, will be eligible for the study. Initial analyses will include those participants without reported hearing, cognitive, behavioral, or language impairments/problems. Both the questionnaire and the assessments will be administered via email (the questionnaire) and Zoom platform online (the assessments). Consent scripts will be used with both the email and the Zoom administration.

Testing

Questionnaire: The *Language Experience and Proficiency Questionnaire* (LEAP-Q) will be used to demonstrate the degree to which the gap persists across the age field, as well as to analyze results of the questionnaire regarding possible causal factors associated with the adult population.

Language Assessments: Participants will be given two standardized receptive and expressive language assessments in both Spanish and English: *Expressive One-Word Picture Vocabulary Test-Spanish Bilingual Edition* (EOWPVT-SBE) and *Receptive One-Word Picture Vocabulary Test-Spanish Bilingual Edition* (ROWPVT-SBE).

Audio Recording

The entire test except for the questionnaire and its consent form will be digitally video-recorded for later analysis. Recordings will be transcribed and analyzed using acoustic software.

Consent Script

1. Study Title: *Characteristics and Causal Factors for the Receptive-Expressive Gap in Typically-Developed Spanish-English Bilingual Adults*
2. Purpose: The purpose of this research is to demonstrate the degree to which a receptive-expressive vocabulary gap, which is a situation measured by a standardized receptive language score (a measure of language comprehension) being statistically greater than a standardized expressive language score (a measure of language production), exists, persists, or fades in the adult bilingual population. A secondary purpose is to speculate as to possible causal factors associated with said gap. The *LEAP-Q*, a questionnaire on language use and history, and the Spanish and English versions of the *EOWPVT* and the *ROWPVT* will be the data gathering tools of the study. The questionnaire will be delivered by email and the language assessments will be administered via Zoom and recorded for analysis. Both data collection tools will have a consent script accompanying them. The email consent script will go with the *LEAP-Q* via email, and the assessments administered over Zoom will have the consent script read at the beginning of the assessment.
3. Number of Participants: up to approximately 20
4. Participants: Participants will include adults from the state, national, and international communities. They will be contacted about the project through email or phone contact information they provide.
5. Inclusion Criteria: You are eligible to participate in the Experimental Group of 10 people if you are 18 or older, from a Spanish-speaking country, are bilingual in both English and Spanish, and without reported hearing, cognitive, behavioral, and/or language impairments.
6. Exclusion Criteria: You are ineligible to participate if you are not from a Spanish-speaking country, are under 18 years of age, and with reported hearing, cognitive, behavioral, and/or language impairments.
7. Risks: There are no risks for participating in this study. Participation in this study is anonymous and documents and Zoom video recordings will be labeled with subject numbers to protect your confidentiality.
8. Privacy: Results of the study may be published, but no names or identifying information will be included in the publication. Subject identity will remain confidential unless disclosure is required by law.
9. Financial Information: There is no cost to the subjects. A small compensation of \$50.00 will be paid to each participant in this study, payable by money order and sent to the participant at the mailing address provided by the participant.
10. Benefits: This study may yield valuable information regarding whether the gap's magnitude exists and /or differs in the English and Spanish of Spanish-English bilingual adults, and which variables, if present, are most strongly associated with the gap.
11. Right to Refuse: Subjects may choose not to participate or to withdraw from the study at any time without penalty or loss of any benefit to which they might otherwise be entitled.
12. Performance Site: Email (questionnaire) and Zoom Platform (assessments) online only between individuals who have email and Zoom software. Assessments will be administered by Zoom only.
13. Signatures: "The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. For injury or illness, call your physician, or the Student Health Center if you are an LSU

student. If I have questions about subject's rights or other concerns, I can contact Alex Cohen, Chairman, LSU Institutional Review Board, (225) 578-8692, irb@lsu.edu, or www.lsu.edu/research. I agree to participate in the study described above and acknowledge the researcher's obligation to provide me with a copy of this consent form if signed by me."

14. The following investigators are available for questions about this study:

Rachael Javaherian: (225) 439-3222 rjavah1@lsu.edu

Dr. Todd Gibson: (225) 578-3571 toddanswergibson@lsu.edu

By continuing to the interview, I give my permission to participate in this study.

Appendix B. IRB Thesis Approval

TO: Rachel Javaherian
Communication Sciences and Disorders

FROM: Dennis Landin
Chair, Institutional Review Board

DATE: February 19, 2020

RE: IRB# E12086

TITLE: The Receptive-Expressive Gap in Spanish-English Bilingual Adults

New Protocol/Modification/Continuation: New Protocol

Review Date: 2/3/2020

Approved X **Disapproved**

Approval Date: 2/18/2020 **Approval Expiration Date:**
2/17/2023

Exemption Category/Paragraph: 2c

Signed Consent Waived?: No

Re-review frequency: Three Years

LSU Proposal Number (if
applicable):



By: Dennis Landin, Chairman

**PRINCIPAL INVESTIGATOR: PLEASE READ THE
FOLLOWING – Continuing approval is CONDITIONAL
on:**

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.

3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. **SPECIAL NOTE: When emailing more than one recipient, make sure you use bcc. Approvals will automatically be closed by the IRB on the expiration date unless the PI requests a continuation.**

** All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at <http://www.lsu.edu/irb>*

Appendix C: LEAP-Q

Northwestern Bilingualism & Psycholinguistics Research Laboratory

Please cite Marian, Blumenfeld, & Kaushanskaya (2007). The Language Experience and Proficiency Questionnaire (LEAP-Q): Assessing language profiles in bilinguals and multilinguals. *Journal of Speech Language and Hearing Research*, 50 (4), 940-967.

Language Experience and Proficiency Questionnaire (LEAP-Q)

Last name		First Name		Today's date	
Age		Date of birth		Male <input type="checkbox"/>	Female <input type="checkbox"/>

(1) Please list all the languages you know **in order of dominance**:

1	2	3	4	5
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(2) Please list all the languages you know **in order of acquisition** (your native language first):

1	2	3	4	5
---	---	---	---	---

(3) Please list what percentage of the time you are *currently* and *on average* exposed to each language.

(Your percentages should add up to 100%):

List languages here					
List percentages here					

(4) When choosing to read a text available in all your languages, in what percentage of cases would you choose to read it in each of your languages? Assume that the original was written in another language, which is unknown to you.

(Your percentages should add up to 100%):

List languages here					
List percentages here					

(5) When choosing a language to speak with a person who is equally fluent in all your languages, what percentage of time would you choose to speak each language? Please report percent of total time.

(Your percentages should add up to 100%):

List languages here					
List percentages here					

(6) Please name the cultures with which you identify. On a scale from zero to ten, please rate the extent to which you identify with each culture. (Examples of possible cultures include US-American, Chinese, Jewish-Orthodox, etc):

List cultures here					
	0: no identification	0: no identification	0: no identification	0: no identification	0: no identification
	1: very low identification	1: very low identification	1: very low identification	1: very low identification	1: very low identification
	2	2	2	2	2
	3	3	3	3	3
	4	4	4	4	4
	5: moderate identification	5: moderate identification	5: moderate identification	5: moderate identification	5: moderate identification
	6	6	6	6	6
	7	7	7	7	7
	8	8	8	8	8
	9	9	9	9	9
	10: complete identification	10: complete identification	10: complete identification	10: complete identification	10: complete identification

(7) How many years of formal education do you have? _____

Please check your highest education level (or the approximate US equivalent to a degree obtained in another country):

<input type="checkbox"/>	Less than High School	<input type="checkbox"/>	Some College	<input type="checkbox"/>	Masters
<input type="checkbox"/>	High School	<input type="checkbox"/>	College	<input type="checkbox"/>	Ph.D./M.D./J.D.
<input type="checkbox"/>	Professional Training	<input type="checkbox"/>	Some Graduate School	<input type="checkbox"/>	Other:

(8) Date of immigration to the USA, if applicable _____

If you have ever immigrated to another country, please provide name of country and date of immigration here. _____

(9) Have you ever had a vision problem , hearing impairment , language disability , or learning disability ? (Check all applicable). If yes, please explain (including any corrections):

Language:

This is my (NATIVE, SECOND, THIRD, FOURTH, FIFTH) language.

All questions below refer to your knowledge of .

(1) Age when you...:

<i>began acquiring</i> :	<i>became fluent</i> in :	<i>began reading</i> in :	<i>became fluent reading</i> in :

(2) Please list the number of years and months you spent in each language environment:

	Years	Months
A country where is spoken		
A family where is spoken		
A school and/or working environment where is spoken		

(3) On a scale from zero to ten, please select your *level of proficiency* in speaking, understanding, and reading from the scroll-down menus:

Speaking	0: none 1: very low 2: low 3: fair 4: slightly less than adequate 5: adequate 6: slightly more than adequate 7: good 8: very good 9: excellent 10: perfect	Understanding spoken language	0: none 1: very low 2: low 3: fair 4: slightly less than adequate 5: adequate 6: slightly more than adequate 7: good 8: very good 9: excellent 10: perfect	Reading	0: none 1: very low 2: low 3: fair 4: slightly less than adequate 5: adequate 6: slightly more than adequate 7: good 8: very good 9: excellent 10: perfect
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(4) On a scale from zero to ten, please select how much the following factors contributed to you learning:

Interacting with friends	0: not a contributor 1: minimal contributor 2 3 4 5: moderate contributor 6 7 8 9 10: most important contributor	Language tapes/ self-instruction	0: not a contributor 1: minimal contributor 2 3 4 5: moderate contributor 6 7 8 9 10: most important contributor
Interacting with family	0: not a contributor 1: minimal contributor 2 3 4 5: moderate contributor 6 7 8 9 10: most important contributor	Watching TV	0: not a contributor 1: minimal contributor 2 3 4 5: moderate contributor 6 7 8 9 10: most important contributor
Reading	0: not a contributor 1: minimal contributor 2 3 4 5: moderate contributor 6 7 8 9 10: most important contributor	Listening to the radio	0: not a contributor 1: minimal contributor 2 3 4 5: moderate contributor 6 7 8 9 10: most important contributor

(5) Please rate to what extent you are currently exposed to _____ in the following contexts:

Interacting with friends	0: never 1: almost never 2 3 4 5: half of the time 6 7 8 9 10: always	Listening to radio/music	0: never 1: almost never 2 3 4 5: half of the time 6 7 8 9 10: always
Interacting with family	0: never 1: almost never 2 3 4 5: half of the time 6 7 8 9 10: always	Reading	0: never 1: almost never 2 3 4 5: half of the time 6 7 8 9 10: always
Watching TV	0: never 1: almost never 2 3 4 5: half of the time 6 7 8 9 10: always	Language-lab/self-instruction	0: never 1: almost never 2 3 4 5: half of the time 6 7 8 9 10: always

(6) In your perception, how much of a foreign accent do you have in _____?

- | |
|--------------------|
| 0: none |
| 1: almost none |
| 2: very light |
| 3: light |
| 4: some |
| 5: moderate |
| 6: considerate |
| 7: heavy |
| 8: very heavy |
| 9: extremely heavy |
| 10: pervasive |

(7) Please rate how frequently others identify you as a non-native speaker based on your accent in _____ :

- | |
|---------------------|
| 0: never |
| 1: almost never |
| 2 |
| 3 |
| 4 |
| 5: half of the time |
| 6 |
| 7 |
| 8 |
| 9 |
| 10: always |

Language:

This is my language.

All questions below refer to your knowledge of _____ .

(1) Age when you...:

<i>began acquiring:</i>	<i>became fluent in:</i>	<i>began reading in:</i>	<i>became fluent reading in :</i>

(2) Please list the number of years and months you spent in each language environment:

	Years	Months
A country where _____ is spoken		
A family where _____ is spoken		
A school and/or working environment where _____ is spoken		

(3) On a scale from zero to ten please select your *level of proficiency* in speaking, understanding, and reading from the scroll-down menus:

Speaking	0: none 1: very low 2: low 3: fair 4: slightly less than adequate 5: adequate 6: slightly more than adequate 7: good 8: very good 9: excellent 10: perfect	Understanding spoken language	0: none 1: very low 2: low 3: fair 4: slightly less than adequate 5: adequate 6: slightly more than adequate 7: good 8: very good 9: excellent 10: perfect	Reading	0: none 1: very low 2: low 3: fair 4: slightly less than adequate 5: adequate 6: slightly more than adequate 7: good 8: very good 9: excellent 10: perfect
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(4) On a scale from zero to ten, please select how much the following factors contributed to you learning :

Interacting with friends	0: not a contributor 1: minimal contributor 2 3 4 5: moderate contributor 6 7 8 9 10: most important contributor	Language tapes/self instruction	0: not a contributor 1: minimal contributor 2 3 4 5: moderate contributor 6 7 8 9 10: most important contributor
Interacting with family	0: not a contributor 1: minimal contributor 2 3 4 5: moderate contributor 6 7 8 9 10: most important contributor	Watching TV	0: not a contributor 1: minimal contributor 2 3 4 5: moderate contributor 6 7 8 9 10: most important contributor

Reading	0: not a contributor 1: minimal contributor 2 3 4 5: moderate contributor 6 7 8 9 10: most important contributor	Listening to the radio	0: not a contributor 1: minimal contributor 2 3 4 5: moderate contributor 6 7 8 9 10: most important contributor
---------	--	------------------------	--

(5) Please rate to what extent you are currently exposed to _____ in the following contexts:

Interacting with friends	0: never 1: almost never 2 3 4 5: half of the time 6 7 8 9 10: always	Listening to radio/music	0: never 1: almost never 2 3 4 5: half of the time 6 7 8 9 10: always
Interacting with family	0: never 1: almost never 2 3 4 5: half of the time 6 7 8 9 10: always	Reading	0: never 1: almost never 2 3 4 5: half of the time 6 7 8 9 10: always
Watching TV	0: never 1: almost never 2 3 4 5: half of the time 6 7 8 9 10: always	Language-lab/self-instruction	0: never 1: almost never 2 3 4 5: half of the time 6 7 8 9 10: always

(6) In your perception, how much of a foreign accent do you have in_____?

- 0: none
- 1: almost none
- 2: very light
- 3: light
- 4: some
- 5: moderate
- 6: considerate
- 7: heavy
- 8: very heavy
- 9: extremely heavy
- 10: pervasive

(7) Please rate how frequently others identify you as a non-native speaker based on your accent in:

- 0: none
- 1: almost none
- 2: very light
- 3: light
- 4: some
- 5: moderate
- 6: considerate
- 7: heavy
- 8: very heavy
- 9: extremely heavy
- 10: pervasive

REFERENCES

- Abudarham, S. (1997). The tenability of comparing the receptive lexical proficiency of dual language children with standardized monoglot norms. *Educational Studies*, 23(1), 127–143. <https://doi-org.libezp.lib.lsu.edu/10.1080/0305569970230108>
- Ardila, A., & Ramos, E. (2007). Chapter 8: *Bilingualism across the Life-Span Under Normal and Abnormal Conditions*, p. 153 In *Speech and Language Disorders in Bilinguals*. New York, NY: Nova.
- Benedict, H. (1979). Early lexical development: comprehension and production. *Journal of Child Language*, 6(2), 183–200. <https://doi-org.libezp.lib.lsu.edu/10.1017/s0305000900002245>
- Bialystok, E. (2001). *Bilingualism in development: Language, literacy, and cognition*. New York: Cambridge University Press.
- Bilingualism and Psycholinguistics research group. (n.d.). Retrieved March 22, 2021, from <https://bilingualism.northwestern.edu/leapq/>
- Borragán, M., Martin, C. D., de Bruin, A., & Duñabeitia, J. A. (2018). Exploring different types of inhibition during bilingual language production. *Frontiers in Psychology*, 9. <https://doi-org.libezp.lib.lsu.edu/10.3389/fpsyg.2018.02256>
- Casas, R., Calamia, M., & Tranel, D. (2008). A screening test of English naming ability in bilingual Spanish/English speakers. *Journal of Clinical & Experimental Neuropsychology*, 30(8), 956–966. <https://doi-org.libezp.lib.lsu.edu/10.1080/13803390801945046>
- Clark, C. M., DeCarli, C., Mungas, D., Chui, H. I., Higdon, R., Nuñez, J., Fernandez, H., Negrón, M., Manly, J., Ferris, S., Perez, A., Torres, M., Ewbank, D., Glosser, G., & van Belle, G. (2005). Earlier Onset of Alzheimer Disease Symptoms in Latino Individuals Compared With Anglo Individuals. *Archives of Neurology*, 62(5), 774. <https://doi.org/10.1001/archneur.62.5.774>
- Dr. José G. Centeno, Dr. Raquel T. Anderson, & Loraine K. Obler. (2007). *Communication Disorders in Spanish Speakers: Theoretical, Research and Clinical Aspects*. Multilingual Matters.
- Duff, D., Tomblin, J. B., & Catts, H. (2015). The Influence of Reading on Vocabulary Growth: A Case for a Matthew Effect. *Journal of speech, language, and hearing research : JSLHR*, 58(3), 853–864. https://doi.org/10.1044/2015_JSLHR-L-13-0310
- Edmonds, L.A. & Donovan, N.J. (2013). Research applications for An Object and Action Naming Battery to assess naming skills in Spanish/English bilingual speakers. *Behavior Research Methods*, DOI 10.3758/s13428-013-0381-7.
- Ellajosyula, R., Narayanan, J., & Patterson, K. (2020). Striking loss of second language in bilingual patients with semantic dementia. *Journal of Neurology*, 267(2), 551–560. <https://doi-org.libezp.lib.lsu.edu/10.1007/s00415-019-09616-2>

- Gibson, T. A., Oller, D. K., Jarmulowicz, L., & Ethington, C. A. (2012). The Receptive-Expressive Gap in the Vocabulary of Young Second-Language Learners: Robustness and Possible Mechanisms. *Bilingualism: Language and Cognition*, 15, 1. Retrieved from <http://search.ebscohost.com.libezp.lib.lsu.edu/login.aspx?direct=true&db=eric&AN=EJ968176&site=ehost-live&scope=site>
- Gibson, T. A., Peña, E. D., & Bedore, L. M. (2014a). The Relation between Language Experience and Receptive-Expressive Semantic Gaps in Bilingual Children. *International Journal of Bilingual Education and Bilingualism*, 17(1), 90–110. Retrieved from <http://search.ebscohost.com.libezp.lib.lsu.edu/login.aspx?direct=true&db=eric&AN=EJ1025756&site=ehost-live&scope=site>
- Gibson, T. A., Peña, E. D., & Bedore, L. M. (2014b). The Receptive–Expressive Gap in Bilingual Children With and Without Primary Language Impairment. *American Journal of Speech-Language Pathology*, 23(4), 655–667. https://doi-org.libezp.lib.lsu.edu/10.1044/2014_AJSLP-12-0119
- Gibson, T. A., Jarmulowicz, L., & Oller, K. (2017). Difficulties Using Standardized Tests to Identify the Receptive Expressive Gap in Bilingual Children’s Vocabularies. *Bilingualism: Language and Cognition*, 21(2), 328–339.
- Gibson, T. A., Peña, E. D., & Bedore, L. M. (2018a). The Receptive-Expressive Gap in English of Spanish-English Bilingual Children With and Without Language Impairment. *Journal of Speech, Language & Hearing Research*, 61(6), 1381–1392. https://doi-org.libezp.lib.lsu.edu/10.1044/2018_JSLHR-L-16-0432
- Gollan, T. H., Montoya, R. I., Cera, C., & Sandoval, T. C. (2008). More Use Almost Always Means a Smaller Frequency Effect: Aging, Bilingualism, and the Weaker Links Hypothesis. *Journal of Memory and Language*, 58(3), 787–814. <https://doi-org.libezp.lib.lsu.edu/10.1016/j.jml.2007.07.001>
- Gollan, T. H., & Acenas, L.-A. R. (2004). What Is a TOT? Cognate and Translation Effects on Tip-of-the-Tongue States in Spanish-English and Tagalog-English Bilinguals. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 30(1), 246–269. <https://doi-org.libezp.lib.lsu.edu/10.1037/0278-7393.30.1.246>
- Gross, M., Buac, M., & Kaushanskaya, M. (2014). Conceptual Scoring of Receptive and Expressive Vocabulary Measures in Simultaneous and Sequential Bilingual Children. *American Journal of Speech-Language Pathology*, 23(4), 574–586. https://doi-org.libezp.lib.lsu.edu/10.1044/2014_AJSLP-13-0026
- Hull, R., & Vaid, J. (2007). Bilingual language lateralization: a meta-analytic tale of two hemispheres. *Neuropsychologia*, 45(9), 1987–2008. <https://doi-org.libezp.lib.lsu.edu/10.1016/j.neuropsychologia.2007.03.002>
- Hyltenstam, K. (ed.), & Obler, L. K. (ed.) (1989). *Bilingualism across the Lifespan: Aspects of Acquisition, Maturity, and Loss*. Cambridge: Cambridge UP. Retrieved from <http://search.ebscohost.com.libezp.lib.lsu.edu/login.aspx?direct=true&db=mzh&AN=1990011468&site=ehost-live&scope=site>

- Isel, F., Baumgaertner, A., Thran, J., Meisel, J. M., & Buchel, C. (2010). Neural Circuitry of the Bilingual Mental Lexicon: Effect of Age of Second Language Acquisition. *Brain and Cognition*, 72(2), 169–180.
- Jafari, Z., Esmaili, M., Toufan, R., & Aghamollaei, M. (2015). Bilingual proficiency and cognitive reserve in Persian-English bilingual older adults. *Aging clinical and experimental research*, 27(3), 351–357. <https://doi.org/10.1007/s40520-014-0288-x>
- Jia, G., Kohnert, K., Collado, J., & Aquino-Garcia, F. (2006). Action naming in Spanish and English by sequential bilingual children and adolescents. *Journal of Speech, Language, and Hearing Research*, 49(3), 588–602. [https://doi-org.libezp.lib.lsu.edu/10.1044/1092-4388\(2006/042\)](https://doi-org.libezp.lib.lsu.edu/10.1044/1092-4388(2006/042))
- Jared, D., Poh, R. P. Y., & Paivio, A. (2013). L1 and L2 Picture Naming in Mandarin-English Bilinguals: A Test of Bilingual Dual Coding Theory. *Bilingualism: Language and Cognition*, 16(2), 383–396. <https://doi-org.libezp.lib.lsu.edu/10.1017/S1366728912000685>
- Kan P.F., & Kohnert K. (2005). Preschoolers learning Hmong and English: lexical-semantic skills in L1 and L2. *Journal of Speech, Language & Hearing Research*, 48(2), 372–383. Retrieved from <http://search.ebscohost.com.libezp.lib.lsu.edu/login.aspx?direct=true&db=ccm&AN=106529433&site=ehost-live&scope=site>
- Kaushanskaya, M., Blumenfeld, H. K., & Marian, V. (2020). The Language Experience and Proficiency Questionnaire (LEAP-Q): Ten Years Later. *Bilingualism: Language and Cognition*, 23(5), 945–950.
- Kayser, H. (1995). *Bilingual Speech-Language Pathology: An Hispanic Focus*. San Diego, CA: Singular Publishing Group.
- Keller, K., Troesch, L. M., & Grob, A. (2015). A large receptive–expressive gap in bilingual children. *Frontiers in Psychology*, 6. <https://doi-org.libezp.lib.lsu.edu/10.3389/fpsyg.2015.01284>
- Kroll, J.F., & de Groot, A.M.B. (2005). *Handbook of bilingualism: Psycholinguistic approaches*. Oxford, England. Oxford University Press.
- Linck, J. A., Kroll, J. F., & Sunderman, G. (2009). Losing access to the native language while immersed in a second language: Evidence for the role of inhibition in second-language learning. *Psychological Science*, 20(12), 1507–1515. <https://doi-org.libezp.lib.lsu.edu/10.1111/j.1467-9280.2009.02480.x>
- Lorenzen, B., & Murray, L. L. (2008). Bilingual Aphasia: A Theoretical and Clinical Review. *American Journal of Speech-Language Pathology*, 17(3), 299–317. [https://doi-org.libezp.lib.lsu.edu/10.1044/1058-0360\(2008/026\)](https://doi-org.libezp.lib.lsu.edu/10.1044/1058-0360(2008/026))
- Maier, M. F., Bohlmann, N. L., & Palacios, N. A. (2016). Cross-language associations in the development of preschoolers’ receptive and expressive vocabulary. *Early Childhood Research Quarterly*, 36, 49–63. <https://doi-org.libezp.lib.lsu.edu/10.1016/j.ecresq.2015.11.006>
- Marian, V., Blumenfeld, H. K., & Kaushanskaya, M. (2007). The Language Experience and Proficiency Questionnaire (LEAP-Q): Assessing Language Profiles in Bilinguals and

- Multilinguals. *Journal of Speech, Language & Hearing Research*, 50(4),940–967. [https://doi-org.libezp.lib.lsu.edu/10.1044/1092-4388\(2007/067\)](https://doi-org.libezp.lib.lsu.edu/10.1044/1092-4388(2007/067))
- Martin, N. A. (2013). *Expressive One-Word Picture Vocabulary Test–4: Spanish-Bilingual Edition*.
- Martin, N. A. (2013). *Receptive One-Word Picture Vocabulary Test–4: Spanish-Bilingual Edition*.
- MacWhinney, B. (2015). Language development. In L. S. Liben, U. Müller, & R. M. Lerner (Eds.), *Handbook of child psychology and developmental science: Cognitive processes.*, Vol. 2, 7th ed. (pp. 296–338). John Wiley & Sons, Inc. <https://doi-org.libezp.lib.lsu.edu/10.1002/9781118963418.childpsy208>
- MacSwan, J., & Pray, L. (2005). Learning English Bilingually: Age of Onset of Exposure and Rate of Acquisition among English Language Learners in a Bilingual Education Program. *Bilingual Research Journal*, 29(3), 653–678.
- Newman, R.S., & German, D.J. (2005). Life span effects of lexical factors on oral naming. *Language & Speech*, 48(2), 123–156. <https://doi-org.libezp.lib.lsu.edu/10.1177/00238309050480020101>
- Oller, D. K., Jarmulowicz, L., Gibson, T., & Hoff, E. (2007). First language vocabulary loss in early bilinguals during language immersion: A possible role for suppression. In H. Caunt-Milton, S. Kulatilake & I. Woo (eds.), *Proceedings of the 31st Annual Boston University Conference on Language Development*, pp. 474–484. Somerville, MA: Cascadilla Press.
- Oller, D., & Eilers, R. (2002). *Language and literacy in bilingual children*. Tonawanda, NY: Multilingual Matters.
- Paradis, J. (2007). Bilingual Children with Specific Language Impairment: Theoretical and Applied Issues. *Applied Psycholinguistics*, 28(3), 551–564. <https://doi-org.libezp.lib.lsu.edu/10.1017/S0142716407070300>
- Pearson, B. Z., Fernández, S. C., Lewedeg, V. & Oller, D. K. (1997). The relation of input factors to lexical learning by bilingual infants. *Applied Psycholinguistics* 18, 41–58.
- Peña, E., Bedore, L. M., & Rappazzo, C. (2003). Comparison of Spanish, English, and Bilingual Children's Performance Across Semantic Tasks. *Language, speech, and hearing services in schools*, 34(1), 5–16. [https://doi.org/10.1044/0161-1461\(2003/001\)](https://doi.org/10.1044/0161-1461(2003/001))
- US Census Bureau. (2020, September 22). Hispanic Heritage Month 2020. The United States Census Bureau. <https://www.census.gov/newsroom/facts-for-features/2020/hispanic-heritage-month.html#:~:text=60.6%20million&text=Hispanics%20constituted%2018.5%25%20of%20the%20nation%27s%20total%20population.>
- Windsor, J., & Kohnert, K. (2004). The search for common ground. Part I: Lexical performance by linguistically diverse learners. *Journal of Speech Language and Hearing Research*, 47 (4), 877–890.

Yan, S., & Nicoladis, E. (2009). Finding le mot juste: Differences between bilingual and monolingual children's lexical access in comprehension and production. *Bilingualism: Language & Cognition*, 12(3), 323–335. Retrieved from <https://doi-org.libezp.lib.lsu.edu/10.1017/S1366728909990101>

VITA

Rachael Javaherian is pursuing her master's degree with the Louisiana State University Communication Sciences and Disorders program in Baton Rouge, Louisiana. She previously earned a B.A. degree in Spanish, with a minor in Hispanic Ethnic Studies, and a B.S. degree in Communication Sciences and Disorders from Southeastern Louisiana University in Hammond. She plans to receive her Masters this December 2021. In the Clinical Fellowship Year, she looks forward to gaining more experience in the speech-pathology field. She would like to work with either the school-age population in the areas of fluency, language, articulation and phonological processing disorders, or with the adult bilingual population, with a focus on helping non-native English speakers who struggle with aphasia or with adults who would like to modify their foreign accents.